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The collection includes scientific articles of participants of the International University Science Forum, the purpose of which is to present significant results of scientific research in the field of humanities, natural and technical sciences; the formation of a modern level of scientific knowledge, experience in transformation of theoretical science into the sphere of practical application of innovations; generalization of research and practical experience. The forum is a tool for establishing sustainable ties, as well as the exchange of experience between teachers and researchers of universities and research organizations.

Le recueil comprend des articles scientifiques des participants du Forum Scientifique International des Universités, dont l'objectif est la présentation des résultats significatifs de la recherche dans le domaine des sciences humaines, de la nature et de l'ingénieur; la formation du niveau contemporain des connaissances scientifiques, de l'expérience de la transformation de la science théorique au champ de l'application pratique des innovations; la synthèse de l'expérience des recherches scientifiques et pratiques. Le forum est un instrument permettant d'établir des liens durables et d'échanger des données d'expérience entre les enseignants et les chercheurs des universités et les organisations scientifiques.

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ANALYSIS OF FACTORS HAMPERING BRICS COOPERATION

Medvedkina E.A.
Doctor of Economic Sciences, Full Professor
Head of the Department of World Economy
Rostov State University of Economics
Panasenkov V.S.
Student
Rostov State University of Economics

Abstract. The article is devoted to the analysis of factors that hinder the development of cooperation between the BRICS countries. The author outlines the significance and relevance of the consideration of this topic, in particular in the context of the implementation of the goals set out in the UN Declaration on Sustainable Development Goals. Three factors are presented that have been updated in connection with the onset of the pandemic. First of all, a permanent problem was considered, which is the main barrier to the development of cooperation between the BRICS countries, economic. In relation to it, the problem of jointly achieving the goals in the field of ecology and climate is presented, the situation with which in the BRIC states is different, but difficult. The issue of interethnic confrontation between the United States, China and Russia will be touched upon, on the progression and decision of which, in fact, the further development of cooperation between the BRICS countries will depend. Recommendations on minimizing losses of BRICS member States from these and other relevant factors hindering the development of cooperation between BRICS countries are presented.

Keywords: sustainable development, cooperation, BRICS countries, BRICS +, confrontation, coronavirus, pandemic, environmental problems.

As is known, many countries of the world signed the UN Declaration on the Sustainable Development Goals in 2015 and pledged together to move towards their implementation; however, national goals were formulated in accordance with the specifics of their development: for developed countries - this is mainly the solution of accumulated socio-environmental problems with an emphasis on mitigation of climate change, for develop-

ing countries - this is an increase in the insufficiently high levels of development laid down in the corresponding growth programs. However, for the BRICS countries - this is a much more important and urgent task of an integrated approach to their (catching up) development. Thanks to two documents of 2015 - the UN Declaration and the Paris Agreement on the Prevention of Climate Change on the Planet (Sustainable Development Goal № 13), humanity, for the first time, was united not only by important principles or rules, but by a single framework program, the contents of which countries should formulate for themselves.

The transition of the BRICS member countries to a post-industrial society is important not only for themselves, but also for many states connected, in particular, by partnerships. And this applies both to trade and economic relations, and to a wide range of social institutions. Sustainable development goals cover almost all important areas of human life, despite varying degrees of detail. For more than ten years, the BRICS countries, within the framework of the policy of cooperation, have been uniting common interests in many areas on the world stage, especially in supporting acceptable rules for world coordination and management, including in the areas of finance, trade, international development. As for the Sustainable Development Goals, their relative position is certainly a little more complicated [3, p. 64]: a uniform formulation of all seventeen goals for five states is a priori impossible. It is hardly possible for them to establish uniform concrete levels for most indicators of these goals, on the basis of which cooperation with third countries is a real way for the development of the BRICS countries. This thesis confirms the presence of a certain range of factors exacerbated, it is worth saying, by the coronavirus pandemic, which to one degree or another impedes the development of productive partnerships, in particular, those aimed at achieving the Sustainable Development Goals, among the BRICS member states.

One of the main factors is the difference in the stages of economic development. So, according to the Analytical Center under the Government of the RF, by the end of 2019, the total nominal GDP of the BRICS countries amounted to $ 20.8 trillion, which in value terms makes up 24% of the world total, of which 18.6% belongs to PRC, 7.7 % - India, 3.2% - Russia, 2.4% - Brazil, 1.1% - Iran and 0.58% - RSA. India and PRC are recognized as one of the fastest growing economies in the world [12]. Despite a slight decrease in growth rates, last year the indicator amounted to 6.1% and 4.2%, while the aggregate GDP growth for 2015-2019 in Brazil and Russia amounted to 4.5% and 3.4%, respectively. Moreover, according to IMF forecasts, due to the coronavirus infection pandemic, restrictive

measures and social distance protocols introduced by the authorities of PRC, India, Russia and RSA, the total GDP of the countries will decrease by more than 5%. This decline in gross value added is due to shattered supply chains, declining consumer demand, an increase in the number of unemployed, border closures and the expectation of repeated outbreaks of the virus. Economic uncertainty is also increasing due to the deteriorating situation in the energy market: a decrease in demand for oil and oil products due to a pandemic, uncertainty about the OPEC + deal and oversupply of oil - all this led to a sharp drop in the price of Brent oil [5].

In addition, according to forecasts, the GDP of India and PRC will not decrease by the end of 2020, however, the growth rate will fall compared with the values of the indicator in previous years. This year, the PRC economy will show growth of only 1.2%, and the Indian economy - by 1.9%. The Russian economy will shrink by 5.5%, the RSA economy - by 5.8%, Brazil - by 5.3%. These countries will recover more slowly. The cumulative loss of world GDP in the period 2020–2021 of the anticipated amount to about 9 trillion dollars [2]. In general, the level of economic development of the BRICS countries is still significantly lower than in developed countries and this trend is progressing due to the epidemiological factor. For example, Russia and Brazil, which in 2019 reached the highest GDP per capita at purchasing power parity (PPP) among all BRICS countries, make up only half (Russia) and a quarter (Brazil) of the corresponding PPP GDP per capita in developed countries. Thus, *the economic barrier to the development of cooperation between the BRICS countries may become even "higher".*

Another factor related in a certain way to the 2015 Declaration is the environmental and climatic one. Its isolation is due to the fact that, firstly, it directly correlates with the economic factor, and secondly, it is understood at a new level by the BRICS member countries in connection with the coronavirus pandemic, because against the background of increasing environmental value there is a dilemma of ensuring economic growth under significant environmental restrictions [6]. So, the fact that the BRICS countries are ecologically extremely unsuccessful is undeniable. Thus, their positions in the ranking of countries according to the environmental efficiency index, compiled on a regular basis by Yale University and summarizing the whole range of environmental problems facing states, are indicative. Of the 180 countries included in the ranking in 2018, the highest place among the BRICS participants is Russia (52-nd), Brazil - 69-th, China - 120-th, RSA is 142-nd and India - 177-th [11]. All BRICS countries are, to one degree or another, characterized by high levels of air,

water and soil pollution (especially in PRC and India), waste management problems (in all countries), forest and forest fires (especially in Russia and Brazil), loss of biodiversity (especially in Brazil and RSA), water shortages (especially in India, China and RSA), etc. Environmental problems have a significant negative impact on public health, causing additional morbidity and mortality, as well as on the state of the economy. In addition, in all BRICS countries, environmental degradation is closely integrated into current economic growth models; Due to the size and structure of the economies, the BRICS countries are important for solving global environmental problems. Narrow initiatives designed to ensure the exchange of experience in the field of individual environmental problems, as well as the financing of individual "green" projects, are important but insufficient areas of cooperation.

Today, the economic development of these countries continues to be largely extensive, due to the involvement of an increasing number of resources in the economic turnover, including natural. All BRICS countries, partly except Brazil, rely in their development on the export of natural resources or resource-intensive (and harmful to the environment) products, and, consequently, *the reduction of environmental problems as economic growth proceeds without switching to other development models in them.* This problem became even more serious with the spread of COVID-19, which demonstrated that transnational factors pose a much greater threat to people's lives and economic development than the rivalry of great powers for influence and power.

The third factor is foreign policy, due to the confrontation of USA with the PRC and Russia, which, in our opinion, has a multivector influence on all areas of cooperation between the BRICS countries. The authors of the report “A New Arsenal for Competition: Coercive Economic Measures in the U.S.-China Relationship” highlight two main trends related to Washington’s impact on PRC. Firstly, it is about increasing the number of measures applied and the intensity of their use against the country. Secondly, an increase in the number of tasks that the USA plans to solve through the application of economic measures against PRC. USA has developed extensive tools to influence PRC policies. Among the tools, the authors of the report single out tariffs, regulate the export of advanced technologies, carefully check Chinese investments in the US economy and the possibility of restricting investment, local economic sanctions [10]. So, for example, April 28, 2020. The Bureau of Industry and Security (BIS) of the US Department of Commerce published the final rules, taking into account the tightening of the regime for controlling the export of technology

in relation to China, Russia and Venezuela. Americans thus aim to prevent the use of US goods for military purposes [8]. According to experts, in an attempt to find a modality of relations with the world, the USA chose the option of confrontation with respect to those who defied American leadership. M. Pompeo at the Munich Conference explained that this is aimed at the "new" victory "of the USA and the collective West, similar to 1989-1991" [4]. This means the further intensification of conflict and rivalry in the world, the continuation of the practice of sanctions and trade wars against PRC and Russia, which have become the new norm of international relations, as well as the breaking of the rules, institutions and regimes of international security and global governance.

As is quite rightly noted by A.A. Arkhangelskaya et al., Relations between PRC and USA become the general axis of world politics in the first half of the XXI-st century, which raises the question of what role other BRICS countries will play in the new global configuration of the international system. So, for them, a similar situation, first of all, creates a risk of internal splits [1, p. 21]. So, according to experts, the USA is already trying to drag India into a confrontation with Beijing, over time they can connect Brazil and the RSA. In addition, it is noted that the struggle will unfold in the technological sphere, where the American and Chinese platforms will act as dominants, respectively. If, for example, one of the BRICS countries opts for the American platform and imposes restrictions on Chinese manufacturers, the PRC response will be extremely painful and will follow immediately [9]. In general, the tension along the axes "USA - PRC" and "USA - Russia" has ideological value in the context of the development of cooperation between the BRICS countries.

According to experts of the Moscow State Institute of Electronics and Mathematics - this is a “hybrid war”, the logic of which forces the BRICS countries to determine their position, since the risk of unleashing a global conflict is increasing day by day. With the collapse of the system for maintaining global strategic stability, the development of regional crises, and even their unexpected deepening in close proximity to the BRICS countries, the association faces serious challenges in order to become a "stability archipelago" in an increasingly unpredictable world. It is important for Russia to take full advantage of this opportunity [7, p. 9]. In this case, the BRICS + institutional mechanism, which, in our opinion, Russia should contribute to, can provide certain opportunities for interaction with different actors.

In conclusion, it should be said that despite these factors, which a priori hinder the development of cooperation between the BRICS countries,

interethnic interaction is still an *undeniable*, or more precisely, a necessary *prospect*. The proof of this thesis is that in conditions when the practice of unilateral actions is intensifying and will intensify, the level of conflict will grow, and many institutions and forums will be paralyzed, BRICS, as a multifunctional organization, will be a priori demanded to strengthen multilateralism and strengthen global governance. However, it is important that BRICS openly position itself as an institution of global governance, striving not to “weaken” or “displace”, but to fill the vacuum of governance in the world. The BRICS agenda should put in absolute terms not so much the relationship in the “five” format as the dialogue of the "five" member states of the association on peace. Of course, the BRICS countries, in order for further productive cooperation, should not be "drawn into" the confrontation between "USA - PRC", "USA - Russia"; the agenda should be unifying, and not dividing in nature [1, p. 25]. At the same time, it is important to remember that there is a multi-speed development of cooperation in BRICS today: Russian-Chinese interaction far exceeds the relations of other participating countries.

The new world crisis strengthens the relevance of building up the economic cooperation of the BRICS countries with each other (as well as cooperation in the fields of innovation, security, education, social institutions, agriculture, etc.); in order to maintain this direction, it is necessary to accelerate the creation of new financial instruments that level the effectiveness and soreness of American sanctions, to lower the significance of the US currency in favor of using national currencies in trade settlements with each other with third countries. In addition, the epidemiological factor increases the importance of cooperation between the BRICS member states in addressing key challenges such as environmental degradation, climate change and pandemics. Due to their global nature, fighting them in the “five” format is inefficient: it is necessary to attract third countries. In particular, in this regard, one of the main BRICS priorities in the coming years should be the development of cooperation with countries within the framework of the BRICS + and expanded partnerships. In our opinion, BRICS + needs to enter into a constant dialogue with those states that are much more committed to the implementation of the Sustainable Development Goals, the mission of forming a polycentric world order, pursuing an independent policy and are useful for solving specific problems of both global and supranational and regional level. First of all, these are the countries participants of the G20 (Saudi Arabia, Indonesia, Turkey, Mexico, Argentina, South Korea). Of course, we should not limit ourselves to them only: BRICS is maximally open to partnership in the framework of

achieving ideas and realizing the tasks of universal well-being. That is, as long as a full-fledged expansion of the BRICS is not urgently needed, it is important to establish a constant dialogue with non-Western countries that share the strategic views of the "five".

From our point of view, the areas to which the new strengthened BRICS + should be oriented in the first place are the fight against climate change and environmental degradation, the protection of biodiversity, the prevention of a pandemic and the fight against consequences, the decrease in the share of the American currency in trade calculations in favor of its own currencies and protection of unilateral restrictive measures in general, the creation of additional incentives for the revitalization of the global economy, the stability of world energy markets, the development of intercultural and inter-civilization humanitarian flows.

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GLOBAL ISSUES OF SOCIAL ENTREPRENEURSHIP

Yankovskaya Natalia Borisovna
Candidate of Pedogogical Sciences, Associate Professor, Head of the Business Communication Department,
Institute of Business Studies, Russian Academy of National Economy and Public Administration
Barannikova Ekaterina Andreevna
Graduate of the Institute of Business Studies
Russian Academy of National Economy and Public Administration

The article is devoted to the main issues of social entrepreneurship in the global context. It presents the concept of social entrepreneurship and explains its nature. The background and development of social entrepreneurship have been analyzed as well as the current situation in Russia.

The comparative analysis of the experience of social entrepreneurship in Russia and in the world based on SEFORÏS research is of great interest.

Keywords: social entrepreneurship, sustainable development, social enterprise, solutions to social challenges, social entrepreneurs

Nowadays more and more attention is paid to environmental, economic and social problems globally. As a result of numerous discussions and research a new global concept of Sustainable Development has been developed and the 2030 Agenda for Sustainable Development was adopted by the United Nations in 2015. “Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”[1]. It is impossible without inseparable connection between economic, social development and environmental protection.

The researchers, such as M. Batalina, A. Moskovskaya and others affirm that a lot of actions and measures taken by the governments to find solutions to social problems are not effective[2]. At the same time social

1 Brundtland, G. (1987). Report of the World Commission on Environment and Development: Our Common Future. United Nations General Assembly document A/42/427.

2 Moskovskaja A., Batalina M., Taradina L. Obzor opyta i koncepcij social'nogo predprinimatel'stva s uchetom vozmozhnostej ego primenenija v sovremennoj Rossii// Preprint WP1/2008/02. — M.: GU VShJe, 2008. - p. 9. https://www.hse.ru/data/2010/05/04/1216403244/WP1_2008_02.pdf (12.04.2020)

activity of commercial enterprises is inconsistent and from time to time in many cases. As a result, there is a need for new ways of addressing social issues. Social entrepreneurs are becoming an important part of the process. They tend to be drivers of sustainable development.

The need for social entrepreneurship development in Russia is caused by a large number of social problems in the country. In Legatum Prosperity Index Russia was only 74th according to the standard of leaving of the population[3]. The nearest future complex objective is to increase productivity and to decrease the growth of social tension. Development of social entrepreneurship can help meet the objective.

The research activity on social entrepreneurship started not long ago. So there are lots of concepts of social entrepreneurship and different views on the issue. More research is needed to clarify the essence and role of social entrepreneurship in sustainable development worldwide and in Russia in particular. All this makes the problem actual.

The article is aimed to define the challenges and prospects of social entrepreneurship in Russia. To do this it is necessary to define the essence of social entrepreneurship, analyze the current situation and do cross-country analysis of social entrepreneurship experience in Russia and in the world.

Such authors as K. Alter, G. J. Dees, S. Zakhra, J. Mair, I. Martin, R.L. Martin, S. Osberg, J. Thompson and others made contribution to the theory of social entrepreneurship. In Russia a substantial research has been done by the group of researchers of the Centre of Entrepreneurship and Social Innovations at the High School of Economics, headed by A. Moskovskaya. “Social entrepreneurship in Russia and in the World: Experience and Research” has become the first research in Russian language devoted to Russian and overseas social entrepreneurship experience and theory.

Genesis and specific of social entrepreneurship were researched by Russian experts such as Y.S. Grishina, M.S. Volkova, V.V. Zhokhova, O.A. Voinova and O.A. Kozlova. It should be noted that the research of Russian experts is mostly based on the theory and experience summation of the overseas research. This is due to the fact that social entrepreneurship started not long ago in Russia. There is a compelling need to analyze social entrepreneurship, to define its role and specific features both in the world economy and Russian national economy.

Based on the analysis of different approaches to the interpretation of the social entrepreneurship concept, there have been defined the key fea-

3 https://www.prosperity.com/rankings (12.04.2020)

tures of social entrepreneurship such as a focus on social change, innovation and financial stability. Social innovation in business is socially oriented innovations that can be commercialized in production, services, labour organization and management, new combination of resources, but more important they provide solutions to social challenges. Financial stability means that income from sales accounts for the most part of the social enterprise income rather than grants, charity or other donation.

Cross country analysis based on SEFORÏS research is of particular interest. SEFORÏS is multidisciplinary research program, backed by the European Commission, that runs the research of the social entrepreneurship potential in the EU and beyond. In 2016 SEFORÏS[4] conducted a survey of 1 000 social enterprises in Hungary, Romania, Spain, Portugal, Germany, Sweden, the UK, Russia and China. As a result the largest database on social enterprises was created.

SEFORÏS analysts used 5 key models of social enterprises in their research:

1. **Entrepreneur support model** is when social enterprises support businesses and self-employed people.

2. **Employment model** is when social enterprises provide jobs and professional development to the people that have difficulties with employment (invalids, homeless, delinquents and others).

3. **Fee-for-service/product model** is when social enterprises commercialize their social services and sell them to the target audience or businesses. They receive income from fees charged for the services.

4. **Service-subsidization model** is when the business and social functions of an enterprise are separated. An enterprise operates on the market, a part of the money earned invests in social projects.

5. **Cooperative model** is when social enterprises support cooperative business by providing them market information, IT services, access to the market and others.

4 Cross-country report: A first cross-country analysis and profiling of social enterprises prepared by the SEFORÏS research consortium. SEFORIS, 2016. http://www.seforis.eu/cross-country-report (15.05.2020).

Table 1 – Operational Models of Social Enterprises

Countries	Operational Models of Social Enterprises				
	Eentrepre-neur sup-port model	Employ-ment model	Fee-for-service model	Service-subsidiza-tion model	Coopera-tive model
Hungary	7	16	54	49	40
Romania	9	38	22	28	18
Portugal	6	2	81	38	3
Russia	**13,5**	**9**	**78**	**0**	**1**
China	7	10	93	12	2
Germany	22	7	67	35	1
Sweden	7	26	57	64	7
The UK	2	14	91	11	1
Spain	5	24	82	2	3

Source: developed by the authors based on SEFORÏS Cross-Country Report.

In Russia there were no social enterprises with service-subsidization model.

In other countries all 5 models were represented. Fee-for-service/product model became dominating. It is more popular in 7 countries from the list of 9. Service-subsidization model is the most spread in Sweden, as well as employment model in Romania. Although cooperative model was not so often used, it became popular in Hungary. Entrepreneur support model entered the top three widespread models. In Russia it took the 2nd place and in Germany the 3d. So different types of social enterprise models have been defined. However, fee-for-service/product model clearly dominates.

SEFORIS research highlights 4 key forms of social enterprises financing such as fees and sales, investments, grants and donations. Table 2 presents the popularity of each of the form among different countries.

Table 2 – Sources of Financing

Countries	Sources of Financing			
	Fees and sales	Investment	Grants	Donations
Hungary	62	2	25,3	1,7
Romania	28,5	2	26,5	12,1
Portugal	50,1	2	35	5,6
Russia	**60,4**	**3,9**	**23,1**	**11,8**
China	53	21	18,9	4,3
Germany	43	6,5	28,7	10,3
Sweden	53	2,1	36,2	4,2
United Kingdom	64	1,4	29,5	2
Spain	74,5	0,6	20,8	1,6

Source: SEFORIS Cross-Country Report.

Table 2 shows that fees and sales is the most common source of financing in all countries that participated in the survey. Grants come next. Spain has generated the maximum income from sales that is 74,5% of social enterprises. At the same time grants account for 36% in Sweden. In comparison with the other countries investments are more common for China (21%) as well as donations for Germany (10%). However, the researchers point out that in China the investments are mostly made by the owners of social enterprises and obtaining external investments is difficult. In Russia the most common source of financing is fees and sales, that account for 60,4%. Actually, social investments are not developed in Russia. To meet the challenge, it is necessary to establish specialized entities for social investments.

The analysis of the current situation of social entrepreneurship in Russia reveals, that it is in its infancy but shows positive dynamic. Adoption of Federal Law № 245-FZ[5] has become the milestone in establishing social entrepreneurship. Since then the concept of "social entrepreneurship" and "social entrepreneur" have been officially recognized by the legislation. The criteria that social entrepreneurship should meet have been defined as well as the forms of governmental support.

The Federal Law defines social entrepreneurship as an activity aimed at achieving social objectives and solving social problems of the community.

"Nashe Budushhee" fund outlines the key areas of social entrepreneurs activity in Russia:

- education;
- increase in availability of medical services;
- care activity for elderly people;
- production of socially significant products;
- travel services for socially vulnerable sitizence;
- preservation of the cultural heritage of Russia;
- waste recycling and others.[6]

Thomson Reuters Foundation (TRF), which specializes in inclusive economy and human rights support, in 2019 assessed expert opinion on the conditions for development of social entrepreneurship.

900 experts in social entrepreneurship from 45 countries, the largest

5 Zakon Rossijskoj Federacii "O vnesenii izmenenij v Federal'nyj zakon „O razvitii malogo i srednego predprinimatel'stva v Rossijskoj Federacii" v chasti zakreplenija ponjatij „social'noe predprinimatel'stvo", „social'noe predprijatie"" ot 26.08.2019 № 245-FZ // Rossijskaja gazeta.

6 Social'noe predprinimatel'stvo: vidy dejatel'nosti [Jelektronnyj resurs] // Fond Nashe budushhee: Vserossijskij konkurs proektov «Social'nyj predprinimatel'». 2020. http://konkurs.nb-fund.ru/scopes (24.04.2020).

economies in the world, took part in the survey[7]. The experts answered 12 questions on legal, cultural and economic conditions for social entrepreneurship development. The results of the survey reviled that Russia is 23 among the countries participants, rather low level of the activity. But in comparison with the first TRF rating survey in 2013, when Russia was only 31, it could be stated that there is positive dynamic. The leaders on social entrepreneurship development according to TRF are Canada, Austria, France, Belgium, Singapore, Denmark, The Neverlands, Finland, Indonesia and Chili[8].

The results of assessments by Russian experts are presented in figure 1.

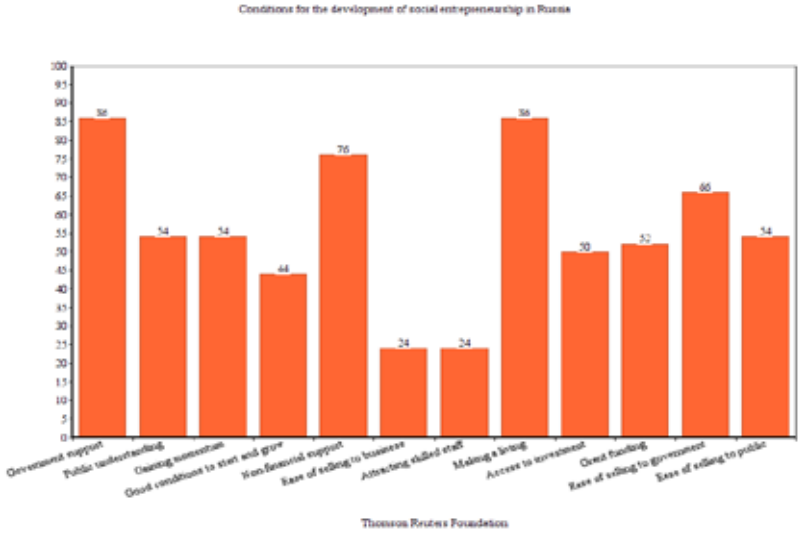

Figure 1- Conditions for the Development of Social Entrepreneurship in Russia

Source: The best countries to be a Social Entrepreneur//Thomson Reuters Foundation 2019

The data in figure 1 show that the experts consider valuable non-financial support which includes legal, technical support and professional development. Government support and making a living are also assessed as important conditions. It should be noted that on government support

7 Methodology // Thomson Reuters Foundation, 2019. http://poll2019.trust.org/methodology/ (24.04.2020).

8 The best countries to be a Social Entrepreneur // Thomson Reuters Foundation. 2016. https://poll2019.trust.org/ (24.04.2020)

Russia is on the 7th place, while in 2016 it was 17. This is due to the adoption of the amendments to the law on small and medium entrepreneurship, introduction the concept of "social entrepreneurship" and measures to support it.

Several problems have been identified in the development of social entrepreneurship in Russia: imperfection of legislation, lack of public awareness of social entrepreneurship, low trust in social entrepreneurs and administrative barriers.

So social enterprises need complex support as well as social entrepreneurs should be more active to promote their businesses and be ready to seek help from government and other organizations.

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PARTICULARITÉ DE LA CULTURE JURIDIQUE DE LA SOCIÉTÉ RUSSE CONTEMPORAINE

Lavitskaya Marina Ivanovna
Docteur en Histoire, Professeur au département
de théorie du droit et du droit comparé
L'université d'État des sciences humaines de Russie
Russie, Moscou

Annotation. L'auteur examine les particularités du développement de la culture juridique de la société russe contemporaine, en identifiant les facteurs qui les déterminent. L'article conclut que la culture juridique est un indicateur de la maturité du système juridique et de la civilisation de l'homme, tandis que la formation de la culture juridique de l'individu et de la société en général est possible dans les limites de l'éducation juridique.

Mots clés: culture juridique, conscience juridique, société russe contemporaine, éducation juridique.

La crise spirituelle et morale de la société, le développement du nihilisme juridique et la diminution du niveau de culture dans la société créent un besoin pressant d'appeler des scientifiques à la composante de valeur du mécanisme d'influence juridique et à l'élaboration d'une stratégie pour la formation de la culture juridique de la société.

La culture juridique est une composante essentielle de la culture de la société et est soumise à ses règles générales, en meme temps la culture juridique a ses propres particularités spécifiques. La formation de la culture juridique de la société et de l'individu est influencée par la culture de la société de l'époque antérieure, les caractéristiques nationales du peuple et ses traditions historiques. Conformément à certaines conditions historiques, la culture juridique se dévéloppe en relation étroite avec les notions et les conceptions hériteés des époques précédentes. En même temps, elle est influencée par d'autres sociétés ayant leur propre culture, leur droit, leurs relations juridiques et leur conscience juridique.

La culture juridique russe a également ses propres caractéristiques pour des raisons historiques. A. Toynby, S. Huntington, N. Y. Danilevsky, N. A. Berdyaev et d'autres auteurs ont noté l'originalité de la voie historique russe et du dévéloppement politique, en soulignant l'autonomie et l'unicité du phénomène civilisationnel de la Russie, puisqu'il couvre un

vaste territoire et présente une civilisation eurasienne.

Au cours des siècles, la compréhension et la conscience de l'importance exceptionnelle de l'état, le rôle de l'état comme le collecteur des terres et des peuples, le défendeur essentiel de la culture multinationale russe et de l'existance même des nations nombreuses, des peuples, caractérisait la majorité des russes. Contrairement à l'Europe occidentale où la société et l'état se formaient de bas en haut, et le pouvoir central s'est appérçu comme la superstructure au-déssus de la société établie, en Russie l'état présentait un autre type – l'état formant une société. L'état russe est un état principalement territorial. En raison de tout ça l'archétype dominant de la puissance a été formé dans la culture russe, qui en combinaison avec les moeurs paternalistes dominant lors du cours de toute histoire, a placé au premier rang les intérêts du gouvernement dans les relations "gouvernement – individu". Ainsi l'idée de la suprématie du gouvernement au-dessus du droit et du pouvoir gouvernemental comme la force décisitive dans la légistique.

L'absence de l'attention à l'individu, aux droits, à la dignité, à la valeur de la vie privée est une suite des débuts collectivistes, sans lesquels, en fait, le territoire énorme de l'état Russe ne pouvait pas être acquis. Le rôle particulier de la commune, des traditions de l'interménagement, de l'interaide et de l'empathie se reflétent dans les orientations stables collectivists des russes [1]. Il ne faut pas parler du collectivisme du coté négatif (aujourd'hui beaucoup de gens ont ce défaut), le collectivisme pour l'état Russe était une condition de la survie des gens dans les conditions climatiques dures, la condition de l'acquisition des territories et de la confrontation aux ennemis exterieurs. Il présente un trait indétachable de la culture russe en raison de son importance et valeur fonctionnelle. Et par conséquent, le priorité des idées d'obligation, du service et du devoir ont été fixés dans la culture juridique russe. C'est pour ça, pour l'homme russe le moral, religion et moralité sont plus importants que le droit et les idées des commencements subjectifs. Le droit s'associait aux mésures policieres, et le respect des lois s'expliquaient pas par le respect à elles, mais par la peur des sanctions. Historiquement en Russie la peur de la punition encourageait les gens de suivre les lois. Les traditions du priorité de la verité au-dessus de la loi, de la foi au-dessus de la connaissance, de la violence au-dessus de conviction, du gouvernement au-dessus de la société sont aussi répandues.

Le trait caractéristique de la conscience des russes est l'idée dominante pendant des sciècles de la subordination du droit à l'ideologie d'état. Les périodes tsarine et soviétique de l'histoire de notre gouverne-

ment représentent comment le droit “servait” à l’idéologie d’état qui à son tour était une legitimation du pouvoir d’état existant.

Ainsi dans le droit soviétique la notion de la propriété privée n’existait pas dans son interprétation qui est fondamentale pour le dévélopment des relations économiques aujourd’hui. Pour cette raison telle notion que les impôts s’est presque tournée à l’archaïsme et était presque oubliée pendant les années du pouvoir soviétique. Par conséquent on peut dire que les impôts eux-même et l’évasion fiscale sont le phénomène nouveau dans la vie de la société russe, qui n’est apparue qu’aux conditions de la perestroïka et transition vers des relations économiques. Les gens qui travaillent dans les organisations fisquales et font leurs fonctions d’emploi sont souvent perseptés négativement par le people, comme les burocrates et les fonctionnaires.

Après plusieurs années de l’instauration en Russie soviétique les valeurs du ménage collectif, de l’interaide et de la vie collective, de la solidarité des travailleurs la thèse de inviolabilité et sainteté de la propriété privée n’a pas non plus de valeur évidente pour le russe, ce qui est propre aux cultures occidentales.

Pour des raisons historiques les traditions de gouvernement juridique sont faibles en Russie; pour longtemps traditionellement les russes pretaient peu d’attention à l’éducation de la culture juridique démocratique. L’arbitraire du pouvoir existant était lié à l’activité des messieurs et des fonctionnaires dans la conscience du peuple, qui abusaient la confiance du bon-Tsar qui était desinformé sur les vœux des ses citoyens. Ça explique la désaffection de toutes choses gouvernementales, le nihilism juridique stable, l’aspiration à suivre la voix de la conscience, de la verité interne, et pas à la justice juridique formelle.

L’attitude servile au pouvoir, la perception du maître comme le vicaire du Dieu sur la terre, peu important qu’il soit – tsar, empereur, souverain, secrétaire général et président, caractérisaient le russe depuis la nuit des temps. Les bases patriarcales de la culture russe trouvent sa mise en évidence dans la vie contemporaine: l’inertie, la passivité, l’espoire à la manne céleste, l’habitude du paternalism du coté du gouvernement, etc., deviennent les freins pour l’instauration de la société civique impliquante l’initiative, l’indépendence, l’autoorganisation, la responsabilité, la haute culture juridique, la bonne connaissance des lois, le respect à elles.

Les causes de l’attitude péjorative des russes au droit aujourd’hui se trouvent dans le népotisme, le clanisme dans les questions d’emploi des position dirirgeantes de secteur juridique, la moralité et l’injustice des decisions des juges, le niveau professionel médiocre de certains juristes

praticiens, l'arbitraire de certains fonctionnaires, la bureaucratie et la corruption, les inconvénients et les omissions dans le travail des services chargés de l'ordre public, le comportement des pouvoirs comme des maîtres, et pas comme des serviteurs du peuple [2].

La particularité de la culture juridique nationale en Russie apparait dans le besoin de la subordination des normes de droit aux principes moraux. Les relations familiales basées sur la confiance réciproque représentent l'idéal russe des relations juridiques. Le bon effectif se situe dans le champ de la moralité et pas du droit; l'éducation de la conscience est plus efficace que la conformité à la loi indifférente.

Cependant, malgré ce qui précède il est juste de noter les tendances positives contemporaines de relèvement du niveau de la culture juridique des russes. Les réformes politiques et économiques, lancées à la fin du siècle passé, sont loins de leur achèvement, mais même maintenant on peut noter les changements positifs qui se sont passés sous leur influence à la conscience juridique des russes contemporains.

Il faut noter le dévélopment actif du mouvement social, de la jeunesse y compris, qui n'est pas indifférente aux réalités politiques et juridiques russes. Aujourd'hui le réseau vaste de l'éducation juridique est bien developé, et plusieurs gens aspirent à le recevoir pas des intérèts professionnaux, mais aussi dans le but de l'accès de la connaissance de la réglementation nationale. Les organisations gouvernementales différentes travaillent sur l'éducation juridique de la population qui donne les connaissances des droits et des libertés de l'homme et du citoyen et la possibilité de leur défense. Une pratique des consultations juridiques gratuites s'est établie sur la base des facultés dans le domaine du droit. Depuis le dernier temps le niveau de la technique de la législation s'est elevé significativement, le système balancé de la justice s'est instauré, la lutte contre corruption est en vigueur. Les mass-medias participent activement à la propagande de l'éducation juridique et informent clairement la société de tous les changements de la législation contemporain.

En conclusion il faut noter que la culture juridique présénte un phénomène reproduit le rapport du droit de la culture générale de la société et le grade du reflet de cette culture dans le système juridique de cette société. La culture juridique est un indicateur de la maturité du sytème juridique et la civilisation de l'homme. La formation de la culture juridique d'un individu particulier ou d'une société en général, aussi que son amélioration suivante dans le cadre de l'activité professionelle est possible au sens de l'éducation juridique réalisée par les organisations différentes de système de droit et d'enseignement.

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THE USE OF PROJECT ACTIVITIES IN BILINGUAL EDUCATION OF PRESCHOOL CHILDREN

Khazratova Firuza Vakilyevna
Candidate of Pedagogic Sciences, Associate Professor
Naberezhnye Chelny State Trade and Technological Institute

Abstract. In the system of preschool education, the project method is at the stage of implementation in the educational process and it is necessary to study the specifics of the application of the project method in bilingual education of preschool children.

Keywords: project activities, bilingual education, languages, preschool age, children, preschoolers, projects, projects method.

The educational standard of the new generation requires the teacher not only to form system knowledge among the pupils, but also to teach them to use the acquired competencies on a daily basis, to provide opportunities for the diverse development of the individual. One of the ways to comprehensively solve the problems of modern preschool education is the project method, which allows the pupils to form the ability to carry out practical activities: to teach goal-setting, determine the tasks of their work, ways to achieve, analyze and evaluate the results. In the system of preschool education, the project method is at the stage of implementation in the educational process and it is necessary to study the specifics of the project method in bilingual education of preschool children.

In article 8 of the Constitution of the Republic of Tatarstan, the Tatar and Russian languages are equal state languages [1, p. 54]. Mastering two languages as a means of communication is aimed at ensuring the ability and readiness for communication in everyday life, for interaction and mutual understanding in a multinational society.

So, in the Republic of Tatarstan the ways of development of education are defined - a growing generation should become a bilingual generation.

In our study, we turned to the definition formulated by W. Weinreich, where he argues that bilingualism is the mastery of two languages and their alternate use depending on the conditions of speech communication [3, p. 25].

For successful mastery of two languages, teaching these languages must be carried out, starting from the first stage of a child's verbal communication. In the studies of scientists such as L.S. Vygotsky, A.A. Leontiev, S.L. Rubinstein says that the senior preschool and primary school age is a sensitive period for teaching foreign languages, since at this time the child intensively forms cognitive processes, develops simulation skills, he can easily remember language information and is emotionally ready to master a foreign language [4, p. 200; 6, p. 113; 8, p. 56].

A.Sh. Asadullin, F.F. Kharisov in their writings noted that children of preschool and primary school age understand the meanings of words, they can also use these words to build phrases and sentences, through dictionaries to get acquainted with the richness of their native and foreign languages, to get information about the customs and traditions of the people [2, p. 150; 9, p. 100].

The works of such researchers as Kashapova Marziya Fatykhovna, Harisov Firaz Fakhrazovich, Gabdulkhakov Valeryan Faritovich examined the principles of teaching the Tatar language in preschool educational organizations.

The methodology of teaching foreign languages in preschool educational institutions was studied in detail in the work of Ekaterina Yurievna Protasova and Natalya Mikhailovna Rodina, where they focus on the coordination of the actions of all teachers. According to their study, the reason for poor language skills in preschool educational organizations is the inconsistency of actions of kindergarten teachers, the isolation of subject programs.

Project activity involves the use of equivalent materials in organized educational activities like toys, games, illustrations, study guides, the Internet, newspapers, etc. to explain a new topic. Also traditionally used is the system of communication between senior preschool children and younger preschool children in those languages that are studied in joint activities related to organized educational activities.

At the present stage in Russia, in language teaching, they turn to practical orientation, multimedia, and learning through games, fairy tales, and cartoons. Also, recently, more and more often they pay attention to the fact that each child receives an education that corresponds to his character and interests and call this “individualization of education”.

One of the promising methods used in bilingual education is the project activity method. The project method is a set of measures aimed at the cooperation of children and adults, taking into account age-related, individual characteristics of children, the relationship of the pedagogical

process with the environment and is one of the forms of organizing the educational process with preschool children. The project activity method allows pupils to more easily adapt to social life, independently master role-playing actions.

The main conditions for the implementation of this approach are respect for the child, acceptance of his opinion, interests. The project method is aimed at developing the personality of the pupils, their cognitive, creative abilities. Project activity involves independent research, cognitive, game, creative, productive activities of students, during which the child learns himself and the world around him, translates new knowledge into real products.

The main goal of the method of project activity in preschool educational organizations is the development of the creative personality of the child, which is determined by the development tasks and tasks of children's research activities.

The tasks of research activity are characteristic for each age group. At a younger preschool age, the tasks include:

– introducing children to a special game situation;

– intensification of the desire to look for ways to resolve the problem situation;

– the formation of the necessary skills at the initial level of research activity.

In older preschool age:

– formation of skills in search activity, intellectual initiative; development of the ability to determine possible methods for solving the problem with the help of a teacher, and then independently;

– formation of the ability to apply the methods necessary to solve the problem, using various options; activation of desire to use special terminology;

– conducting constructive conversation in the process of joint research activities.

E.G. Kagarov in 1926 identified four characteristic features of the project method:

1) interests of the child should be in the first place;

2) projects reveal various aspects of being;

3) children are the initiators of training programs and carry it out intensively;

4) a project – is a fusion of theory and practice, setting goals and their implementation [5, p. 41].

There are different types of project classification. V. Kilpatrick divides

all projects into four types:

1) creative
2) consumer
3) project aimed at solving problems and intellectual difficulties
4) exercise project [10, p. 150].

E. Polat classifies projects according to their distinguishing features: the dominant method, the number of participants, the nature of the contacts, the mode of coordination, and the duration. Focusing on these signs, he identifies the following types of projects relevant in preschool educational organizations [7]:

1. By to the dominant method: research, gaming, adventure, information, creative, practice-oriented.

2. By the nature of the content: including the preschooler and his family, the preschooler and nature, the child and the man-made world, the preschooler, society and its cultural values.

3. By the nature of the pupil's participation in the project: customer, expert, performer, participant from the inception of the idea to the receipt of the result.

4. By the nature of the contacts: carried out within one age group, in contact with another age group, within ECE, in contact with the family, cultural institutions, public organizations.

The system of our work with preschool children on project activities in bilingual education was built in 5 stages. At the first stage of our work, we determined the topic of the project, its purpose, answering such questions: "What do we know?", "What do we want to know?". In determining the topic, attention was drawn to its relevance and the capabilities of each child. In the end, we discussed the duration of the project and set a deadline by which we should complete it.

At the second stage, the planning stage, we drafted an action plan to achieve the final goal, using symbols, also discussed who we can contact for help, in which sources you can find information that we can get as a result of the search.

The third stage is the accumulation of information. At this stage, there was a formation of representations of preschoolers about the world through project activities. A number of activities were carried out that were somehow related to the chosen topic of the project work:

1) placement of material in the information field;
2) creation of a subject-developing environment;
3) conversations;
4) observations;

6) educational games and exercises.

At the fourth stage of our work, we summarized the accumulated material. This stage included combining the collected information into a single project, creating the final product, in the form of:

- albums;
- books united under one theme;
- models;
- exhibitions of works;
- presentation of research projects with the participation of parents.

At the final, reflective stage, we tried to answer the question “What new did we learn”, evaluated the results of our joint work, analyzed errors, shortcomings, determined the topic of the next project.

There are many interesting topics that expand the horizons of children and become food for further thought. Choosing the topics of the projects, we based on the comprehensive thematic planning of ECE, held a conversation with teachers, so that there was a relationship and it was easier for children to remember new words, expressions, we also took into account the views of each child, his abilities and wishes. In our practice, projects have been implemented on the topics: “Autumn Harvest”, “Magic Bloom”, “Drink tasty juice in moderation and be healthy!”.

Usually, the children presented the result of the project work in the lesson, which helped us to identify the level of development of new material. When evaluating the finished project, we paid attention not only to the correct use of the language, the originality of the project and the child’s creative approach to solving simple problems were of particular value to us. The degree of independence of the child increases with the mastery of self-organization techniques, cognitive, creative activity skills, experience of emotional-value attitude to reality.

Throughout the study, we worked with the parents of the pupils to increase their competence in this matter. When working with them, we used the following forms of cooperation with parents:

1. Informative workshop on the organization of project activities in working with preschool children, at which parents became acquainted with the method of project activities, understood the importance of this method in the development of cognitive and creative abilities of preschool children;

2. Round table on the topic “The role of parents in children's project activities”, where we discussed the topics of future projects with parents, provided information on the help that parents can provide to children during the preparation period, emphasized the importance of their support

before presenting the results of work;

3. Placement of information reflecting current events in the group, recommendations, requests, ways to assist the child in conducting research on a specific project, on the stand.

3. Carrying out a matinee, where the children presented their projects.

Thus, project activity is an effective form of educational activity, its use in bilingual education of preschool children in ECE increases the level of language proficiency, serves as a good motivation for pupils, creates a friendly atmosphere in the team and fully justifies itself.

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IMPLICIT CONTENS CODING IN A LITERARY TEXT

Lunkova Larissa Nikolaevna
Doctor of Philological Sciences, Full Professor
State Social and Humanitarian University

Abstract. The article discusses the causes and mechanisms of the appearance of unactualized meanings in a literary text, discusses the types and characteristics of possible content. The author offers a review and analysis of research approaches, points to ways of decoding such information. It is postulated that implicit information almost always takes place in communicative units of any volume, and a message encoded with its participation can have many interpretations, which cannot be ignored in assessing understanding.

Keywords: implicit, text content, prediction

Introduction

Problems of understanding the literary text bring linguistic scientists to different planes of research. One of the areas of analysis of the semantics of a literary text is based on the study of unactualized meanings hidden in it, the decoding of which is necessary for an adequate understanding of the text.

It is known that "sentence is governed by text. A person does not speak separately with invented sentences, but with one conceived text "[3: 108]. But since sentences remain the basic communicative units, the identification and analysis of the implicit meaning of a statement is appropriate to begin with a sentence. Any sentence in the text has the property of *prediction*. This is "attribution to the subject of the utterance (indicated by means of a *topic*) of a sign (named by means of a *rema*)" [6: 58]. There are also other, more general interpretations of prediction.[1] The traditional

1 It is proposed to understand prediction as "control of a mental act occurring in the listener's brain, that is, the derivation of new knowledge", this model does not directly connect predication with a statement and distinguishes the following components of the process: "a) predicate - the initial mental representation; b) a predictor - a representation that affects the original; c) predicate - derived new knowledge. " With this interpretation, different language techniques will create the basis for one or more predications within even one statement-

interpretation, establishing the relation: *one statement - one prediction* [1: 392-394], assumes that the topic of the statement may not have verbal expression and is found in the context or situation of communication. Then, when considered out of context, proposals are correlated with non-specific images of situations, that is, they have unactualized meanings, or implicit content. The appearance of a communicative unit of actualized meaning is associated with its inclusion in a specific speech act, in this case, the communicative units functioning in speech acts acquire actualized meanings. The implicit content of the statement is not directly expressed within this communicative unit and is derived from its explicit content as a result of the interaction of this content with the knowledge of the recipient of the text, including information extracted by the recipient from the context and communication situation.

1. Implicit content

In some studies, implicit content is indicated by the term *subtext* [2]. By analogy with the term subtext, M.Yu. Fedosyuk introduces the concepts of *textual*, *subtextual* and *pretextual* implicit content from the point of view of coding information [6].

Textual implicit content is defined by him as "implicit content, the transmission of which corresponds to the explicit communicative intentions of the sender of the text" [6]. Implicit textual content can also be defined as implicit content expressed in contextual and situational conditions that prevent the recipient of the text from not perceiving them.

Subtextual implicit content – is an implicit content, the transmission of which is part of the hidden communicative intentions of the sender of the text. Subtext content is transmitted in such contextual conditions that do not require comprehension, but at the same time contain certain evidence that the transmission of this content was planned by the sender.

Pretextual implicit content – it is an implicit content that can be inferred from the text, although its transmission was not included in the communicative intentions of the sender. The specified content is transmitted in such contextual and situational conditions that not only do not require its mandatory perception, but also do not indicate that such perception was part of the communicative intentions of the sender.

The researcher also defines several functional types of implicit information in the statement: *constitutive, connotative* and *communicative* implicit content [6].

sentence. – See: Melnikov V.V., Preobrazhensky S.Yu. Methodology of Linguistics. – M., 1989. P.79.

Scheme 1.
Varieties of implicit content in terms of their functions in messaging

Implicit content		
Constitutive	Connotative	Communicative
- positionally fixed	*- expressive coloring of the text*	*- implicitly predicable messages*
- not positionally fixed	*- comical coloring of the text*	*- adjusting components of questions*
	- stylistic coloring of the text	*- implications (textual, subtextual, pretextual)*
	- subjective coloring of the text	
	- allusions	

Constitutive implicit content – is implicitly expressed mandatory components of the content of statements, i.e. such components, without which the utterance cannot be understood. A distinctive feature of constitutive implicit content is that for its explanation it is necessary to rephrase the statement in which this content is expressed.

Connotative implicit content – is implicitly expressed stylistic and semantic shades superimposed on the content of the text or its individual components. A distinctive feature of this content is that its explanation, as a rule, takes the form of a commentary on this component of the text. It can be argued that any violation of the generally accepted postulate noticed by the recipient can lead to the identification of additional content that was laid down in the message by the sender. This type of implicit information includes expressive, comic, stylistic and subjective coloring of the text, as well as allusions.

Expressive coloring of the text – is determined by the nature of the use of language means in the text, its ability to transmit emotional excitement, feelings, heart from the sender to the recipient. Implicitly expressive coloration can be expressed using lexical repetitions, the use of metaphors, inversion of Ypres. Language tools can also be characterized by explicit coloration, i.e. assigned to them in the language system. These include, for example, words with an estimated meaning.

Comical coloring of the text – is determined by the nature of the use of language means in the text, its ability to cause a comic effect. The language means of creating comic coloring of the text include various violations of the rules of stylistic, lexical or syntactic compatibility of words,

the contamination of several phraseological units, as well as other cases of the interaction of language tools with the context.

Stylistic coloring of the text – is reflected in the nature of the used language means information about the text belonging to a particular genre-situational and individual-style. Silistic coloring allows you to enter into the text the meanings implicitly expressed by a combination of specific linguistic elements. Particular implicit content, the stylistic coloring of the text can add to the artistic text in the genres of parody and stylization.

Subjective coloring of the text – is the information reflected in the nature of the used language means about the position of the observer through whose perception events are highlighted. From the point of view of the subjective coloring of a literary text, it is customary to distinguish such techniques as first-person narrative, third-person narrative, internal monologue and the flow of consciousness, etc.

Allusions – are associations generated by the text or its fragments with any facts and statements already known to the recipient. Allusions are directly related to the subtext of the work and are essentially a projection of "what once took place" on what is happening now, and plunging the reader into the atmosphere of more or less approximate echoes and semantic echoes, from which new [...], a deeper understanding of two or more similar, mutually supportive and distant pieces of text "[5: 88].

Communicative implicit content – is messages implicitly expressed in the text. A distinctive feature of this variety of implicit content is that its explanation requires the construction of new statements that complement the content of those that are already in the text.

Conclusion

Implicitly predicted text messages are encountered whenever implicit prediction is consciously used by the sender of the text. Implications are nothing more than information that is added to the content of a received message under the influence of a model of the world in the mind of the recipient of the text.

Implications can be generated not only by the content of statements, but larger or smaller than statements, components of the text. Implications can carry information not only about the situation described in the text, but also about the sender of this text, as well as about the situation in which the text itself is transmitted.

Linguistic literature mentions yet another kind of implicit content. These are described by G.P. Grice *communicative implications* or, in another translation, *implications of discourse*.[2] Communicative implications

2 The principle of cooperation: "Your communicative contribution at a given step of the dialogue should be what the jointly accepted goal (direction) of this dialogue requires." The more

are characterized by G.P. Grice as such implicit content that the recipient logically infers from the text in the sentence that the sender did not violate any of the tenets of the "principle of cooperation".[3]

It should be noted that all these varieties of implicit content are not isolated from each other. Any linguistic unit can simultaneously generate the implicit content of several varieties. Observations show that implicit information almost always occurs in communicative units of any volume, and a message encoded with its participation can have many interpretations, which cannot be ignored in assessing understanding.

Currently, in connection with the development of functional and cognitive approaches in linguistics, the problem of implicitly expressed meanings of a literary text attracts great attention of researchers. Since modern studies of implicit content extend to various kinds of material - monologue, dialogue, texts of different genre and style affiliation - there is a lack of a uniform harmonious theory and a certain inconsistency of terminology in the studies of different authors. A particularly promising direction in the study of implicit content expressed by a text is its correlation with the communicative intentions of the sender of the text, as well as with the cognitive characteristics of the recipient of the text.

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ZAHIRIDDIN MUHAMMAD BABUR AND THE DIVÂN STRUCTURE

Juraboev Otabek Rustambek ugli
Candidate of Philological Sciences, Associate Professor,
Deputy Director for Scientific Affairs of the Alisher Navoi State Museum of Literature
Academy of Sciences of the Republic of Uzbekistan

Abstract. Zahiriddin Muhammad Babur (1483-1530), the founder of the great Baburi dynasty, was not only a talented poet but also a literary theorist. This article is devoted to the study of Zahiriddin Muhammad Babur's original sourse material. It was the first time that Babur had built a giant wall. Manuscript copies of the Babur divân's world libraries, their status brief descriptions. Highlights Babur's own scientific and theoretical views on the structure of the divân, a collection of poems in the classical period of Eastern Islamic literature, based on the author's work. The material is based on information about Babur's collection of poems in Turkish and manuscripts of this collection.

Keywords: Zahiriddin Muhammad Babur, Baburnama, manuscript, divân, divân structure, theory, scientific and critical texts.

Founder of the Great Mongol (Baburi) Empire, encyclopedic scholar and poet Zahiriddin Muhammad Babur (1483-1530) is one of the great figures of Turkish classical literature. There is doubt that "Baburnama" is the most studied work by the orientalists of the world. The author himself calls it is as "Vaqoye" (History). One more title is "Tuzuki Baburiy" – "Rules of Babur". Its first translation in Farsi was done by Shayh Zayniddin Vafoi in 1530-s and called "Baburnama" (Babur`s writings), and then it became famous under this title.

So this work was translated four times into Persian, six times into English, three times into Urdu, two times into French, German and Azerbaijani. Besides that it was translated into Russian, Dutch, Hindi, Turkish, Spanish, Chinese, Japanese, Arabic, Uygur, Kazakh, and was published in more than 20 countries.

A.S.Beveridge (1842-1929), who had carried out researches on

“Baburnama” more than 20 years, translated it into English with scientific comments and wrote these words on the title-page of the publication: “This work is dedicate to Babur`s fame” [1].

So this scientist deserves a high and true acknowledgement to Babur as a person great statesman. At the same time as a person with high intellect and as an open-hearted man. She ranks high the memoirs of Babur (“Baburnama”) and considers this work as significant as Gibbon`s and Newton`s memoirs, and she says: “In Asia this work differs from other works”.

It is necessary to note, that in Great Britain (England), France, Russia and the USA Babur studies were developed with varying degree, and there were made many researched. For example, Britain began to be interested in India from the 18th century. The study of nature and natural resources of this land was carried out at one time with thorough study of Babur and Baburids history and state structure. When English scientists collected special document and scientific literature about India, the first research was carried out on Baburids. So the first translation of “Baburnama” was made in 1811 by J.Leyden. But after his untimely death W.Erskine continued the translation and finished it in 1826. Moreover his big research entitled “History of India at the times of Babur and Khumayun from the Temurids dynasty” was published (1854).

His special work on literature is “Aruz Risolasi”, which is about the poetic dimension of Aruz. In addition, the work “Baburnama” contains information about literature, literary works and literary personalities.

He is a poet who is well-versed in lyrical genres as well. There is also a collection of poems – **ﻥﺍﻭﯾﺩ** (divân) of this collection of works, and his literary-theoretical views on the creation of a special divân in Eastern Islamic literature are contained in the poems of this divân.

First of all, about Babur’s divân. According to recent research, the number of manuscripts of Babur's divân preserved in the world's book treasures is ten [2, 114-116; 3, 51-61]. They are:

1. ﯼﻣﻟﻕ ﻩﺍﺷﺩﺍﭖ ﺭﺑﺎﺏ ﻑﯼﻥﺻﺕ ﯼﺗﺳﺩ ﻩﺗﺷﻭﻥ ﻡﻭﻅﻥﻡ ﯼ ّﺭﺕ ﻩﻟﺍﺳﺭ

(Risâlai turki manzum, navishta dasti tasnifi Bâbur pâdshâh, qalami) (India, Rampur Raza Library, №19) [4].

We should note that Babur was presented to the West in the research of the oriental’s Denison Ross (1871-1940) for the first time not only as an emperor, but as a high-talented, shrewd poet. He quote a foreword to Mirzo Babur`s small divan kept in the Raza Library of Rampur city in India and published this manuscript in the facsimile form in 1910. In addition we can cite the opinion of D.Ross: “Considering the memoirs and romantic

works of all times, this work is important by reflecting the native language of Babur: the Turkic language with all its charm and splendors".

2. دیوان بابر پادشاه ترکی (Divâni turki Bâbur pâdshah)
(Paris, Bibliotheque Nationale, Suppl. Turc. 1230) [5].

3. دیوان بابرشاه چغتائی) Divâni Bâburshah chig'atay)
(İstanbul Üniversitesi kütüphanesiNo: 3743) [6].

4. دیوان سلطان اعظم بابر مرزا (Divâni Sultânul a'zam Bâbur mirzâ)
(İstanbul, Topkapı Sarayı Revan kütüphanesino: 2314) [6].

5. دیوان مرزا بابر (Divâni mirzâ Bâbur)
(İstanbul, 100 Yıl Atatürk Kitaplığı (Belediye Ktb.) Muallim Cevdet yazmaları K. 332) [6].

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(India, Salar Jung State Library No: 4) [7, 49-51].

7. دیوان بابر پادشاه (Divâni Bâbur pâdshah)
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8. دیوان بابر پادشاه (Divâni Bâbur pâdshah)
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9. دیوان بابری (Bâbur divâni)
Tashkent, Fund of the Alisher Navoi State Museum of Literature, Manuscript No. 317.

10. Another divân manuscripts are reported by the Turkmen scholar R. Kurenov in his research [9]. According to him, the manuscript is number 3 in the Islamabad National Library in Pakistan. This copy of divân seems to be close to the Paris manuscript in textual terms. [Although this dissertation is intended to be a textual study of Babur's divân, it should be noted that it did not result in a complete study due to ignorance of many works on the subject and the lack of study of many important materials.]

* * *

During the study of the above-mentioned manuscripts, it can be concluded that:

A) They are mainly manuscripts copied between the XVI-XVIII centuries (the Tashkent copy is foreign);

B) None of them is in the form of a literally traditional Eastern classical structure;

C) They are, first of all, an existing collection of the poet's poems or drafts;

G) There are some ornate copies among them, and it is these ornate manuscripts that are important from the point of view of source studies and textual studies, as well as from Babur studies;

D) Almost all of these manuscripts are written in fluent and beautiful

calligraphy (mostly in Nastaaliq script).

The question is, “Did Babur make divân with his own hands?” it is natural that the question arises [10, 114-117; 11, 41-43]. It is well known that being the owner of a divân is an element in classical literature that requires the poet to be literally the owner of classical poetry. This requires great responsibility and talent from the poet. The composition of divân has a centuries-old tradition, and only a poet who has mastered it could do it.

We do not think it is correct to answer the above question on the basis of the manuscripts of his office without studying the views of Zahiruddin Muhammad Baburshah. Therefore, it would be appropriate to draw a more solid scientific conclusion by studying the author's theoretical views on whether or not Babur compiled divân. It can be said that Babur has his own approach to composing divân. However, his special scholarly work on the structure of poetry, including aruz [12; 13] and we do not know the full text, which contains his theoretical views on the science of aruz, which reflects his scientific views on the structure of divân. However, among his writings there are some passages devoted to the subject through which we see that the author has a perfect knowledge of the subject as well.

In one of his rubai he writes:

Divânima ne rabtu ne tartibedur,
Ne jadvalu ne lavhu ne tazhibedur.
Gar sanga yibordim ani, ayb aylamakim,
Divâningni tilarga taqribedur.

In one place in the “Baburnama” the governor of Samarkand, one of the Shaybanis, writes *“Fólod Sultonga divânimni yibordim”* [14, 174]. This incident took place in 1518, when Babur was still in Kabul. Accordingly, it can be said that the poet arranged the first drafts of his divân at this time. But when was the quoted rubai itself written? Before or after 1518? Who else is Babur asking for in exchange for his office? Why is he counting the shortcomings of his office and what are their “faults”? Does a quartet really raise so many questions?!

True, it is very difficult to find answers to all of them now. In particular, the question of to whom it is addressed will remain open until clarity is established on the basis of a reliable source.

But first of all, it should be noted that Babur did not have time to complete his collection of poems in the traditional classical style. In addition, this rubai was written after the collection was sent to Folad Sultan. That is, the poet's first collection of poems – divân was written after the end.

And we have a reason to think so. First of all, this rubai text comes in only three copies of the manuscripts of the poet's divân. They are manu-

scripts kept in Istanbul. Secondly, the first of these sources – the copy at Istanbul University – is the largest collection of poems by Babur's divâns. The mentioned rubai is on pages 67[b]-68[a] of the manuscript. In addition, this copy served as the basis for two other sources in Istanbul.

The fact is that the absence of this rubai in the copies of Rampur and Paris, which are considered the most revered of Babur's divâns, also indicates that it dates back to 1528-1520. This is because it is the largest collection of Babur's poems at Istanbul University. Even a few poems in it are not found in other sources. According to the calligraphic features on some of its pages, the Turkish scientist B. Yujel also suggested that the author's autograph [6, 21]. But you can't agree with that. After all, the source that confirms the existence of Zahiriddin Babur's handwriting is a copy in Rampur.

Even when comparing the text of the copy of Istanbul University with the text of Babur in the copy of Rampur, B. Yujel's opinion was not confirmed. Moreover, the publication of the source at Istanbul University dates back to the second half of the 16th century. That is, long after the author's death.

Let us now return to Babur's theoretical views.

In his rubai, Babur mentions the important elements of the structure of the divan. That is, here the author emphasizes, albeit briefly, the elements that serve the formal and theoretical foundations of bureaucracy.

So, in the opinion of Babur, in order for the divân to be formally complete, it is necessary to answer the following:

1. طبر *(Connection)*. This term means "communication" and "system". Accordingly, the internal structure of the sofa should be disciplined, i.e. interconnected. That is, first there is a preface and then there are poems of praise, supplication and net type;

2. بترت *(Order)*. The meaning of this term is known. Only, in this regard, the poet is referring to the order of the alphabet and genres in the divân– the sequence;

3. لودج *(Table)*. This term is widely used in Middle Eastern Muslim book art [15, 103] and is considered important. Table is one of the most widely used artistic ornaments in book art. It can be simple, elegant and golden. A separate table is drawn around the text on one page of the manuscript, or a single table is drawn around the text on both pages. If a text on a page consists of several columns (mostly poetic works), each column is separated from each other by table lines. In the divâns, in the bayoz, each poem is also tabulated. The titles and pictures (miniatures) in the manuscript are also separated by a table. A simple table is often one-line red

drawn around the text; the elegant table is very thin and consists of two, three, or even four rows of several colors; the gilded table consists of one or more rows given golden water;

4. **حول** (*Writing board, board.)*This term is also widely used in the art of bibliography [15, 141]. This word has several meanings in relation to the objects it expresses. But in Babur's rubai, the East comes as one of the main artistic ornaments in book art. The sheet can be worked at the beginning of the manuscript, if the manuscript contains several works, at the beginning of each work, and sometimes at the beginning of chapters and chapters. A sheet consists of a pattern drawn across the width of half or one-third of the page where the text begins. In the Eastern book art of the XIV-XVI centuries, the plate was made mainly of golden water. (Manuscripts of the XVII-XIX centuries are distinguished by the fact that they consist of more simple paints.)

5. **بی‌هذت** *(Tazhib)* This term was also active in ancient bibliography according to its application [15, 301]. Tazhib is the gilding of manuscripts, the decoration with golden water. Of the manuscript ornaments, most are engraved with gold watercolors, engravings, titles, plates, patterns, tables. Some manuscripts are embellished by sprinkling golden water on the border of the page. Such a frame is called a "*tazhibi hoshia*".

So, if we pay attention to the above-mentioned rubai, Babur considers these five terms, in a sense, important or sufficient, in order for the divân to be complete and reach the hands of the reader.

Looking at the next two verses of the rubai, the word "*Gar sanga yibordim ani, ayb aylamakim"* asks not to blame his office, even if there are no five main elements – *"connection", "order", "table", "writing board"* and *"tazhib".*

In turn, the reason for this is *"Divâningni tilarga taqribedur"*. That is, he is sending this rubai to another pen-poet, the divân-compiler, and is willing to send his unfinished divân and ask for his collection in return.

It is understood that the tree and fame of Babur's divân were still famous before the author gave it a complete order. Fans, who read it at the request of the author himself, though not in a perfect way, begged him to enjoy it as soon as possible.

From the rubai of Babur it is possible to draw the following theoretical conclusion in connection with the structure of the divân. The first two terms – *"connection"* and *"order"* are related to the textual structure of the divân, while *"table"*, *"writing board"* and *"tazhib"* are terms related to the appearance of the divân, the decoration of the book.

Hence, divân(a collection of poems) should have a strict internal order

in terms of text (sequence of letters of the alphabet, sequence of rhymes, sequence of genres; *introduction of prefixes*, *praises*, *prayers* and *verses*), and then it is appropriate to have internal manuscripts depending on the structure used. It should also be noted that divâncopies of a simple copy, even without artistic decoration, are common. However, at this point it would be appropriate to assume that Babur was a king and a highly talented artist.

It is clear that Babur Mirza is a poet who strives to organize his divân in a perfect way on the basis of the above-mentioned requirements of classical divân and to show his sensitive creative aspects in this regard as well. His divânviews on composition and clerical work once again confirm that he is a talented artist with a perfect knowledge of the classical clerical traditions, experience and skill.

This means that during his lifetime, Babur did not have time to complete his collection of poems in the traditional classical style. [Only, the London manuscript is in a certain divân state. However, it was also copied in 1190 AH (1776) and was thus compiled by the scribe.]. Even in Babur studies, the perfect copy of the poet's divân, which is composed in full accordance with the tradition of composing the classical divân, is still unknown.

In 2013 the international scientific symposium devoted to the 530th anniversary of Babur was held in Tashkent, and Uzbekistan, especially Tashkent was recognized as a real world center on Babur Studies.

It is worth to note the effective activity of Babur`s International public fund. The greatest achievement of the recent years is publication of the “Encyclopedia of Zahiriddin Muhammad Babur” (Tashkent, 2014; the second completed publishing, 2017) [2]. This encyclopedia is the first one in Uzbekistan dedicated to one personality, and it is significant because it includes a complete information about the life of Babur, his activity, works, state, offspring’s , Babur studies, scientific and literary terminology.

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THREE MANUSCRIPT VERSION OF ALISHER NAVOI'S "NAVODIR UN-NIHOYA" AND ITS COMPARATIVE ANALYSIS

Rashidova Mamura Khayrullaevna
Candidate of Philological Sciences,
Alisher Navoi State Museum of Literature of the Academy of Sciences of the Republic of Uzbekistan

Abstract. This article is devoted to a comparative analysis of the sources of the second divan Alisher Navoi, "Navodirun nikhoya", which he collected in 1485-87.

Keywords: divan, source, text, margin, calligraphy, nasta'liq, facsimile publication, scientific-critical text.

"Navodir un-Nihoya" is the second divan (literary collection of poems in alphabetical order) created by Alisher Navoi in 1485-87. This collection includes Uzbek-language ghazals written after the previous one, "Badoe'-ul-bidoya".

The text of the divan "Navodir un-Nihoya" was first published in the current alphabet in the second volume of the 20-volume collection of works dedicated to the 500th anniversary of Alisher Navoi. This publication was prepared by the candidate of philological sciences M. Rahmatullaeva. There are also researches of such scientists as P.Shamsiev, Y.Ishakov, H.Sulaymonov, B.Valikhodjaev, B.Abdullaev, A.Hayitmetov, S.Ganieva on the basis of Divan's ghazals.

To date, only a handful of divan manuscripts have survived. We know:

1. Tashkent, Institute of Oriental Studies named after Abu Rayhon Beruni in the treasury of manuscripts 11675 inv. a copy of the cabinet stored with the number. It was copied in 1487-88 in Herat by the famous calligrapher Abduljamil secretary with high calligraphic art.

The copy in our hands is a photocopy of this unique divan , on which our comments on the text are based. The total length of the work is 149 pages or text 1b and 149a pages, with a few page shortcomings. They are: 1^{a}; 28^{a}, b; 29^{a}; 58^{a}; 67^{b}; 68^{b}; 70^{a}; 143^{b}; 149^{a}. The number of gazelles in this copy of the Divan is 819, complete. Each page has 15-16 lines of text, two columns. The letter is fluent, nastaaliq, the ink is black.

Out of 819 ghazals, 210 are framed. There are also some dropped

bytes or corrected words in the box.

2. Another authoritative copy of the office "Navodir un-Nihoya" is kept in the manuscript fund of the same institute under the inv. Number 1995. It was copied in Herat by Sultan Ali Mashhadi, a famous representative of the 15th century calligraphy. We are also using a photo of this copy. Although the manuscript consists of 205 pages, the poems that make up the “Navodir un-Nihoya” divan are on pages 1a-185a. Total - 628 gazelles. On page 185a of the manuscript there is a line about the “completion” of the “divan i jaded” after the last ghazal. After two pages of space, on page 186b, poems of other genres than ghazals were written, which turned out to be mustazads, muhammas, musaddas, tarjibands, qitas and rubais, which were part of the divan “Badoe' ul-Bidoya”.

As mentioned earlier, there are some missing pages in the photo copy, which are: 1^{b}-2^{a}; 36^{b}-39^{a}; 83^{b}-84^{a}; 109^{b}-110^{a}; 177^{b}-179^{a}.

The text is written in two columns on each page, 13 lines. The ink is black. The letter is a beautiful nastaaliq. The margins contain 18 ghazals and some corrections. Embossed plates are drawn in front of the gazelles for each new letter of the alphabet. The manuscript also includes 7-8 miniature paintings.

3. Another copy of the Divan is kept in the manuscript treasury of Tehran (Iran), which was facsimile published by the hard-working scholar S. Ganieva in 1991 under the name "Navoi's signature" in Tashkent, "Fan" publishing house.

The text of this edition of “Navodir un-Nihoya” divan consists of 138 pages. Number of pages - 275. Each page is written in two columns of 14-15 lines of text. The letter is a simple nastaaliq. A total of 557 ghazals. Divan is incomplete, from "alif" to "kof." The frame contains some fallen bytes, lines, phrases and 14 poems. Page 111a (page 221 no) was replaced by page 98^{a}.

Of the 557 gazelles, 157 are missing from the previous two manuscripts. The 17 gazelles in them are not available in the Tehran copy.

Of the 157 ghazals that did not exist in the previous two copies identified from Tehran, 2 were included in the divan “Badoe' ul-Bidoya”, and the remaining 155 ghazals were distributed to the divan “Khazayn ul-Maoniy” as follows:

“Gharoib us-Sighar” – 25; “Navodir ush-Shabob” – 66;

“Badoe ul-Vasat” – 35; “Favoid ul-Kibar” – 29;

These manuscript sources serve as a worthy basis in the creation of the scientific-critical text of the divan. Especially significant are the copies of the divan, made in direct collaboration with Navoi, based on the

author's text, copied by famous calligraphers of the period. These two sources rank high both in terms of history and perfection. The third copy of the divan also has a unique value.

These three sources can be the basis for creating a perfect scientific-critical text of the work. Comparative-analytical study of the texts leads to the completeness of the divan, the elimination of some spelling and textual shortcomings, as well as the restoration of the original text of the author. The weight of the ghazals increased to 1,018.

In compiling the divan text, their model rules were followed, with an in-depth study of the experience of all Navoi studies in the field of source studies and textual studies. In particular, based on the historical factor, the ancient copy of the work serves as a basis. It has also been taken as a key factor in comparative-critical writing. And again, the copy copied by the secretary Abduljamil was treated as the first basic copy, given the relatively complete, precise date of the copy, and the spelling. The order of the gazelles was also preserved on the basis of this manuscript, and additions from other copies were made in their place.

Based on the above experiments, we conditionally marked the manuscripts with the first three capital letters of the alphabet. This provides shortness and conciseness in the scientific apparatus. Also, based on the factor of composing a scientific-critical text, the text of the poems was carefully studied in comparison, line by line, byte by byte. Identified shortcomings and errors were recorded in the sub-textual scientific apparatus.

The same can be said of the features of all three manuscripts:

1) The complete or partial omission of the radifs in the Gazelles was done consciously. In copy *A*, this is relatively rare, while in copy B, the radifs of most gazelles are written only in matla and makta. The remaining bytes are omitted in whole or in part.

2) "Navodir un-Nihoya" was composed by the poet at the age of 40-45. This idea is true for the main text in the A copy of the divan (except for the ghazals written in the frame). The poet was 45 years old at the time the divan was copied into white, and then over the years the secretary copied his finished ghazals to the frames in their place according to the divan order. At the same time, Navoi was enriched with ghazals written by Navoi at the age of 50. This situation lasted until the creation of the poet's "Khazayn ul-Maoniy" divan. We base our opinion on two things:

a) The gazelles in the margins of copy A (with the exception of some) are not present in copy B. Copy B is under-filled in our opinion.

b) In one of the poems written in the margin, the poet states that he is 50 years old:

Menki ellik yil chekib g'am, topmadim xushvaqtlig',
Topg'amenmu umrning emdiki o'tmish xushrog'i.
Grief for pulling fifty years of mine, entertain not found,
If this is me, in the last sink of his life.

As mentioned above, Abduljamil's analysis of the ghazals written in the margins of the secretary's copy led to the conclusion that even after the completion of the divan , the ghazals were regularly replenished with new ghazals. If these additions were made in the margin, it can be concluded from the location of the ghazals in the Tehran copy that this copy was created before the formation of the "Khazayn ul-Maoniy". This is because the poems in the margins are copied directly in the text in this copy.

The following can be said about the results of the initial comparative analysis: just as each copy is unique, the Tehran copy also serves to overcome some of the shortcomings of the text. For example, in both of the above-mentioned manuscripts, two lines that fell in the same gazelle were restored on the basis of the V copy. These verses are the praise of one byte and the praise of the next byte. In the publication, this poem is given in the size of 6 bytes.

Chu qoldi sayrida ruhul amin, ne tong ul ham
Gar o'lmadi safaringning nihoyatig'a raso.
Maloik o'lmadilar ul haram aro mahram,
Rijol xilvati davrida ul sifatni niso.
Who stayed on the trip, the spirit is sure, what a morning he is
Gar did not die at the end of your journey.
The angels did not die.
In the solitude of Rijal, that property is niso.
Another example:
Necha oh ursam bo'lur ko'zdin bag'ir xunobi fosh,
Istamak bu ersa ko'zda ne ajab ul nav'yosh
How many times can I hit you?
What a wonderful way to screw people over

The ghazal, which begins with 11 verses, is included in the "Navadir ush-Shabab", in which this ghazal from the "Navodir un-Nihoya" divan corresponds only to the matla, and the continuation of the ghazal is completely different.

It is obvious that Navoi severely edited or completely changed some of the ghazals when compiling the divan "Khazayn ul-Maoniy". The ghazals in "Navodir un-Nihoya" are the earlier products of creativity, and knowing and studying them will be the basis for showing the stage of development of Navoi's creativity. After all, in the works of Alisher Navoi there is

almost no difference in the skills of youth and perfection. Nevertheless, the “Navodir un-Nihoya” office is of special importance as a product of a certain period of Alisher Navoi's work.

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ECUTOPIE D'ALEXANDRE GRINE

Gurlenova Lyudmila Viktorovna
docteur ès lettres, professeur d'université, directeur de l'Institut de culture
Université d'état de Syktyvkar Pitirime Sorokine
Gurlenov Vladimir Mikhaïlovitch
doctorat en sciences pédagogiques, chef du Département des langues allemande et française, maître de conférences
Université d'état de Syktyvkar Pitirime Sorokine

Résumé. L'article, se basant sur le contenu des histoires de A. Grine, a pour objet l'étude des idées de l'écrivain sur l'ordre dû des relations entre l'homme et l'environnement naturel qui assureraient la solidité de la civilisation. Sont considérés les motifs et les images naturels, l'antithèse Sud-Nord, pénétrant tout son œuvre; sont analysés aussi les jugements de l'auteur et de ses personnages sur l'environnement naturel idéal et les tâches de l'homme en vue de le maintenir.

Mots-clés: environnement naturel, antithèse Sud-Nord, motifs et images naturels.

Les idées écutopiques dans la culture, étant une réaction à l'ordre naturel moderne, étaient actuelles dans la littérature russe dès le premier tiers du XX^{e} siècle. Elles étaient pertinentes pas seulement dans l'œuvre des écrivains directement liés au thème de la nature, tels que V. Arseniev, L. Léonov, mais aussi dans les œuvres de beaucoup d'autres, y compris Alexandre Grine (1880-1932). L'analyse de ses représentations dans ce domaine est intéressante car son œuvre a été perçu par la critique comme étranger à la littérature russe de la période soviétique. Néanmoins, sa compréhension des relations entre l'environnement naturel et l'homme, malgré toute son originalité, s'est révélée généralement conforme aux idées des écrivains soviétiques qui défendaient la nature.

La reconstruction de la position de A. Grine est faite sur la base de l'analyse des textes de ses histoires (raisonnement sur la nature et descriptions de la nature) et de la mise en relief des images et des motifs naturels centraux. Pour l'analyse sont utilisés les textes de ses histoires des années 1917-1930 : « Les ténèbres » (1917), « L'apprenti sorcier »

(1917, 1926, 1930), « La pendule de l'âme » (1917), « La création d'Aspère » (1917, 1927, 1930), « Le jet » (1917), « En avant et en arrière » (1918), « Les bateaux à Lice » (1921), « Le soleil perdu » (1923), « Le cœur du désert » (1923), « Une boule blanche » (1924), « La voix de la sirène » (1924), « Une voiture grise » (1925), « Fandango » (1927), « Un baril d'eau douce » (1930).

Le noyau de la base de narration écutopique est l'antithèse Sud–Nord, dans laquelle l'image du Sud se réalise dans les motifs de la chaleur, de la diversité et de la vie, et le Nord dans ceux du froid, de la pauvreté et de la mort. L'utopie naturelle de Grine comprend des motifs et des images du Sud, ils forment un espace naturel idéal dans lequel une personne vit avec dignité et bonheur.

Les personnages des œuvres de l'écrivain n'aiment pas le Nord, ils ne veulent pas non seulement y vivre, mais aussi y mourir. Dans leur perception, le Nord est un environnement hostile à l'homme, l'incarnation de la monotonie et de la grisaille. Le héros de l'histoire « Fandango » dit: « Je n'aime pas la neige, le gel, la glace; les joies esquimaudes sont étrangères à mon cœur » (2; p. 497). Le norvégien Olsen, héros de l'histoire « La pendule de l'âme », mourant dans le Nord, dans «un coin gris, offensé, volé au milieu d'une fête monumentale» de la nature, dit à propos du Sud: «Là, c'est le paradis, là, le soleil fleurit dans la poitrine. Et là, vous m'enterrerez» (2; p. 106). Les racines d'une telle perception du Nord devraient être recherchées, probablement, dans les impressions enfantines de A. Grine sur la vie sombre avec ses parents sous Vyatka. C'est V. Kovsky (1; c. 14), commentateur connu de son œuvre, explique l'intérêt de Grine pour l'imagination romantique du «non réalisé» par les événements de la «vie pauvre» de son enfance. Peut-être, dans son intérêt pour le Sud est exprimé le désaccord de Grine avec les impératifs de la littérature soviétique, dans laquelle, dans les années 1920, un intérêt pour le nord est activement manifesté, l'image de l'homme héroïque vivant dans les conditions de vie nordique est formée, l'idée d'une personne créatrice transformant activement la vie est diffusée.

Ainsi, une nature parfaite, selon A. Gine, est la nature du Sud. Elle est le symbole du potentiel réalisé de la belle nature. La nature du Sud chez A. Grine apparaît comme une célébration monumentale de la vie, un puissant environnement florissant, stable et bienveillant envers l'homme.

L'espace dans l'utopie naturelle de Grine est majestueux dans l'échelle (le mot préféré de l'auteur est «énorme»), pour cela il utilise souvent le point de vue «d'en haut», permettant de comprendre sa Géographie. Elle abrite des objets à grande échelle tels que la mer, les montagnes, les

îles, les plans horizontaux étendus et la verticale puissante, il y a beaucoup de lumière et de couleur, le monde est rempli de nombreuses créatures vivantes qui démontrent l'abondance colorée de la vie. Grine aime le rouge qu'il a associé à l'image d'un jardin luxuriant: «la couleur du vin, des roses, de l'aube, du rubis, des lèvres saines, du sang et des petites mandarines... (...) Le sentiment de joie qu'il provoque s'apparente à une respiration complète au milieu d'un jardin luxuriant» (3; p. 487). C'est un espace accueillant et coloré dans lequel l'homme est heureux.

Dans ce monde, l'image du désert est également incluse, ce qui démontre l'idée du pouvoir vital de la matière naturelle: le désert incarne l'idée de l'immortalité, car il est capable de renaître à la vie en présence de l'eau; ceci est facilité par les forces naturelles qui, dans l'espace de l'écutopie, sont créatrices. Le désert reçoit l'humidité dont il a besoin sous forme de pluie: «l'odeur de l'herbe crue, de la fumée, de l'humidité des basses terres, le silence, encore plus silencieux des sons endormis du désert...» (« En avant et en arrière »; 2; p. 145). Le désert est comparé à une personne qui a soif et qui reçoit de l'aide: «... l'humidité pénètre dans les vaisseaux sanguins et y dilue le sang qui s'épaissit d'un long anhydre. ... le cœur en difficulté commence à battre plein, marqué par un coup..." (« Le tonneau d'eau douce »; 2; p. 591).

Dans le concept de nature parfaite, les éléments sont également inclus. A. Grine les décrit comme une force à grande échelle qui secoue la nature et la renouvelle. Dans ses récits, c'est surtout un orage: «Le chaos de l'orage a surgi. Déjà déplacés d'un bord à l'autre des abysses sombres, les traits de feu d'une plume invisible, secouant par une lumière déformée l'espace immense clignotant... " (« Boule blanche »; 2; p. 356).

L'écutopie de A. Grine se développe dans le courant de la direction anti-technocratique de la littérature russe. L'écrivain porte son jugement rude et directe sur le concept technocratique du progrès dans ses récits. Les réflexions à ce sujet sont contenues dans l'histoire «Une voiture grise». Son personnage principal est une voiture qui poursuit le héros et l'amène à l'hôpital psychiatrique. Aux yeux du héros, la voiture est décrite comme «une accumulation grise parmi les peintures pittoresques de la route», «un monstre métallique», «un fantôme ricanant». À l'hôpital, le héros expose sa théorie du progrès humain en utilisant le motif du mouvement du cercle: «plus le centre est proche, plus le mouvement est lent, ... il atteint la cible à un rythme plus lent... Sur la circonférence avec un cri et un bang ... décrit des cercles enragés ... u n e v i e f a u s s e, ...un tourbillon de précipitations insensées, au-delà desquelles est le vide». Le héros conclut que le progrès technique doit se développer lentement afin de ne pas

perturber le mouvement général de la civilisation (2; pp. 420-453). Cette théorie fait partie intégrante de l'écutopie de Gine.

Dans l'espace de la nature parfaite, cependant, il y a un lieu et une image du monde «machine» – un bateau à vapeur associé à l'image de la «mer» et doté d'un large ensemble de significations. Nous illustrons une seule d'entre elles – le bateau à vapeur comme l'incarnation de la puissance et de la plénitude de la vie, de l'unité avec l'élément de la mer. Dans l'histoire «La voix de la sirène », le héros, dont les jambes ne fonctionnent pas à cause de la contusion, se rétablit quand il voit le bateau à vapeur et entend sa sirène: «Et en extase, du bonheur de voir et d'entendre sa force débordante, Detervi, tout tremblant, se leva de sa chaise» (2; p. 367).

Notons que dans les descriptions du «paradis naturel», les notes élégiaques et le sentiment de l'anxiété éprouvés par les héros sont fréquents: «...tout était plein d'une tristesse secrète, majestueuse, comme la nature elle-même qui est la mère des sentiments de tristesse» (« En avant et en arrière »; 2; p. 145). Pourquoi la nature s'appelle-t-elle la mère des sentiments tristes? Dans « Les bateaux à Lice » il y a une insertion lyrique qui y donne la réponse : « ... le rythme de l'élégie règne déjà sur le cœur attristé. Qui est désolé? Vous-même? Le gémissement inaudible de la terre sonne-t-il? Est-ce que les morts se pressent autour de nous à cette heure-là?» (2; p. 222). La brièveté de la matière naturelle vivante est l'imperfection de la vie.

Même en reconnaissant le rôle unique de l'homme dans le monde et l'infini de ses possibilités, A. Grine ne lui a jamais donné le pouvoir de surmonter la brièveté de la vie, l'immortalité (« L'apprenti sorcier », « La création d'Aspère »). Cette décision de l'écrivain est organique à l'écutopie: dans son espace, il est impossible de corriger la loi naturelle. A elle, on ne peut que s'y résigner et retrouver une compensation de l'immortalité, par exemple, dans la conscience de la beauté de la vie actuelle.

Les héros de Grine se demandent s'il est possible de contribuer à l'enrichissement de la nature.

Le rêve du sorcier (« L'apprenti sorcier » – 1917, 1926, 1930) est de transformer les marais en jardins. Notons que c'est l'un des projets utopiques préférés dans la littérature de l'époque: en un jardin sont transformés le désert (A. Platonov), le marais (M. Prichvine), la steppe (A. Neverov), la forêt (écrivains associés à l'idée de la culture du prolétariat), la ville, etc. On voit que l'image du jardin est mythologique, associée au concept du «jardin d'Eden». Le héros de A. Grine était sur le point de transformer le marais en un jardin avec l'aide de diamants extraits par l'alchimie, mais il subit un échec complet.

Le héros de l'histoire « La création d'Aspère » cherche à augmenter la diversité de la nature, sans fixer d'objectifs utilitaires, ce qui n'arrive pas souvent, l'utopie dans la littérature des années 1910-1920 étant généralement une réponse à une situation de famine et de guerre. Le héros dit « la Terre crée avec parcimonie de nouvelles espèces de plantes, d'animaux et d'insectes. J'ai eu l'idée d'apporter encore plus de diversité à la diversité luxueuse de la nature en créant de nouvelles formes animales...» (2; p. 60). Pour l'auteur, les questions de la responsabilité du scientifique pour le sort des formes de vie créées et pour le sort du monde dans son ensemble après l'introduction de nouvelles formes sont importantes. Il conduit le héros à la mort, niant le droit de l'homme à une telle expérience, car la nature est le sommet de la création, l'expression de la compétence du créateur.

Comment une personne devrait-elle équiper sa vie dans l'espace naturel? Dans l'histoire « Le cœur du désert », il y a une réponse à la question de la forme de l'interaction appropriée entre l'homme et la nature. Le héros construit un village dans le désert pour les personnes «naturelles» qui coexistent harmonieusement avec le monde du désert, sans chercher à le refaire. Il surmonte tous les obstacles, car il met son corps en accord avec la nature et reçoit son soutien (son corps a montré comment surmonter le froid, la fièvre, la morsure d'un serpent). Le village s'appelle dans l'histoire le cœur du désert; cette image est un concept qui exprime l'idée de l'harmonie de l'homme et de la nature, les conditions de la préservation de la stabilité du monde terrestre. Le désert apparaît souvent chez A. Grine comme un champ d'expériences utopiques, car il représente un emplacement caractéristique de l'espace utopique – loin du monde familier humain, un endroit perdu (comme une autre image préférée de A. Grine – une île). Le désert incarne une grande échelle spatiale dans laquelle les lois habituelles de l'existence physique et sociale de l'homme disparaissent. On peut parler de l'aspect chrétien de l'idée utopique à l'image du désert, il est associé au thème du désert: avec les images des saints des déserts et de l'espace de purification, l'image du «prétemps» comme un signe de «l'âge d'or».

On peut conclure que l'écutopie de A. Grine repose sur l'idée de la disposition de la nature à l'homme, grâce à laquelle elle peut créer pour lui un environnement naturel confortable (chez Grine c'est la nature du Sud), auquel il adapte ses besoins et ne cherche pas à le refaire et dans lequel il peut être heureux.

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"CULTURE WITHOUT BORDERS". DISTRIBUTION FORMS AND CODES OF GLOBAL CROSS-BORDER CULTURE [1]

Sledzevski Igor Vasilyevich
Doctor of Historical Sciences, Head of the Center for Civilizational and Regional Studies
The Institute for African Studies

Abstract. Globalization has created a special type of culture that spreads over vast spaces in the form of flows of cultural information and ensures free distribution over the boundaries of cultural symbols and meanings, the integration of local cultures into global social and information networks - the so-called global cross-border (transnational) culture, which ensures a sustainable existence inside the nation states of the so-called parallel societies - communities, network communities that are poorly naturalized, retain their customs and forms of identity. The article is devoted to the analysis of key factors ensuring the meaningful coherence of the phenomena and processes of cross-border cultural communication - the forms and codes of its implementation as a special type of culture. In this context, the cultural prerequisites and the origins of modern globalization, the processes of radical changes in the ways, forms of cultural representation of social phenomena and processes as globally significant, understandable (obvious) and objective are considered. It is concluded that long before the world economy and politics reached a new world level of interconnection and interweaving of their elements and the very idea came to define this developing integrity of the world as globalization, in the very type of modern cultural representations, a shift occurred in their codes and forms which made obvious (in the environment of their distribution) the image of a globalizing world.

Keywords: globalization, global cross-border culture, cultural-analytical approach, cultural representation of globalization, cultural forms and codes of global culture, network ("parallel") communities.

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In the scientific explanations of globalization, the emphasis is, as a rule, on the analysis of certain trends and phenomena of world development with the help of recognized patterns (paradigms) of scientific knowledge. These patterns or paradigms, in turn, are associated with the ideological, doctrinal context of the corresponding explanations. It's difficult or even impossible to distance oneself from this context; it constantly makes itself felt in "total" assessments of globalization, and as a positive movement towards universal values, the integrity of the existence of all mankind, and as a negative process associated with attempts to establish ideology and politics on a global scale neoliberalism, the new imperialism of the West and ultimately the hegemony of the United States.

The doctrinal, evaluative context of the explanations of globalization today has become such a self-sufficient ideological and psychological background that an important circumstance escapes the attention of globalist researchers: before this or that trend, a particular phenomenon of world development can be interpreted as global, to their scientific, ideological or ethical assessment, they should become self-evident, should be recognized as such by culture - endowed with sense, cultural meanings, codes providing their global *vision*, and not just global, international, inter-regional, etc. The objectivist type of scientific thinking, for which the objectivity of social processes is equivalent to their occurrence outside culture, regardless of its images, meanings, codes, also hinders the perception of the cultural perspective of world processes as global ones. As a stereotype of consciousness, the principle of objective thinking corresponds to the spirit of the modern era, which has replaced the system of "social things" - universal or claiming universality of impersonal roles and institutions, in place of direct interactions between people.

From the idea of the ontological order of the globalizing world, most of the concepts of globalization that arose at the end of the XX and beginning of the XXI centuries come from the concept of globalization as turning the world into a single place, the idea of world integrity as a global condition for the existence of humanity (R. Robertson, M. Featherstone [1; 2]) to the concepts of existence, structural connections and patterns of the World system (J. Forrester and a group of D. Meadows, M. Mesarovich and E. Pestel, I. Wallerstein [3; 4; 5], in Russian science - A. V Korotaev, A. S. Malkov, D. A. Khalturin [6]) and the global community of mankind as a whole and as a special subject of social changes (M. A. Cheshkov [7]); from the ideas of global cultural studies (M. Melko, S. Sanderson, B. S. Erasov [8; 9; 10]) to the concepts of "polycentric politics" (J. Rosenau [11]) and "international political world order" supported by world hegemony

liberal states (D. Held) [12].

The new realities of the modern world - information, communication, financial, political, problematize the rigid objectivity of social facts, the vision of a person as an exclusively economic and social being, and society as a single whole, united by the general norms, values and forms of identity adopted in it. The reality of globalization is the reality of the environment of information flows and wide cross-border social and communication interactions, and not just social things - norms and institutions external to a person. Given this reality, it is impossible to assert with a sufficient degree of certainty that the processes of globalization are developing entirely according to their own (i.e., completely objective) laws, regardless of human intervention. This is impossible not only because the complexity of global information and communication interactions far exceeds the complexity of institutionalized social practices, but also because the immediate and important part of these interactions is the creation of an informational community of a communicator and a recipient, ensuring the ideological, sociocultural and cultural-psychological unity of the parties of the dialogue. Unlike elements of public organization: social structures, institutions, status systems that can be represented as rigid objective entities, communication and information communities are derived from communication and the special communication units that form it - cultural texts that contain symbolic and encoded forms perception of information and are facts of consciousness of participants in information exchanges.

The specificity of global processes, due to the tremendous growth of cross-border information and communication interactions, does not allow us to consider globalization entirely outside the cultural codes of actions and interpretations of reality associated with it. The necessary tools for this are provided by the so-called understanding or cultural-analytical approach to social reality. The fact that in objectivist thinking is taken for granted - the objectivity of globalization, its perception as a universal process, equivalent to the present reality of world development, is a problem for cultural analysis.

Within the framework of the cultural-analytical approach, the concept of representative culture, proposed in the early 1990s by the German philosopher F. Tenbrook, allows one to understand these problems. According to F. Tenbrook, “culture is a social fact insofar as it is a representative culture, that is, it produces ideas, meanings and values that are valid by virtue of their actual recognition. It covers all beliefs, ideas, worldviews, visions and ideologies that affect social behavior, because they are either actively shared or enjoy passive recognition ” [13, p. 29].

In the information and communication environment, the representative role of "non-material", ideal factors for motivating actions and determining a person's life situations is growing enormously. Symbolic codes and formalized data systems, figuratively expressed, attractive meanings and values, behavioral codes of individual cultural and religious groups, communities, movements, in a word, all that constitutes the content of a representative culture acquire significant and even super-significant status of self-evidence and reliability. The relationship between empirical (present) reality and representative culture is also changing dramatically. In the new electronic information reality, cultural representation significantly replaces the real world, takes its place. The certainty of the world, its present and future states is what it sees, this culture distinguishes, what it considers as existing.

How, in what forms and how definitely, obviously, significantly (at a high level of recognition) culture is generally able to imagine a "world without borders" in which a person is given the place of either a factor, components of a broader human-machine integrity, or the embodiment of a self-referential image based on your own invented reality (communication in Internet and SMS chats)? We will dwell on the specifics and content of globalist world consciousness (globalism) as a new type of representative culture: the role of cultural forms and symbolic codes in the formation of modern transnational (transboundary) culture and the differences in the picture of the world inherent in this type of world consciousness from the representation of a "normal", institutionally defined and spatially holistic society, representing itself in the images and codes of an ordered social whole.

Transnational models of consciousness and culture - the possibilities of representing the global picture of the world

Already in the first third of the XX century, since the advent and rapid spread of mass communications - cinema, broadcasting, mass media, mass actions as a specific type of communication systems, the representation of national models of values, ideas, and behavioral patterns began to acquire a cross-border, transnational character, continuously and all interact more intensively with other cultural models in the inter-regional and global space. These models - from cultural styles to standards of religious and national cultures and ideologies - first entered into a process of constant and increasingly intensive communication with each other. This required completely new rules and forms of their cultural representation: transcultural behavioral codes and recognized cross-border

languages of communication, international mass fashion, global images of power, politics and business, global stereotypes and symbols of national and international relations - more and more cross-border relations.

The formation of a transnational culture in itself, of course, could not provide an advantage over the tendencies of internationalization of the world over the tendencies of its split. This fully applies to the content of cross-border culture itself, which was not and could not be uniform. Throughout the XX century, it reflected the entire spectrum of world ideological contradictions and oppositions. However, the representation of this content at the level of images, meanings, cultural codes, discursive practices ceased to be spatially closed or limited. The spatial isolation of national cultural representations was over.

It is especially important that a new pattern of representation in the minds of members of society of social change has emerged. This pattern was different from the representative culture that developed in Europe at the end of the XVII - beginning of the XIX centuries and was determined by the perception of social transformations as a transition from old to new, traditional to modern (modernization models). The picture of the representation of phenomena and world development trends that the transnational culture proposed did not just deviate from modernization patterns (industrialization, secularization, urbanization, etc.), it changed the very mechanism of dissemination and perception of cultural patterns. A new type of representative culture has incorporated dramatic changes in the information and communication sphere and in the space of world communication: erasing the significance of space as an obstacle to communication; accordingly, the enlargement of the scale of mass perception of changes and the involvement of national communities in them; a representation of modern life as ready-made information blocks ("packets") of information distributed over world communication networks, the content of which consists of unified models of behavior and consciousness, can be disassembled in parts and assembled in a different combination without slowing down the process of change; the perception of cultural patterns as directly and reliably represented primarily by the activities of network communities, the media of communication (the messages of the media are becoming cultural models, and the consumer is a mass audience that expands to the scale of transnational audiences and virtual communities); elevation as the main model for structuring and representing world pictures, mythological and often religious consciousness, which keeps the integrity of perception in a stream of continuous changes.

Compared with other phenomena and trends of world development,

the significance of transnational culture in the XX century has intensified almost continuously and globally. To a tremendous extent this was facilitated by events related to the development of global media: regular broadcasting in short waves from the mid-1920s; the beginning of constant television broadcasting based on relay satellites from the 60s of the XX century and as the apotheosis of this process is the revolution of personal computers in the 1970s and the explosive growth of the global Internet network that followed since the mid-1980s. Since the end of the XX century, the factors of mass global migration and the development of so-called conglomerate communities, including extensive foreign cultural enclaves ("parallel societies" in Europe and North America) have come to the fore in the processes of transnational culture development.

In all of this, a radical change in the space of the cultural representation of social phenomena as significant and obvious was manifested. The unusual nature of this space of cultural forms and cultural codes without borders and without places is precisely expressed in the formula found by A. F. Filippov. He writes about "sad globalization: local without borders, global without place" [14, p. 283].

Thus, we can assume that even before the world economy and politics reached a qualitatively new level of interconnections and interweaving of production, capital, information, and the very idea came to define this interconnectedness of national economies and states as globalization, in the very type of cultural representations of social and interethnic relations there was a shift that made obvious (in a transnational communication environment) the image of a globalizing world. The significance of this shift was the creation and expansion of a *transnational social space.* In this space, the cultural presentation of the world, localized in space and having continuity in time, is in a state of borderland. The connection of sociality with a certain place, with the concepts, images, values of the national-state community, the mandatory nature of this format of cultural presentation, its priority in relation to "possible worlds" are reduced to a vanishingly low level. But the significance of the constructed social reality, sociality, in which the individual and the main actor becomes a self-organizing network, and the main way of social relations (and, of course, relations with reality) is communication in an alternative space, is increasing. choice of forms of identity and social behavior. This kind of communication is close to the type of crisis communications and virtual social entities that are pre-institutional in nature.

Global culture of uncertainty?

It is clear that the cultural representation of such a complex, unambiguous interpretation of reality cannot but differ from the representation of a "normal" society - a social (institutional) structure that has obvious certainty, due to which the facts of cultural representation are perceived as "hard" social realities, obvious substantive meanings. Uncertainty of the World is qualitatively increasing. The artificial life environment created by mankind Nomo Sapiens reaches such dimensions, complexity and diversity that it can no longer be effectively controlled and even perceived by man in all its possible trajectories and developmental consequences. Fundamentally unpredictable are all possible options for the behavior of global social networks, the prospects for their distribution and impact on national and world politics. The unpredictability of actions, events, situations in these networks is determined not only by a high degree of their autonomy and self-organization, but also by the development in parallel with them and partly on their basis of so-called abstract social symbols and symbolic practices that do not require direct contacts of participants in social interactions - non-cash money, all kinds of securities and their surrogates, virtual (not yet produced) goods, symbols of network, including non-cultural, communities. In modern global reality, the world of "social abstractions" not only organizes, but also subjugates the social space, creates it according to its own laws.

There is a deeper factor in the growing global uncertainty of social reality. It is enclosed in the nature of modern symbolic practices themselves and with the greatest force makes itself felt in a transnational social space. Symbolic practices - from financial manipulations and public relations campaigns to the broadcasting of religious symbols, now decisively depend on the flow of information data, and not on the available "material" reality and therefore already do not lend themselves to effective public and state control, do not recognize disciplining norms and frameworks.

All this ultimately changes the nature of the most "globalizing" social reality. Its main elements are network formations: separate groups of links of a network connected to the rest of the network through a node (the most developed network link), the priority system - the general vector of changes and development of the network, as well as the rules for its functioning in a common space, centers (dominants) networks establishing such priorities and manipulating them within national-state communities. The most successful and long-term network projects create their own social and cultural space, cultural enclaves and their own social worlds. This brings the reality of globalization closer to virtual reality, not only at the

level of information technology, but also at the level of social reality itself. According to the conditions of its formation and the logic of development, this reality takes on the features of a destructive reality - disordered, conglomerate, indefinite, chaotic. Developing in an increasingly unstable mode, outside the given social dimensions, social reality acquires the features of social chaos, exceeding in scale and consequences the chaotic conditions of society associated with the transition from one social system to another. The very everyday life of millions of people ceases to be perceived as an order, or rather, more and more often and differently in various social worlds it makes you think, talk about order, turns the feeling that things are getting out of control, "into a stable thematism" of various modern cultures. Overcoming normative regulation "is felt as emancipation and is perceived by the global elite as a demand of reason and evidence of progress." At the same time, for those who are deprived of the new ability to move around provided by globalization - “swiftly and whenever necessary”, this means the threat or reality of losing control over their daily lives, over their present.

Gaining a wide cultural representation, becoming a recognized social fact, the internal mobility of a person’s private life recreates the local order, though rather in the form of a communication-virtual space built by a person in a system of modern network communications and able to connect different worlds. For a person who created such a space and perceives it as a present reality, the uncertainty of the world ceases to be a virtual state for some time. In-depth semantic processes become necessary: semantic formation (the formation of semantic attitudes and personal meanings in situations that lose their certainty), semantic awareness (solving problems with meaning by defining the context of a situation), semantic construction (commensuration, correlation, ordering of a person’s relationship with the world). The role of these conditions is openly manifested in situations of social chaos, when they come to the fore, restore; meaningful contexts of life and social actions, ensure the de-problematization of the world.

In a specific, fundamentally borderline space of rethinking the existence of oneself and another in the world, the most important conditions for a sociocultural definition and streamlining at the level of cultural representation of global reality are taking shape. Sense proportional to man, his life problems, tasks and plans, semantic restructures are necessary, important, concrete, and in an obvious way are combined with the conditions of globalization. Rethinking the realities of their own and global worlds plays a central role in the motivational mechanism of cultural globalization. As a result, the phenomena of globalization are presented pri-

marily as meanings, and not as things. The reality of the global whole is confirmed, first of all, as a semiotic system. Could we perceive the facts of globalization as its obvious existence if it hadn't already been given the meanings of "global market", "global politics", "global environmental crisis", "global macrodonaldization", etc.?

And the last general consideration. Factors and features of globalization put at the center of its cultural representation the reality of the design type, combining thought and action, imagination and planning, the subject characteristics of the object and its images. A project, a design image allows us to comprehend and make manageable, partly predictable, uncertainty, formalizing it in symbolic, code values of the plan, project requirements, and decision systems.

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THE ROLE OF "SOFT POWER" IN THE CENTRAL ASIAN POLICY OF THE FEDERAL REPUBLIC OF GERMANY

Uktamzhon Bituraev Bazarbaevich
Teacher
Tashkent State University of Oriental Studies,
Uzbekistan

Abstract. This article is devoted to the analysis of the role and importance of "soft power" in the policy of the Federal Republic of Germany in Central Asia. The article reveals the theoretical interpretation of the concept of "soft power". By the 1990s, the Federal Republic of Germany had merged into a single state and sought to increase its influence in the international arena. In particular, Germany's interests in the Central Asian region began to take shape, and diplomatic relations were established with countries that had gained independence as a result of the collapse of the USSR. Germany is the only member of the European Union to open embassies in all countries in the region.

The main reason for the support of German policy in the region by the Central Asian states is the lack of geopolitical competition between the parties. That is why Germany's "soft power" diplomacy in Central Asia is considered successful. German policy in Central Asia is based on economic, cultural, humanitarian and educational cooperation. The article analyzes the various institutions that contribute to the implementation of the German "soft power" policy and reveals their activities in Central Asia.

Keywords: Federal Republic of Germany, Central Asia, "Soft power" Society for International Cooperation (GIZ), DAAD, The Goethe Institute, PASCH, funds of political parties

Introduction

With the emergence of independent states in Central Asia, the Federal Republic of Germany was one of the first to recognize their sovereignty in the international arena. The Kol government recognized the independence of all the states in the region six days after Gorbachev resigned as head of the Soviet Union on December 31, 1991 [3]. As a result, Germany has become the only EU member to have an embassy in all Central Asian states.

Today, cultural and humanitarian cooperation between the Central Asian states and the Federal Republic of Germany is carried out in almost all areas. "Soft power" is the main tool of German foreign policy in the formation of a positive image of Germany in the international arena.

Theoretical interpretation of the concept of "soft power". In the modern world, forceful influence, primarily military one, is becoming increasingly obvious for a number of reasons: the use of force can lead to an unpredictable expansion of the conflict; the use of precision weapons when confronted with archaic methods of warfare does not always ensure victory; there is a problem of settlement after the end of hostilities, etc. And although force methods have not disappeared from the arsenal of influence, the resource of influence in world politics is undergoing serious changes. In this regard, the possibilities of "soft power" are of particular interest[6].

Joseph Nye, who coined the term "soft power" in modern times, has tried to explain the theoretical aspects of "soft power" in several of his works. In his book, “Soft Power. The Means to Success in World Politics”, J.Nay briefly described soft power: “What is soft power? It is the ability to attract what you want, not by force or payment. This is due to the country’s culture, political symbols, and its appeal in politics. As our policy becomes legitimate in the eyes of others, our soft power will continue to grow”. As the concept of “soft power” was developed by Joseph Nye, it relies mainly on three components: culture, political values and foreign policy, respecting international law and having moral authority[2; 11].

As a complex conceptual model of soft power diplomacy in modern society, the following are highlighted:

- economic soft power;
- human capital soft power;
- cultural soft power;
- political soft power;
- diplomatic soft power.

In turn, the main instruments of "soft power" diplomacy are political PR, global marketing, the popularity of the state language in the world, the state position in the global hierarchy, cultural exchange, sports, tourism, public diplomacy, education, information warfare, intercultural dialogue, national diasporas, migration policy can be included[7; 30].

The goal of German “Soft Power”. The British Portland-PR agency has announced the 2019 World Ranking of Soft Power Diplomacy. It is ranked third in the Federal Republic of Germany. Germany retained its 2018 position[1].

For a number of reasons, soft power has historically played a particularly important role in German international relations[5; 28-58]:

Firstly, after World War II, the tools of "hard power" for this country became inaccessible, and so far the possibilities of using many of them are limited, since at the international level such actions will be perceived negatively;

Secondly, after the Second World War, Germany had to restore its reputation for a long time, including through cultural diplomacy, respect for human rights, and support for pluralism and multilateral international relations;

Thirdly, recently the popularity of "soft power" instruments has been growing all over the world, and Germany, as one of the largest economies in the world, cannot remain aloof from this international trend.

It should be noted that the practice of implementing "soft power" does not always correspond to the understanding that J. Nye puts into this concept (this is clearly seen in Central Asia). Often, "soft power" is understood to mean any impact not by force. It seems that the emphasis on attractiveness opens up great opportunities for influence. However, for this it is necessary to build a strategy and determine:

- firstly, why "soft power" is being realized (what short-term and long-term goals are set);

- secondly, to select the population groups to which "soft power" will primarily be oriented;

- thirdly, to evaluate what can be attractive for these groups and in what ways this attractiveness can be demonstrated. In this case, of course, it is important to consider what and how other actors in the region do with the help of "soft power".

"Soft power" is widely used both by external actors in relation to Central Asia, and by internal ones. At the same time, participants use different strategies and influence different groups of the population. So, Russia sets the task of working with a Russian-speaking audience; The United States pays a lot of attention to Internet technologies, having in mind primarily the youth audience; The US and the EU focus on a variety of programs, including environmental and health; China seeks to influence through official channels, with emphasis on language and culture; The EU and China use "soft power" in many ways to realize economic interests[6].

Germany's "Soft Power" diplomacy in Central Asia. German policy in Central Asia should be viewed in two ways. Firstly, within the framework of common EU strategies for this region, the role of Germany in the development of these strategies is increasing. And secondly, Germany,

unlike other EU member states, has its own special interest in Central Asia - the protection and support of German-speaking minorities living in Kyrgyzstan, Uzbekistan and Kazakhstan. According to researchers, Germany has no serious geopolitical interests in Central Asia, only limited to economic interests[8].

Therefore, the goal of Germany's soft power policy is to increase the country's influence in the world through language, culture, science, economic relations, and through promoting international development. To achieve this goal, Germany allocates financial resources and takes a number of measures both at the federal and regional levels, supporting and developing networks of organizations with foreign missions, whose activities form the image of Germany abroad and contribute to the establishment of international relations in the field of culture, education, science and business. As a result, Germany has become a recognized "locomotive" of European integration, whose opinion is heeded in the event of crisis not only in the European integration space, but also within the framework of multilateral structures in which it has recently sought to play a major role.

The main institutions of German "soft power" diplomacy in Central Asia can be divided into two parts [See: 5; 28-58]:

- The first is the direct government agencies and the various projects under their jurisdiction. Currently, there are seven state-recognized organizations in Germany that act as intermediaries between the customer (state) and the final recipients of support. Among them, only one state organization is the Society for International Cooperation (Gesellschaft für Internationale Zusammenarbeit, GIZ). This structure was formed in 2011 through the merger of three organizations - the Society for Technical Cooperation (Gesellschaft für Technische Zusammenarbeit, GTZ), the German Development Service (Deutscher Entwicklungsdienst, DED), and the International Society for Continuing Education and Development (Internationale Weiterbildung und Entwicklung GmbH, InWEnt). The merger was justified, inter alia, by the need to eliminate duplicate functions. GIZ customers are various federal departments, primarily the German Ministry for Economic Cooperation and Development, as well as the Ministry of Foreign Affairs and the German Ministry of Education and Research. Today, the Society for International Cooperation (GIZ) operates in four Central Asian countries: Uzbekistan, Kazakhstan, Kyrgyzstan and Tajikistan.

In Uzbekistan, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH implements projects and programmes on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), the German Federal Foreign Office (AA) and the German Federal

Ministry of the Interior (BMI). GIZ opened a country office in the capital Tashkent in 1992. Other project offices in Syrdarya, Jizzakh, Kashkadarya and Andijan regions as well as in Karakalpakstan are responsible for activities in the country's rural areas[10]. Within the framework of international cooperation, GIZ is supporting reforms in the economy, health and the protection of natural resources. Health is a priority area of Germany's cooperation with Uzbekistan. GIZ is working hard to promote inclusive economic growth. By developing the private sector, the aim is to support the diversification of the economy and expand the upstream and downstream sectors of agriculture in order to create jobs and income-generating opportunities, particularly in disadvantaged regions.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH has been working in Kazakhstan since the early 1990s. It opened its first office in 1996 and today has offices in Nur-Sultan and Almaty. The Kazakh Government is receiving support in the following areas:

- Long-term economic development and good governance
- Education and vocational training
- Environment and climate

GIZ has maintained an office in the Kyrgyz capital of Bishkek since 1992. GIZ is also implementing a number of projects in Central Asian countries on a regional and transnational basis, most of which are administered from Kyrgyzstan. In addition to managing our work in Kyrgyzstan, the office in Bishkek is also the regional office for Central Asia and coordinates activities in this region. Economic stabilisation, structural reforms and debt reduction are key objectives of Kyrgyzstan's Country Development Strategy (CDS), which aims to reduce poverty nationwide. GIZ's projects make a flanking contribution to sustainable economic development by promoting the private sector, supporting the abolition of trade barriers and providing advisory services for the microfinance and resource sectors.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH has been working in Tajikistan since 1995. It has offices in the capital, Dushanbe, and two other locations. Working on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), other German federal ministries and the European Union, GIZ focuses on the following priority areas in Tajikistan:

- Environment and climate
- Economic development and employment
- Social development

Recently, Germany has been paying more and more attention not only

to the development of science and innovation, but also to the dissemination of information and the development of cooperation in this area. In Germany, there are about 750 state-funded research organizations, as well as research and development centers for industrial concerns, many of which are united in networks and groups in order to accelerate the process of introducing new goods and services. For example, such an organization is the Fund them. Humboldt (Alexander von Humboldt Stiftung). This fund is mainly funded by the Ministry of Education and Science and the Ministry of Foreign Affairs, as well as some other federal departments. The fund finances long-term trips of researchers to Germany for the purpose of conducting research, and also issues awards for achievements in various fields of science.

- *The second is non-governmental organizations.* The most important part of the political culture of Germany is the unique system of funds of political parties that are members of the Bundestag (German parliament), which are one of the most significant tools of the country's "soft power". There are currently six political foundations in Germany, all of which are affiliated with German political parties.

1. Friedrich-Ebert-Stiftung, 1925 - Sozialdemokratische Partei Deutschlands, SPD
2. Friedrich-Naumann-Stiftung, 1958 - Freie Demokratische Partei, FPD
3. Konrad-Adenauer-Stiftung, 1965- Christlich Demokratische Union Deutschlands, CDU
4. HannsSeidel-Stiftung, 1967 - Christlich Soziale Unionin Bayern, CSU
5. Heinrich-BÖll-Stiftung, 1987 - Bundespartei Bündnis 90 / Die Grünen
6. Rosa-Luxemburg-Stiftung, 1992 - Die Linke

In Central Asia, funds (with the exception of the Böll Foundation, which is not represented at all in the region) do not have representative offices in all states. Mostly offices are located in the capitals of countries, in large metropolitan areas. So, the Friedrich Ebert Foundation has representative offices in Uzbekistan (Tashkent), Tajikistan (Dushanbe), Kazakhstan (Almaty), Kyrgyzstan (Bishkek); Konrad Adenauer Foundation - in Tashkent and Astana; Friedrich Naumann Foundation - in Kazakhstan, Kyrgyzstan, Uzbekistan and Tajikistan; Hans Seidel Foundation - in Astana, Bishkek and Dushanbe; Rosa Luxemburg Foundation - only in Almaty.

Currently, the work of the Adenauer Foundation in Central Asia is carried out from the regional office in Tashkent. One of the most important priorities is to stimulate the Central Asian countries to regional economic and political cooperation. In addition, in recent years, the foundation has been carrying out consulting activities for parties with a democratic orien-

tation, cooperates with parliamentarians, continues to work with municipal self-government structures, supports the development of the media, holds events as part of a dialogue of religions and cultures, and works intensively with youth. The Friedrich Ebert Foundation also has a bureau in Uzbekistan, from which it coordinates its activities in the countries of the Central Asian region. The main areas of work of the Ebert Foundation are strengthening civil society (pluralism, democracy), educational programs in the field of economic policy, and support for regional cooperation.

In addition to political foundations in Central Asia, other German non-governmental organizations or carrier organizations working within the framework of German and European strategies are also represented. These include the German Academic Exchange Service (Deutscher Akademischer Austausch Dienst, DAAD), the German Schools Union (PASCH), and the Goethe Institute. Projects carried out by German host organizations outside European programs, on a bilateral basis, are coordinated with the respective projects of the EU and other European countries in order to avoid overlaps.

The Goethe Institute, with more than 150 offices in almost 98 countries, operates in all major cities of the region (Astana, Tashkent, Dushanbe and Bishkek), in addition to having its representative offices in Karaganda, Kostanay and Pavlodar. The organization's activities are aimed at popularizing the German language and culture abroad, expanding international cooperation. The staff of the centers are specially trained German specialists, as well as local candidates who are fluent in German. The Institute provides an opportunity to take a variety of courses in mastering and improving the level of foreign language proficiency. Students in general and higher educational institutions are given the opportunity to participate in competitive programs[4].

The German Academic Exchange Service (DAAD) is the largest organization responsible for managing programs aimed at supporting cooperation in higher education and exchange with all countries of the world. The company was created in 1925 and recreated in 1950: now DAAD is an independent non-profit organization, full members of which are higher education institutions and student organizations in Germany. DAAD implements over 250 programs through which it annually finances more than 74,000 German and foreign scientists around the world[9].

In addition, DAAD is part of an extensive global network of experts and policy makers. The DAAD service carries out its activities in the field of exchange with the region where the CAEP project is implemented, through the Central Asia and the Caucasus department in Bonn, with the support

of its branches abroad ("information centers"), which are established in the following cities: • Almaty, Kazakhstan); • Bishkek (Kyrgyzstan); • Tashkent (Uzbekistan); • Dushanbe (Tajikistan); • Baku, Azerbaijan); • Yerevan, Armenia) ; • Tbilisi, Georgia).

In February 2008, the Federal Ministry of Foreign Affairs launched "The Schools: Partners for the Future" (PASCH) initiative. "The Schools: Partners of the Future" (PASCH) initiative supports and unites about 2,000 PASCH schools around the world, focusing on relations with Germany. The Goethe Institute oversees about 600 schools participating in the PAS initiative, which are part of national education systems in more than 100 countries. The initiative provides support to German schools abroad and schools offering the German language diploma exam. In addition, a system of cooperation with schools is being built to stimulate the study of German as a foreign language within the framework of national education systems. In addition, scholarships for study in Germany are provided, as well as exchange programs for students and partnerships between schools.

In conclusion, the influence of the concept of "soft power" on German Central Asian policy is effective: First, there is no geopolitical competition between Germany and Central Asian states; Second, the core focus of German Soft Power in Central Asia is economic, educational, and cultural relations; Third, while German foreign policy has well-established mechanisms for implementing soft power, there is no clear strategic initiative for Central Asia. Fourth, the newly independent Central Asian states are seeking to successfully use the German experience in state and society building. In this regard, in the context of modern geopolitical competition in Central Asia, the most effective way to increase Germany's influence in the region is the systematic use of "soft power" diplomacy.

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COMPARATIVE ANALYSIS OF MIGRATION PROCESSES IN NORTH AFRICAN COUNTRIES

Madaminova Durdona Iskandarovna
Candidate of Political Sciences, Associate professor,
Tashkent State University of Oriental Studies,
Uzbekistan

Abstract. The article examines effects of migration to changing many nation states acts such as preservation of national identity, protecting political balance and keeping national security issues. At the current time escalation of migration processes, has a negative impact on each states national security and national identity, as well as on the development of the countries of North Africa. These countries serving as a transit corridor for their citizens, and migrants from the Middle East and other African countries to Europe, Asia and America. Cause of the influx of asylum seekers, the number of legal and illegal migrants have increased. Since some of them fail in migration processes, they are forced to settle in the countries of North Africa. The countries of North Africa, such as Morocco, Algeria, Libya and Tunisia in the history of the formation and development of statehood, have experienced various forms of migration, including internal and external, voluntary and compulsory, individual and collective, legal and illegal migration.

Even at the current time, Libya has also traditionally been a major transit country for a movement of migration flows from African countries to European countries. In recent years, the dynamics of these processes has intensified. This was particularly influenced by the military-political situation in southern sub-Saharan Africa, which served as a source of migration flows, as well as the political situation that arose in 2011 after the overthrow of Muammar Caddafi. Despite the fact that in February 2020 marks nine years since the beginning of the Libyan revolution, a civil war is still ongoing in the country. In addition, radical Islamic organizations that belong to terrorist groups retain their influence in the territory of the state. Therefore, it is reasonable to assume that in the coming years, under the influence of the economic and political processes of these countries, the number

of migration flows moving to Europe through Africa will only increase. This article analyzes the history of the migration problem, its causes and consequences. Studying migration processes using the example of North African countries, we can conclude that the current situation negatively affects national security, national identity and socio-economic development of these countries.

Keywords: migration, migration policy, transit migration, demographic instability, illegal migration, the "Arab Spring", national security, unemployment, poverty.

Introduction

At the current globalizing world, influence of international migration affects many nation states acts such as preservation of national identity, protecting political balance and keeping national security issues.On the occasion of the 24th anniversary of the adoption of the Constitution of the Republic of Uzbekistan, a ceremonial event took place at the Uzbekistan" palace of international forums on December 7, 2016. At the ceremony, President Shavkat Mirziyoyev spoke about the urgency of the growing threat of religious extremism, terrorism, drug addictions, human trafficking, illegal migration, and mass culture around us today, the deeper meaning and significance of these words are even clearer from these issues. "Indeed, educating young people today is an issue that will never lose its relevance and importance for us" he said.[1]

It is obvious that in recent years, as a result of the demographic instability in the world, radical changes happened in the political, financial and economic world order. In particular, the Arab Spring has caused millions of migrants to move to Europe. The current situation has a negative impact on the economies and sustainable development of European countries. En example of African countries, after 1960s (in the years of independence) it can be seen that the number of migrants increased from 5 to 31 times. To date, the escalation of migration processes is having a negative impact on national security and national identity, as well as the development of North African countries.

Goals and Objectives: Analyzing the migration processes, the factors that contribute to their intensification, the direction of migration, and the changes in social life under the influence of migration flows, in the case of the Middle East and North African countries. The aim of the article is

1 Shavkat Mirziyoyevning O'zbekiston Respubliikasi Konstitutsiyasi qabul qilinganining 24 yilligiga bag'ishlangan marosimidagi ma'ruzasi // Avialable at; https://www.gazeta.uz/uz/2016/12/07/speech/

to identify trends in the problem, to summarize the results of research, to identify the current problem, and to draw conclusions. The following tasks have been set in this direction:

- A comprehensive study of the factors contributing to the escalation of migration processes in the Middle East and North Africa;
- Determining the direction of movement of migrants;
- Assessment of the economic, political and socio-cultural situation in Europe as a result of migration flows;
- promotion of proposals and recommendations on combating migration in the context of globalization as a threat to international security.

Methods: at the prosses of writing this article theoretical-methodological, historical and objectivity, historical-comparative, historical-comparative, historical-typological, system-based, system-analysis, structural-task, structural-system, synthesis, analysis, historical-genetic, chronological methods were used.

Conclusions and Remarks: last decades it can be seen that trends in migration processes in African countries, with migrants from Central, South and West Africa moving mainly to America and Oceania, and migrants from North Africa to Europe. Factors such as the economic crisis, escalation of military conflicts and violence, poverty, job shortages and poor quality of education in the Middle East and Africa have led to high rates of resettlement in the region and remaining as a significant issue. Geographically, African countries such as Morocco, Algeria, and Libya are becoming an increasingly transit destination for African immigrants seeking Europe. Today, the migration crisis that has contributed to the collapse of Europe is one of the biggest crises that have emerged since the end of World War II. At the same time, the current political situation demands the development of a migration science based on the study of the migration movement of the population and the formation of a theoretical basis for the management of existing processes.

By the 21st century, countries that are active participants in the world politics have been operating under the positive and negative effects of globalization. In this context, international migration has put nations at the forefront of issues such as political stability and national security and preserving their national identity. Cause of the demographic instability in the world in recent years, political, financial and economic changes in the world order have undergone fundamental changes, in particular the inequality between different state societies. In the context of globalization, migration processes are becoming one of its components. Exactly in 2010, the Arab Spring, which covered these countries, set the stage

for millions of migrants to move to Europe. This situation has had a negative impact on the economies and sustainable development of European countries. In the case of African countries, there has been a rapid expansion in the number of migrants, which has increased more than fivefold to 31 times since the 1960s.[2] To date, the outbreak of migration has a negative impact on national security and national identity as well as the development of North African countries. Along with their nationals, these countries serve as a transit hub for migrants from the Middle East and other African countries to Europe, Asia and America. The influx of refugees has led to an increase in the number of legal and illegal immigrants. Some of them fail in migration processes and are forced to settle in North Africa. In this regard, it is worthwhile to mention the history of the origin and development of migration processes in these countries. North African countries such as Morocco, Algeria, Libya and Tunisia have experienced various forms of migration, including internal and external, voluntary and compulsory, individual and collective, and legal and illegal migration. Modern immigrants were born under the influence of colonialism and flourished in several directions. It is well known that in the late 19th and early 20th centuries, Africa had numerous administrative and territorial divisions, excluding ethnic groups. As a result of this policy, countries with different ethnic groups were emerged on the continent.

During the colonial policy in Africa, foreign businessmen, farmers and traders, who later settled in the region, became more active. There has been some temporary migration of the rural population as a result of increased labor demand in production-related activities. However, as the colonial authorities have increasingly lost control of these processes, the existing policy has given rise to the process of urbanization, which is still active today.

The movement of the first influx of migrants to Europe also happened at the colonial period. The first wave of them was made up of those who served in the French Army and thus came to Europe, and in recent years this process has grown more and more, based on the needs of the host countries. Although emigrants from European countries were initially attracted to Western Europe for a period of time, they continued to work there permanently because of employment problems in their home countries. In recent years, there has been support from countries such as Morocco and Tunisia, as the ability of the state to improve the solvency of migrants through remittances.

2 Moxamed Grifa. Osnovnye tendencii migracionnyx processov cherez strany Severnoj Afriki (The main trends of migration processes through the countries of North Africa) // Aziya i Afrika. – Moskva, 2019. – no 2. – pp, 49-52.

By 1974, the number of immigrants in Europe was 1.5 million. Approximately 500,000 of them were Moroccan immigrants. According to the Ministry of Employment Promotion in the 1970s, the total number of immigrants in 1986 increased from 17,000 to 30,000.[3] Immigration service centers were established in France, Belgium, and the Netherlands for recruitment in major Moroccan cities such as Casablanca, Rabot, Fos and Morocco.[4]

In the 1970s and 1980s, two immigrant streams were affected by the policy of voluntary and involuntary resettlement of immigrants, the ongoing wars in the Saxel and climate change related to drought. Former settlers and merchants, such as Tuareg, who had financial problems, were involved in oil fields and construction activities in Algeria and southern Libya. The second category of refugees is who have been settled in numerous cities in Libya, Algeria, Mauritania and Egypt as a result of the war in the Sahel.[5]

Migration flows have been recognized by some North African governments as a positive process. In particular, migrants from southern sub-Saharan Africa to Algeria and Mauritania have helped to meet the demand for labor and increase the activity of minorities. The second category of refugees is the thousands of refugees who have been settled in numerous cities in Libya, Algeria, Mauritania and Egypt as a result of the war in the Sahel. Migration flows have been recognized by some North African governments as positive. In particular, migrants from southern sub-Saharan Africa to Algeria and Mauritania have helped to meet the demand for labor and increase the activity of minorities.

It is well known that today Libya traditionally serves as a transit point for the migration flows from Africa to the European countries. In recent years, the dynamics of these processes have intensified. This was especially influenced by the military and political situation in the southern sub-Saharan Africa, which served as a source of migration flows, and the political environment that emerged in 2011 following the ouster of Muammar Gaddafi. Despite the nine years since the start of the Libyan revolu-

3 Reznik G.A., Amirova D.R. [Migration as a threat to the national security of the country: international and national aspects] Migraciya kak ugroza nacionalnoj bezopasnosti strany: mezhdunarodnye i nacionalnye aspekty // Internet-journal "Science of Science". Volume 8, No.6. (2016). Avialable at: http://naukovedenie.ru/PDF/82EVN616.pdf (accessed: 10.15.2019)

4 Natter K. The Formation of Morocco's Policy Towards Irregular Migration (2000-2007): Political Rationale and Policy Prosses // International Migration. 2013. – P. 82.

5Дейч Т.Л. [African migration in the context of modern international relations]. Afrikanskaya migratsiya v kontekste sovremennyih mejdunarodnyih otnosheniy. – Moskva: IAfr RAN, 2015. – S. 45.

tion in February 2020, the country still has a state of civil war.

Further more, radical Islamic organizations belonging to terrorist groups maintain their influence on the territory of the state. Therefore, it is safe to assume that the economic and political life in these countries will increase in the coming years, as the number of migrants moving to Europe through Africa.[6] Immigrants are now making their way through the Earth and Air route, which has multiple destinations. Only a small number of immigrants from the western countries use air transport. Most of the immigrants enter North Africa through the town of Agades, Niger. [7]

Migrants from southern Libya will travel to Tripoli, coastal cities or Tunisia. Through coastal areas, they travel by boat to the islands of Malta or the Italian island of Lampedusa, the Pantallera, and Sicily. Emigrants settled in Algeria's Tamanrasset migrate to Morocco through the country's northern cities or the border area of the city of Ujda.

Due to increased control in the border areas of the Gibraltar Strait, migrants in Morocco seek to move south to the western Sahara, to the Canary Islands, which are part of the Atlantic Ocean. To date, Libya has become one of the main intermediary countries connecting East Africa with the Mediterranean. Along with the growing Egyptians, there are also labor migrants and refugees from countries such as Sudan, Somalia, Eritrea and Ethiopia.[8]

Most of the immigrants from countries such as Mauritania, Cape Verde and Senegal to the west of the African continent are moving westward to the Kabir, trying to cross the Canary Islands. Refugees who have been unsuccessful in moving to Europe find alternatives to settle in North Africa. Large immigrant communities are formed in areas such as Nuakshot, Rabot, Algeria, Tunisia, Tripoli, Benghazi and Cairo. Immigrants who have no formal legal status in these countries are now employed by the informal services sector, such as cleaning services, housekeeping, housekeeping, construction, agriculture and fisheries. Some of them are trying to contin-

6 Hein de Yaas. Trans-Saharan Migration to North Africa and the EU: Historical Roots and Current Trends. Migration Policy Institute November 1, 2017 – http://www.migrationpolicy.org/article/trans-saharan-migration-north-africa-and-eu-historical-roots-and-current-trends (accessed 11.11.2019)

7 Agades shahri hozirda G‘arbiy va Markaziy Afrikada joylashgan tarixiy savdo yo‘llari chorrahasida joylashgan. Aynan Agadesda muhojirlarning Liviya va Jazoir (Tamanrasset shahri) davlatlari tomon yo‘nalgan ikki oqimi vujudga keladi.

8 Natter K. Fifty years of Maghreb emigration: How states shaped Algerian, Moroccan and Tunisian emigration. IMI/DEMIG working paper. University of Oxford: International Migration Institute. 2014. – P. 37.

Herbert M. At the edge. Trends and routes of North African clandestine migrants // ISS Paper 298. November, 2016. – P. 6.

ue their education in order to obtain residency and temporary registration.

Although perceptions of migration processes are related to factors such as poverty and rising unemployment, research shows that immigration to areas with higher income and education quality and access to information and social networks is possible. Current situation is mainly observed among young people.[9] Armed conflicts and unstable situation will undoubtedly have an impact on this process, as evidenced by recent political crises in North Africa and the Middle East. Although the current situation is recognized as a major factor, the link between migration and violence is characteristic.

Population of living in areas that are at risk of military action or violence are often reluctant to become "passive victims" rather than refugee camps, but to settle in relatively quiet rural and urban areas where they can begin and adapt. are moving. Indeed, while military conflicts and the mood of violence can exacerbate the current situation, they can at the same time reduce the risk of migration. Although life-threatening and lack of basic living conditions lead people to migrate, some obstacles prevent them from leaving their homes.

Existing factors include the risk of losing property, financial deficits, inadequate knowledge and opportunities to change their place of residence and so on. In addition to the above-mentioned "personal" reasons, it may also be prevented by authoritarian regimes such as emigration and restriction (such as exit visas and passport control).[10]

While factors such as instability and outbreak of poverty are one of the main causes of migration across North Africa and the region, it is important to remember that labor demand is also crucial. The demand for labor in foreign labor markets such as Africa, Europe and the Middle East is an important factor in making changes in the African migrant model.

High segmentation of the labor markets in Europe and the Middle East enables employment of both highly skilled and relatively low-income migrants. In this case, it is worth noting the "feminization" of migration processes in the case of North African countries. Because, unlike other regions, there is a growing need for women as home workers in Europe and North America.

Factors such as poverty and lack of jobs in rural areas is the main rea-

9 Flahaux M. African migration: trends, patterns, drivers // Comporative Migration Studies. 2017. http:/comporativemigrationstudies.springeropen.com/articles/10.1186/s40878-015-0015-6. (accessed 27.11.2019)

10 Chernyak A.V. [Political cooperation between Russia and the EU in the regulation of international migration processes: status and prospects. Dr. polit.sci.diss.]. Politicheskoe sotrudnichestvo Rossii i ES v regulirovanii mejdunarodnyih migratsionnyih protsessov: sostoyanie i perspektivyi: dis. … kand. polit. nauk. – Orel, 2015. – S.230.

son of the aspirations for urban areas.

At the same time, desire to study in Europe and America is increasing among the population. Some researches about African students' revealed that 5.8% of African students are leaving their homeland to pursue higher education. The current level of student mobility is highest among the regions of the planet, which can be explained by the quality of education available and the limited availability of higher education.[11]

In conclusion, it can be seen the migration trends in African countries over the past 50 years, with migrants from Central, South and West Africa moving mainly to America, Oceania, and North Africa. Migration processes in the African continent maintain high intensity. Until recently, there have been cases of African withdrawal in North African countries, but this is evident in the aspirations of migrants from Europe, Asia, and North Africa, for example in Eastern and West Africa. Thus, factors such as the economic crisis, escalation of military conflicts and violence, poverty, job shortages, and poor quality of education in the Middle East and Africa have led to significant migration. It is becoming more and more important as the problems must be solved.

Morocco, Algeria, and Libya have become increasingly transit cities for African-American migrants seeking geographical location. With the ever-expanding European Union from 2015, the migratory crisis that has laid the groundwork for Europe's demise can be regarded as one of the biggest crises that have emerged since the end of World War II. Simultaneously, the current political situation demands the development of a migration science based on the study of the migration movement of the population and the formation of a theoretical basis for the management of existing processes.

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11 Kryukova O.V. [Modern Immigration from the Maghreb to Western Europe: Regional Features]. Sovremennaya immigratsiya iz stran Magriba v Zapadnuyu Evropu: regionalnyie osobennosti. Modern Immigration from the Maghreb to Western Europe: Regional Features 2009. – SPb. – S. 15.

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THE BOLOGNA PROCESS IN THE HIGHER MEDICAL EDUCATION AND ITS CONTRADICTIONS

Izvin Alexandr Ivanovich
Tyumen State Medical University
Tyumen, Russia

The purpose of the work - analyze the opportunities offered by the Bologna system to improve the quality of higher medical education in the post-Soviet space. Any innovations in education, including entry into the Bologna process, should first be evaluated in terms of their impact on the quality of education. The article identifies the main factors contributing to a decrease in the quality of specialist training, as well as evidence that the principles of the Bologna Declaration can work effectively only in the Western educational model, but even there their widespread implementation in practice is often fraught with significant contradictions. However, the two-level training system deserves attention, firstly, as a mechanism for the student to easily transfer to another specialty after completing the cycle of the first level, and secondly, as a means of shortening the general period of specialist training. It is established that the competency model, cited as exclusively European innovation, is in fact borrowed from Soviet higher education. The destructive consequences of the total transition to a modular teaching system are described.

Keywords: Bologna process, quality of education, competency-based model, modular education system.

In 1999, in the Italian Bologna, 29 countries signed the famous Bologna Declaration on a single zone of European education, which marked a new stage in the development of higher education in Europe. Currently, 49 countries, including Russia, have joined the Bologna Process (BP). In the beginning of the 90s, we and the former republics of the Union were given the condition - in exchange for World Bank loans, to accept USE in schools and the Bologna system of higher education.

The beneficiaries of the reforms are the leading European and American universities, which do not use the Bologna system, but use the classical national systems. The Bologna system is based on standardization,

simplification and cheapening of mass education with a reduced level of teaching. With the help of the Bologna system, they collect young "brains" for themselves all over the world.

At present, the level of training of specialists and, consequently, the quality of education show a steady tendency to fall, and this problem is relevant for all countries where there is a higher school. It is no secret that the level of training of a mechanic half a century ago corresponds to the level of training of a modern engineer, and the pre-war medical assistant is a modern doctor. At the same time, it is quite obvious that a higher school, like any other social system, should correspond to the level of social development, and it would even be nice if it outstrips it somewhat, which now, unfortunately, is not observed. Soviet higher education was respected throughout the world and was for its time a fairly developed educational model. This has manifested itself most clearly in recent years, when the resource for the development of the educational system, laid down in the Soviet period, has practically dried up, and new sources of movement have not appeared.

The second reason for the decline in the quality of higher education is the lack of motivation to study. If the employer does not see the correlation between the grades received at the university and the level of training, then the student himself does not see it. This is due to the fact that universities and production workers fundamentally differently understand what a specialist is. Although formally the Bologna Declaration does not concern this problem, in fact, within the framework of BP, a solution is proposed through the introduction of academic degrees. It is about dividing higher education into two incompatible segments: elite – for chosen and mass – for everyone else. The academic degrees offered by the Bologna Declaration are an attempt to combine the incompatible: on the one hand, to leave higher education widespread, and on the other, to make it clear that it is not truly higher.

It could be assumed that the extensive program of reforming higher education in Europe, which has already gone down in history as BP, has as its main goal to improve the quality of training of specialists or, at least, to prevent its decline. The reforms should be based on the improvement of teaching methods and knowledge control. However, in reality, not these aspirations formed the basis of BP. The Bologna Declaration does not contain a single line devoted to this topic, although the topic is quite worthy of becoming the subject of the broadest discussion.

In most countries that have joined BP in recent years, the most active supporters of the Bologna reforms are officials responsible for the educa-

tion system. At the same time, universities and professional associations are not enthusiastic about the reform process, for there have been many contradictions in the implementation of the Bologna Declarations, despite the fact that the European education system has been preparing for reforms for more than a decade. First of all, relations between the countries participating in BP are not supported by any legal norms. Secondly, in the participating countries themselves, there are no legal obligations of state bodies in relation to the implementation of its goals. So, for example, right after Russia's entry into BP, experts noted that the continuation of reforms requires a change in its right margin in accordance with the principles of the Bologna Declaration, but in fact there are no significant changes today [1].

Already in 2000, a year after the official launch of the BP, representatives of the largest European associations of engineering education, diplomatically supporting the ideology of reforms, noted that this type of training is already a fairly integrated subsystem in European higher education, and therefore does not need further integration. Therefore, among engineers, a bachelor's degree remained an intermediate stage of preparation, not fitting into the fundamental principles of BP. It was emphasized that the recommended period of undergraduate 3 years and graduate 2 years can in no way be regarded as dogma, and other options are quite acceptable, for example: 5 years or 4 + 2, etc. [3].

It is symptomatic that the question of who needs a bachelor's doctor, how the Bologna Declaration is positioning him, did not even arise, because many European countries excluded medical education from the BP format without any discussion, and at the same time with the medical one, pharmaceutical and veterinary. Back in 2005, at the Russian-German seminar "The Bologna Process: Problems of Two-Stage Higher Vocational Education", held at the South Russian State University, a statement was made that the two-stage higher education system is unacceptable for certain specialties, including medical ones, and should be built on monoprograms lasting at least 6 years. In their political statements, the main BP strategy was approved by almost all public medical organizations in Europe, but in fact the two-stage system of medical education was not supported by the World Medical Association, the World Federation of Medical Education, the Standing Committee of European Doctors and even some European medical student associations. European countries such as Finland, Poland, Denmark, Sweden, and active BP participants are not in a hurry to introduce a two-stage system of training for doctors [5-6].

Problems in higher education, including post-Soviet, undoubtedly ex-

ist and require their solution. However, how capable is BP to solve given all its inconsistencies, which creates numerous inconsistencies even in the countries it initiated?

1. The fact that about 40% of people who graduate from a university do not work by profession is a well-known fact. From this point of view, the training system provides a tool at least for a partial solution to this problem if, after completing the first stage of education, it is possible to transfer to another specialty, or maybe to another faculty. A similar practice is widely used in Japan, which never sought to join BP.

2. Further, the idea of a three-year bachelor's degree makes us think about a significant reduction in the terms of study, primarily due to a decrease in hours for theoretical disciplines, and such a reduction in terms is possible only through a decrease in the amount of information offered to students. At the same time, as paradoxical as it is, there is still no clear scientific justification for what and in what volume one or another specialist should study. And how can one determine this sufficient minimum? Obviously, it is necessary to translate the content of education to those professional requirements that are presented to a specialist in his real work. However, there is no methodology for such a translation either. Consequently, today no one is able to reasonably prove that this specialist needs one discipline, and another is not needed [4]. So, for example, does a pharmaceutical student who will work in a pharmacy really needs one and a half dozen different chemical disciplines in order to sell aspirin tablets?

In fact, the vicious practice of introducing more and more information into the curriculum began in the USSR in the late 80s. At the same time, new academic disciplines began to appear, devouring academic time, but introduced not only to improve the quality of training of specialists, but as a tribute to fashion and the desire to keep up with modern technologies.

3. Representatives of the professional community and public opinion came to the understanding that success in the profession is not only related to having a diploma. The personal qualities of a specialist, communication skills, past work experience are becoming increasingly important, and in this context, a new model for assessing the level of specialist training, the competency, has been introduced in Europe. The old approach - qualification - was emasculated, but it was based on professional knowledge and skills. The new model, in addition to training, seeks to evaluate the learner’s personal qualities: initiative, the ability to work in a team, the ability to select useful information from a large information stream, logical thinking, the ability to quickly adapt to a new team, city, country. There

is no objection to this approach, but it is surprising that this model again comes to our universities from the West as a kind of innovation. Although everyone knows that the assessment of a specialist in the Soviet system of education has always been based on a competency-based approach rather than a qualification approach in its purest form. Today, the same thing is offered to us as a pedagogical innovation, and it is exclusively of a Western standard. In fairness, it should be said that in those days in the West it was precisely the qualification model that prevailed in the assessment of a specialist. It seemed to us then that this approach was the most logical, and we looked with undisguised envy at the iron curtain. However, life has shown the correctness of the Soviet version of the solution to this issue, therefore, for Western higher education, the transition to a competency model is truly innovative.

4. The so-called credit-modular teaching system is considered a significant innovation related to BP, despite the fact that the Bologna Declaration itself does not indicate a modular system as an unreasonable priority. Most Russian studies devoted to this topic lack a clear understanding of what the modular teaching principle is, although there is Order № 2654 of the Ministry of Education of 11.07.2002, on conducting an experiment on introducing a rating system for assessing academic performance of university students, which and provides for the block-modular principle of building the educational process. The conference in Krasnoyarsk (2012), “Actual Problems and Prospects for the Development of Russian and International Medical Education,” was devoted to the same issue. It was proposed to consider a small but finished part of the training material as an autonomous unit and to form a training course from such autonomous units that can be easily counted. At first, these units were called "microcourses", then credit cards, and then "modules". The “module” began to evolve, and the idea arose to design modules, combining information from different disciplines, which quickly gained popularity.

The attractiveness of modular teaching is due to the fact that the module can include only what, according to the creators, is of interest, while the rest of the information contained in the discipline can be ignored. The traditional (disciplinary) method of teaching differs from the modular one in that it gives a systematic idea of the subject of study and its place in the universe. It is the systemic idea of the world that is put into the young person in the process of education that forms an independently thinking personality, which is especially important in a medical university, in which the image of a future doctor, his personal and professional competencies are formed. In this regard, the question arises: should the teach-

ing of “narrow” specialties (otorhinolaryngology, urology, ophthalmology, etc.) somehow change in connection with Bologna initiatives? And how should these initiatives reflect on the training of "narrow" specialists? In fairness, it should be noted that neither the Bologna Declaration nor subsequent documents regulate these processes, since they relate mainly to the undergraduate study period, and the acquisition of a narrow medical specialty belongs to its postgraduate stage. This problem is artificially aggravated when, in the guise of introducing Bologna innovations, an attempt is made to completely copy the Western system of training medical personnel, which poses a serious danger.

At the same time, it should be emphasized that the development of medical pedagogical science at the present stage is impossible without the introduction of new educational technologies. The unification of efforts of different countries in the field of improving educational technologies is welcome. However, Bologna initiatives, being deeply controversial in their socio-historical nature, cannot be transferred mechanically to the post-Soviet space. They will be useful only to that national school, which with the high quality of its work deserves the respect of partners in the Bologna community.

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ASSESSMENT OF THE SEVERITY OF CORONARY ARTERY DISEASE IN PATIENTS WITH STABLE ANGINA IN COMBINATION WITH LIVER STEATOSIS

Zykina Elena Yuryevna
Postgraduate of the Department of hospital therapy
Kirov state medical University, Kirov, Russia
Simonova Zhanna Georgievna
Doctor of Medical Sciences, Associate Professor, Professor of the Department of hospital therapy
Kirov state medical University, Kirov, Russia

The study included 104 patients with stable angina. Group I consisted of 69 patients with a combination of non-alcoholic liver steatosis, group II (control) - 35 patients with stable angina in the absence of a combination with liver steatosis. The following parameters were evaluated: liver function, carbohydrate and lipid metabolism, coronary angiography (CAG) data. The severity of coronary atherosclerosis was analyzed on the Gensini score (GS). All patients underwent an ultrasound examination of the liver. Group I patients showed more significant hypertriglyceridemia and increased activity of liver transaminases. It was found that patients with stable angina in combination with non-alcoholic liver steatosis are characterized by multi-vessel coronary artery (CA)disease, in contrast to patients with stable angina without liver steatosis, who were more likely to have a lesion of one of the main CA. The proportion of patients with significant CA stenosis (>70 % of the vessel lumen) was higher in group I, amounting to 69,5 %, in group II – 42,8 % ($\chi 2$=6,9; p=0,009). The GS index values were higher in group I patients compared to group II (p=0,01).

Keywords: non-alcoholic fatty liver disease; atherosclerosis, obesity, stable angina, coronary heart disease.

Introduction

Non-alcoholic fatty liver disease (NAFLD) is the most common form of liver disease and a leading cause of morbidity and mortality in both developed and developing countries [1]. Currently, it is known that NAFLD is not only limited to the liver, but can also be part of a multi-system disease.

It is well known that patients with NAFLD usually die of extra-hepatic causes, frequently for cardiovascular diseases (CVD) [2]. This determines the importance of early diagnosis and treatment of suspected lesions of the cardiovascular system.

The aim of the study was to assess the severity of coronary atherosclerosis in patients with stable angina combined with non-alcoholic liver steatosis.

Materials and methods

The study involved 69 patients with stable angina pectoris in combination with non-alcoholic liver steatosis. The control group (n = 35) consisted of patients with stable angina without fatty hepatosis. Inclusion criteria: stable angina I-III functional class, age from 35 to 75 years; patient consent to participate in the study. Criteria for not inclusion: patient age up to 35 years and older than 75 years; the presence of chronic renal failure, type 1 and type 2 diabetes mellitus, severe heart failure, hypothyroidism, thyrotoxicosis, hepatitis B and C, alcohol abuse, a history of hepatotoxic drugs. During the study, complaints, medical history, questionnaires were collected, including to exclude alcohol and drug damage to the liver, measurement of anthropometric parameters, study of functional, laboratory and instrumental indicators. Persons included in the study did not abuse alcohol (questionnaires taking into account WHO recommended norms - less than 40 g of ethanol per day for men and 20 g for women).

Assessed: routine laboratory blood tests, including alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels. All patients underwent ultrasound examination of the liver on a Philips Epiq 5 apparatus (USA); selective coronary angiography (CAG) from femoral or radial access using the GE Innova 3100 IQ angiographic complex (manufacturer: GE Medical Systems, USA). In assessing the severity of coronary atherosclerosis, in addition to the standard protocol of polyprojectional CAG, the number of affected coronary arteries (CA) was calculated, taking into account only the presence of significant (more than 50% of the lumen of the vessel) stenosis in the segments of the coronary channel, and a modified Gensini score (GS) was used (Gensini GG, 1983) [3]. The GS index is an integral indicator of the severity of atherosclerotic lesions of the coronary arteries, taking into account not only the quantity but also the hemodynamic significance of each stenosis. Patients of both groups received basic therapy for coronary artery disease.

Statistical analysis was performed using the SPSS 11.0 program. The significance of statistical tests was defined at two-sided $p<0,05$. Quantitative variables were expressed as mean (M), standard deviation (σ), mean

error (m). For comparison of categorical variables, Pearson Chi square test was used, in case of count less than 5 in contingency table, Fisher's exact test was used.

Results and discussion

The formed groups were comparable by age, gender, fact of smoking, accompanying pathology, duration of ischemic history and arterial hypertension (table 1). A comparative analysis of the studied biochemical characteristics showed that in patients of group I, against the background of exceeding the reference values of the atherogenic parameters of the lipid profile, more significant hypertriglyceridemia was found in comparison with the control group (1,82 ± 0,96 mmol / l vs 1,25 ± 0,48 mmol / l; p = 0,0012) and a higher level of total cholesterol (5,5 ± 1,62 mmol / l vs 4,0 ± 1,03 mmol / l; p = 0,049) (table 2). The fasting plasma glucose level was in the target range in both groups, however, in group I patients it was higher compared to group II (5,5±0,4 vs 5,2±0,3 mmol/l; p=0,009). Group I patients showed a significant increase in liver transaminase activity compared to the control group: ALT (27,7±10,7 vs 19,4±6,2 U/l; p=0,000046), AST (27,0±9,0 vs 21,6±6,8 U/l; p=0,002). According to the results of ultrasound in 100% of patients of group I, non-alcoholic liver steatosis was detected. When evaluating CAG the following data were obtained (table 3). Hemodynamically significant stenosis of one of the main CA (monovascular lesion) in group I were established in 13 (18,8%), in group II in 16 (45,7%) patients (p = 0,004); bivascular lesion - in 13 (18,8%) and 8 (22,8%) patients, (p = 0,6); lesion of three vessels were found in 29 (42%) and 7 (20%), (p = 0,02) patients, respectively. In other cases, the changes in the CA were non-stenotic. Thus, patients with stable angina in combination with non-alcoholic liver steatosis have a multi-vascular lesion, in contrast to patients with stable angina without fat hepatosis, who more often have a lesion of one of the main coronary arteries. The proportion of patients with significant stenosis (>70% of the vessel lumen) was higher in group I, and amounted to 69,5%. In group II, this indicator was 42,8% (p=0,009). The proportion of patients with borderline stenosis (50-69% of vessel lumen) in groups I and II did not significantly differ (8,7% vs 20%). Non-stenosing CA lesion (<50% of the vessel lumen) was found with greater frequency in group II patients compared to group I (37,1% vs 21,7%). The GS index values were higher in patients with stable angina in combination with fat hepatosis compared to patients with stable angina without liver steatosis (69,2±47,67 vs 45,8±33,9 points, p=0,01). Our data are consistent with previously published research data, where it was demonstrated that non-alcoholic liver steatosis is associated with more

pronounced coronary atherosclerosis [4, 5].

Conclusions

Patients with stable angina combined with non-alcoholic liver steatosis, along with an increase in hepatic transaminases and severe hypertriglyceridemia, have more pronounced atherosclerotic changes in the coronary arteries compared with patients without liver steatosis. In patients with stable angina in combination with fatty hepatosis ultrasound examination of the liver being an affordable and non-invasive method, provides an opportunity to further predict the risk of progression of coronary heart disease.

Table 1

Clinical characteristics of patients with stable angina

Parameters	I group (study) (n=69)	II group (controls) (n=35)
Age, years (M±σ)	60,9±7,2	62,7±6,4
Male, abs. (%)	47(68,1)	27 (77)
Female, abs.(%)	22 (31,8)	8 (23)
Tobacco addiction, abs.(%)	36 (52,1)	20 (57)
Cardiovascular events in the anamnesis, abs. (%)	33 (47,8)	20 (57)
Family history of CVD, abs.(%)	46 (66,6)	23 (65,7)
Arterial hypertension, abs.(%)	69(100)	35(100)
Body mass index (BMI), kg / m2 (M±σ)	32,7±2,6	23,9±1,4*
Duration of coronary heart disease (M±σ)	11,2±4,2	10,2±4,45
Duration of arterial hypertension (M±σ)	12,3±5,1	11,1±5,2

Note:- level of significance of differences between groups p<0,05*

Table 2

Characteristics of laboratory parameters in patients with stable angina

Parameters	I group (study) (n=69)	II group (controls) (n=35)
Total cholesterol, mmol / l (M±σ)	5,5±1,62	4,07±1,0*
Triglycerides (TG), mmol/l (M±σ)	1,82±0,96	1,25±0,48*
HDL cholesterol, mmol/l (M±σ)	1,1±0,24	1,15±0,26
LDL cholesterol, mmol/l (M±σ)	2,74±1,36	2,31±0,93
GFR, ml / min/1, 73m2 (M±σ)	84,9±12,0	86,7±11,02
Plasma glucose, mmol / l (M±σ)	5,5±0,4	5,2±0,3*
ALT, U/l (M±σ)	27,7±10,72	19,4±6,2*
AST, U/l (M±σ)	27,0±9,03	21,6±6,8*
AST/ALT (M±σ)	1,03±0,34	1,17±0,49
Total bilirubin, mmol / l (M±σ)	17,7±9,5	14,5±6,5

Note:- level of significance of differences between groups p<0,05; ALT-Alanine aminotransferase; AST-Aspartate aminotransferase; GFR-glomerular filtration rate*

Table 3

Features of coronary artery disease in patients with stable angina pectoris

	I group (study) (n=69)	II group (controls) (n=35)	χ2	p
Significant stenosis (>70 %) abs.,%	48 (69,5)*	15 (42,8)	6,9	0,009
Borderline stenosis (50-69 %) abs.,%	6 (8,7)	7 (20)	2,7	0,1
Stenosis < 50% абс.,%	15 (21,7)	13 (37,1)	2,8	0,09
1- vascular lesion, abs.,%	13 (18,8)*	16 (45,7)	8,3	0,004
2- vascular lesion, abs.,%	13 (18,8)	8 (22,8)	0,2	0,6
3-vascular lesion, abs.,%	29 (42)*	7 (20)	4,9	0,02
Gensini score (GS) (M±σ)	69,2±47,67	45,8±33,9	-	0,01

Note:- level of significance of differences between groups p<0,05*

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THE FREQUENCY OF SENSITIZATION TO FOOD ALLERGENS IN INFANTS IN THE FAR EASTERN REGION OF THE RUSSIAN FEDERATION

Revyakina Vera Afanasevna
Doctor of Medical Sciences, Head of the Division of Allergology,
Medical Nutrition Clinic
Scientific Research Institute of Nutrition
Russian Federation
Denisova Svetlana Nikolaevna
Doctor of Medical Sciences, Full Professor
Pirogov Russian National Research Medical University
Vigurzhinskaya Elena Vladislavovna
Candidate of Medical Sciences, Associate Professor
Pirogov Russian National Research Medical University
Tarasova Olga Vladimirovna
Candidate of Medical Sciences, Associate Professor
Pirogov Russian National Research Medical University

Abstract. Over the past 10 years, in most countries of the world there was a tendency towards the increase in the prevalence of food sensitization, especially among young children. According to modern concepts, latent (asymptomatic) sensitization (LS), in contrast to the manifest forms of allergy, occurs without clinical symptoms.

The purpose of the work was to study the comparative frequency and nature of latent sensitization to milk proteins in healthy children of the first year of life, living in the Far Eastern region of the Russian Federation.

The article presents the results of a survey of 149 healthy children in Kazan (55 children), Khabarovsk (43 children) and Vladivostok (51 children) aged 2 to 8 months who were artificially fed. The duration of observation of children ranged from 6 to 8 months. Before the start of the study and every 2-2.5 months against the background of taking mixtures in all children, the determination of allergen-specific IgE antibodies to cow's milk protein (CMP), casein (C), β-lactoglobulin (β -LG), α-lactalbumin (α-LA) and goat

milk (GM) in coprofiltrates was carried out. For the quantitative determination of allergen-specific IgE antibodies to milk proteins in coprofiltrates, a non-competitive enzyme-linked immunosorbent assay was used using test systems from Dr. Fooke (Germany).

As the study showed, the frequency of latent sensitization to CMP and other protein fractions of cow's milk, as well as goat's milk in healthy breast-fed children at the age of 2-3 months of life was high in all these cities. It was noteworthy that the frequency of LS to casein, β-LG, and α-LA in children from Vladivostok on natural feeding of the first three months of life significantly exceeded the similar values in infants from Kazan and Khabarovsk. From seven to eight months of life, the frequency of LS to most milk proteins significantly decreased in children from all these cities and had minimal values. Moreover, in this age category of children, there were no differences in the LS frequency between cities.

Thus, in healthy young children from Kazan, Khabarovsk and Vladivostok, a high frequency of latent sensitization to milk proteins was observed, which formed on the background of natural feeding. From the end of the first year of life, the frequency of latent sensitization decreased, which indicated the formation of oral tolerance in children.

Keywords: latent (asymptomatic) sensitization, nutrition, milk proteins, children.

Food sensitization is the implementation of immune mechanisms, as well as factors such as genetic predisposition, antigen dose and frequency of administration, the state of the barrier function of the gastrointestinal tract (GIT), etc. [1,2] The interaction of antigen with cells of the immune system trigger the mechanism of formation of food sensitization (FS). There are 8 major food allergens that most often cause FS. These include cow's milk, soybeans, eggs and seafood, peanuts, wheat, fish, and hazelnuts [3]. A number of factors contribute to the development of sensitization to cow's milk proteins (CMP) in children, among which are: poor nutrition of the mother during pregnancy and breastfeeding, insufficient supply of vitamins to the woman, the presence of diseases of the gastrointestinal tract in her, the transfer of the newborn to artificial feeding, use unadapted milk formulas [4, 5].

Over the past 10 years, in most countries of the world there was a tendency towards the increase in the prevalence of food sensitization, especially among young children. Currently, the prevalence of FA in preschool children in developed countries is above 10% [6]. There is also a tendency towards the increase in the number of patients in the

first years of life with allergic diseases to 15-20% [7, 8] and in Russia to 34% [9]. In the presence of allergic diseases in both parents, the risk of FA increases [8]. Recently, the issue of the influence of maternal nutrition during pregnancy and lactation on the development of FS has been actively discussed, however, these data are contradictory [10, 11, 12]. The literature provides data on the role of vitamin D in the development of FS in children whose mothers were deficient in this vitamin [13, 14]. The results of our previous studies have confirmed the importance of vitamin D in the implementation of allergic inflammation in children [15].

According to modern concepts, latent (asymptomatic) sensitization (LS), in contrast to the manifest forms of allergy, occurs without clinical symptoms [16]. According to G.V.Poryadin et al. LS in young children is 6-8 times more common than the clinical manifestations of allergies. Among the possible immunological reasons for the formation of LS, insufficient expression of the chemokine receptors Th_2 (CCR_3, CCR_8) and Th_1 (CCR_5) is distinguished [17]. In addition, with LS in the eosinophil population, their stimulated forms are absent, and there is no active migration of eosinophils to the foci of allergic inflammation, i.e. less active production by specific T cells ($CD8^+$) of interleukin -5 and -10 occurs in the same way as in healthy children [18, 19].

International data on the study of the frequency of allergies in children have shown that one of the factors causing an increase in the prevalence of FA is the environment [20]. For example, in Russia in 349 cities there is a tenfold pollution of the territory compared to the background level (Concord Ltd. environmental dictionary – ecoprom, Moscow, 1993) [21].

The presence of LS in a child with the possible development of allergic diseases needs further in-depth study and should be considered inextricably linked mother-child.

The aim of the work was to study the comparative frequency and nature of latent sensitization to milk proteins in healthy children of the first year of life, living in the Far Eastern region of the Russian Federation.

Patients and methods

The article presents the results of a study and follow-up observation of 149 healthy children in the Far East of the Russian Federation from the cities of Kazan (55 children), Khabarovsk (43 children) and Vladivostok (51 children) aged 2 to 8 months, who were breast-fed. Mothers of children participating in the study were informed in advance about the goals, objectives of the planned study, upcoming analyzes and methods of their collection in children. All mothers observed in the last stages of gestation took vitamin D3 at a dose of 400 IU per day as part of a multivitamin

complex.

The duration of observation of children ranged from 6 to 8 months. Prior to the transfer to artificial feeding, all children were breastfed. The transfer of children in all these cities to artificial feeding was carried out because of the impossibility of breastfeeding. The choice of the formula was carried out depending on the age of the child: the first formulas were received by infants of the first 5 months of life, the following formulas - from 5 months of age, from 6 months of life, children were given cereal complementary foods. All infants underwent a general clinical examination every 2 weeks during the entire observation period. All children tolerated adapted mixtures well; no one refused to eat. Allergic reactions in the form of skin rashes were observed in 1 child (1.8%) from Vladivostok and in 2 children (2.3%) from Khabarovsk. Subsequently, these children were successfully transferred to hydrolyzed mixtures. In infants from Kazan, allergic reactions against the background of artificial feeding were not observed.

A burdened allergic history in healthy children from Kazan, Khabarovsk and Vladivostok occurred with the same frequency: 40%, 41% and 34% of cases, respectively.

Criteria for the inclusion of children in the study:

- all children were full-term;
- the weight and body length of all children corresponded to normal harmonious physical development, in accordance with centile tables for this age group;
- at the beginning and in the process of conducting the study, the children were practically healthy;
- children did not have allergic reactions at the time of the study and in history;
- the absence of any other types of nutrition, other than these adapted milk formulas for a given observation period;
- patients did not have acute diseases of the gastrointestinal tract, severe infections;
- children did not receive probiotics.
- at the beginning of the observation, the children did not receive complementary foods

Before the start of the study and every 2-2.5 months against the background of taking the mixtures in all children, allergen-specific IgE antibodies for the protein of cow's milk (CMP), casein (C), β-lactoglobulin (β -LG), α- lactalbumin (α-LA) and goat milk (GM) were determined in coprofiltrates. For the quantitative determination of allergen-specific IgE

antibodies to milk proteins in coprofiltrates, a non-competitive enzyme-linked immunosorbent assay was used using test systems from Dr. Fooke (Germany) [patent for the invention № 2633749 "Method for the diagnosis of food allergies"].

Processing of the research results was carried out on a personal computer using the STATISTICA software package from StatSoftInc. (USA). The mean values of the sign (M), standard errors of the mean sign (m), and standard deviations (σ) were calculated. Using the Student criterion, the significance of differences (t) was evaluated at probability values $p < 0.05$. Data in the groups were regarded as statistically significant at $p < 0.05$ or statistically highly significant at $p < 0.01$ [22]. When analyzing contingency tables, the Pearson criterion χ^2 was applied to assess the statistical significance of differences between the two relative indicators.

Results

The results of studies of the frequency of latent sensitization to milk proteins of cow and goat milk according to allergen-specific IgE antibodies in coprofiltrates in healthy children from the cities of Kazan, Khabarovsk and Vladivostok are presented in Tables 1 and 2. A comparative analysis of the LS frequency was carried out in two directions: 1. Dynamics of the LS frequency to milk proteins, depending on the age of the children in each city; 2. Dynamics of the frequency of LS to milk proteins depending on the age of children between cities.

As the study showed, the frequency of latent sensitization to CMP and other protein fractions of cow's milk, as well as goat's milk in healthy breast-fed children at the age of 2-3 months of life was high in all these cities. It was noteworthy that the frequency of LS to casein, β-LG, and α-LA in children from Vladivostok on natural feeding of the first three months of life significantly exceeded the similar values in infants from Kazan and Khabarovsk. No statistically significant differences were found in the frequency of LS to goat milk between children from these cities. However, when comparing data in healthy children from the cities of Khabarovsk and Kazan, there was a significantly higher frequency of LS for β-LG, α-LA and goat milk in infants living in Khabarovsk (Table 1). The degree of latent sensitization to these types of proteins did not exceed the first class of allergies (+1).

From five months of life, despite the transition to artificial feeding, there was a tendency to a decrease in the frequency of LS to proteins of cow and goat milk in all observed children (Table 1). However, in children from Vladivostok, the frequency of LS to casein and β-LG remained statistically significantly higher ($p<0.05$) than LS to these types of proteins in children

from the cities of Khabarovsk and Kazan.

In the second half of the life of children on artificial feeding, living in these cities, there was a significant decrease in the frequency of LS to protein fractions of cow's milk and goat's milk compared with infants of five months of life. However, despite the positive dynamics of LS frequency indicators in all cities, differences with children from Vladivostok persisted. (Table 2).

From eight months of life, the frequency of LS to most milk proteins significantly decreased in children from all these cities and had minimal values. Moreover, in this age category of children, there were no differences in LS frequency between cities (Table 3).

Discussion:

Currently, it is generally accepted that in healthy children, oral tolerance to milk proteins is formed by 12-18 months of life [23]. In the course of the study, the data obtained confirm the fact of induction of food tolerance to milk proteins in all children up to 8 months of age while taking adapted milk mixtures despite regional differences in the frequency of LS in early age periods [24]. Apparently, the intake of vitamin D3 by women at the end of gestation as part of the multivitamin complex contributed to the sufficient provision of this vitamin to their children. In turn, it is likely that vitamin D metabolites had an immunomodulating effect, as a result of which the clinical manifestations of allergy in children were not observed despite the presence of LS. Thus, low concentrations of 25 (OH) D3 affect the content of the anti-inflammatory growth factor TGFβ1 and contribute to the development of allergic reactions in children. In this regard, researchers are of great interest to the vitamin D receptor gene (VDR), which encodes an intracellular receptor that can bind active forms of vitamin D, indirectly effecting dose-dependent immunoregulatory effects [15, 25]. The variability of the biological effects of vitamin D is associated with the presence of more than 245 polymorphisms, some of which have known biological characteristics, the role of others is not yet fully understood. Polymorphic genetic variants of vitamin D can affect the level of a metabolite such as 25 (OH) D3, and in some cases can be considered as a marker of vitamin D deficiency [26]. Since the vitamin D receptor is widely present in many cells and tissues of the body, in recent years numerous attempts have been made to study the association of VDR gene polymorphism with the development of various diseases, including allergic [27, 28]. In addition, in recent years it has been demonstrated that VDR is expressed on cells of the immune system: monocytes, macrophages, activated lymphocytes, thymus cells, etc. [29,30]. Therefore, it becomes apparent that the identi-

fication of the functioning of immunoregulatory substances with vitamin D deficiency is not only of great theoretical, but also practical importance for characterizing the severity of allergic inflammation. A study of the regional characteristics of LS showed that the highest frequency of LS to milk proteins in healthy young children was observed in the cities of Vladivostok and Khabarovsk. Apparently, in children living in the Far Eastern region of the Russian Federation, the high frequency of LS for milk proteins was due to regional climatic characteristics, nutritional characteristics and vitamin supply of the population.

Thus, in healthy young children living in megacities of the Far Eastern region of the Russian Federation, a high frequency of latent sensitization to milk proteins was observed, which was formed against the background of natural feeding. From the end of the first year of life, the frequency of latent sensitization decreased, which indicated the formation of oral tolerance in children.

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Table 1. The frequency of latent sensitization to milk proteins in healthy children of 2-5 months of life

Cities	Allergen-specific IgE antibodies									
	CMP 1		Casein 2		β-LG 3		α-LA 4		Goat milk 5	
	Abs.	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%
	Age 2.50±1.02 months									
I. Vladivostok n=51	25	49,0	39	76,3	31	60,7	24	47,1	13	25,5
II. Khabarovsk n=43	13	30,2	21	48,8	20	46,5	21	48,8	15	34,9
III. Kazan n=55	23	41,8	23	41,8	21	38,1	21	38,1	12	21,8
	Age 5.06±0.64 months									
I. Vladivostok n=51	21	41,1	28	54,9	22	43,1	17	33,3	9	17,6
II. Khabarovsk n=43	14	32,6	14	32,6	10	23,3	10	23,3	7	16,3
III. Kazan n=57	20	35,1	20	35,1	14	24,6	16	28,1	11	19,3

Note: *Depending on age* I-I Vladivostok II-II Khabarovsk III-III Kazan	I-I	II-II	III-III
	χ^2=0,52; P_{1-1}>0,05 χ^2=3,17; P_{2-2}>0,05 χ^2=2,6; P_{3-3}>0,05 χ^2=2,0; P_{4-4}>0,05 χ^2=1,1; P_{5-5}>0,01	χ^2=0,03; P_{1-1}>0,05 χ^2=2,8; P_{2-2}>0,05 **χ^2=7,06; P_{3-3}<0,01** **χ^2=8.3; P_{4-4}<0,01** **χ^2=6,05; P_{5-5}<0,02**	χ^2=0,42; P_{1-1}>0,05 χ^2=0,42; P_{2-2}>0,05 χ^2=2,4; P_{3-3}>0,05 χ^2=1,2; P_{4-4}>0,05 χ^2=0,05; P_{5-5}>0,05

Note: *Age 2.50±1.02 months* I-II Vladivostok-Khabarovsk I-III Vladivostok-Kazan II-III Khabarovsk-Kazan	I-II	I-III	II-III
	χ^2=2,9; P_{1-1}>0,05 **χ^2=16,7; P_{2-2}<0,01** **χ^2=15,7; P_{3-3}<0,01** **χ^2=7,3; P_{4-4}<0,01** χ^2=1,6; P_{5-5}>0,05	χ^2=1,9; P_{1-1}>0,05, **χ^2=14,5; P_{2-2}<0,01,** **χ^2=14,4; P_{3-3}<0,01, χ^2=4,3; P_{4-4}<0,05** χ^2=0,6; P_{5-5}>0,05	χ^2=0,023; P_{1-1}>0,05, χ^2=0,23; P_{2-2}>0,05, **χ^2=6,1; P_{3-3}<0,02, χ^2=5,1; P_{4-4}<0,05 χ^2=3,9; P_{5-5}<0,05**

Note: *Age 5.06±0.64 months* I-II Vladivostok-Khabarovsk I-III Vladivostok-Kazan II-III Khabarovsk-Kazan	I-II	I-III	II.-III
	χ^2=0,76; P_{1-1}>0,05 **χ^2=5,18; P_{2-2}<0,05** **χ^2=5,32; P_{3-3}<0,05** χ^2=1,43; P_{4-4}>0,05 χ^2=0,002; P_{5-5}>0,05	χ^2=0,32; P_{1-1}>0,05 **χ^2=3,92; P_{2-2}<0,05** **χ^2=4,52; P_{3-3}<0,05** χ^2=0,28; P_{4-4}>0,05 χ^2=0,014;P_{5-5}>0,05	χ^2=0,034; P_{1-1}>0,05 χ^2=0,034; P_{2-2}>0,05 χ^2=0,002; P_{3-3}>0,05 χ^2=0,28; P_{4-4}>0,05 χ^2=0,112;P_{5-5}>0,05

Table 2. The frequency of latent sensitization to milk proteins in healthy children of 5-6 months of life

Cities	Allergen-specific IgE antibodies									
	CMP 1		Casein 2		β-LG 3		α-LA 4		Goat milk 5	
	Abs.	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%
	Age 5.06 ± 0.64 months									
I.Vladivostok n=51	21	41,1	28	54,9	22	43,1	17	33,3	9	17,6
II. Khabarovsk n=43	14	32,6	14	32,6	10	23,3	10	23,3	7	16,3
III. Kazan n=55	20	35,1	20	35,1	14	24,6	16	28,1	11	19,3
	Age 6.07 ± 0.61 months									
I. Vladivostok n=51	16	31,4	13	25,5	12	23,5	10	19,6	3	5,9
II.Khabarovsk n=43	10	23,3	12	27,9	10	23,3	7	16,3	14	32,6
III.Kazan n=57	11	21,1	9	17,3	19	36,5	7	13,4	5	9,6
Note: *Depending on age* I-I Vladivostok II-II Khabarovsk III-III Kazan		I-I χ2=1,04; P1-1> 0,05 **χ2=10,03; P2-2 <0,01** **χ2=5,19; P3-3 <0,02** χ2=3,04; P4-4 >0,05 **χ2=4,87 P5-5 <0,04**				II-II χ2=1,26; P1-1>0,05 χ2=0,22; P2-2>0,05 **χ2= 0,02; P3-3 >0,05** χ2=0,91; P4-4>0,05 **χ2=4,78; P5-5 <0,02**		III-III χ2=3,08; P1-1>0,05 **χ2=5,38; P2-2<0,02** χ2=1,94; P3-3>0,05 **χ2=4,52; P4-4,<0,02** χ2=2,6; P5-5>0,05		

Table 3. The frequency of latent sensitization to milk proteins in healthy children of 6-7 months of life

Cities	Allergen-specific IgE antibodies									
	CMP 1		Casein 2		β-LG 3		α-LA 4		Goat milk 5	
	Abs.	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%
	Age 6.07±0.61 months									
I.Vladivostok n=51	16	31,4	13	25,5	12	23,5	10	19,6	3	5,9
II.Khabarovsk n=43	10	23,3	12	27,9	10	23,3	7	16,3	14	32,6
III.Kazan n=52	11	21,1	9	17,3	19	36,5	7	13,4	5	9,6
	Age 7.22±0.65 months									
I.Vladivostok n=51	7	13,7	5	9,8	7	13,7	6	11,7	1	1,9
II.Khabarovsk n=432	5	11,6	3	6,9	4	9,3	3	6,9	3	6,9
III.Kazan n=49	4	8,1	4	8,1	9	18,3	3	6,1	1	2,0

Cities	Allergen-specific IgE antibodies									
	CMP 1		Casein 2		β-LG 3		α-LA 4		Goat milk 5	
	Abs.	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%
Note: *Depending on age* I-I Vladivostok I I - I I Khabarovsk III-III Kazan	I-I **χ^2= 6,1; P_{1-1}<0,02** **χ^2=6,1; P_{2-2}<0,02** χ^2= 2,08; P_{3-3}>0,05 χ^2=1,5; P_{4-4}>0,05 **χ^2=4,8; P_{5-5}<0,05**		II-II χ^2=3,2; P_{1-1}>0,05 **χ^2=11,4; P_{2-2}<0,01** **χ^2=5,1; P_{3-3}<0,05** χ^2= 3,0; P_{4-4}>0,05 **χ^2=15,4 P_{5-5}<0,01**		III-III **χ^2= 4,9; P_{1-1}<0,05** χ^2=2,6; P_{2-2}>0,05 **χ^2=5,3; P_{3-3}<0,05** χ^2=2,0; P_{4-4}>0,05 χ^2=3,7; P_{5-5}>0,05			
Note: *Age 6.07±0.61 months* I-II Vladivostok-Khabarovsk I-III Vladivostok-Kazan II-III Khabarovsk-Kazan	I.-II. **χ^2=8,2; P_{1-1}<0,01,** **χ^2=9,5; P_{2-2}<0,01,** **χ^2=5,3; P_{3-3}<0,02** **χ^2=5,1; P_{4-4}<0,02** χ^2=0,022; P_{5-5}>0,05		I.-III. **χ^2=12.5; P_{1-1}<0,01** **χ^2=8,0; P_{2-2}<0,01** χ^2=1,9; P_{3-3}>0,05 **χ^2=16,74 P_{4-4}<0,02** **χ^2=4,8; P_{5-5}<0,05**		II.-III. **χ^2=6,4; P_{1-1}<0,02** **χ^2=9,8; P_{2-2}<0,01** χ^2=0,3; P_{3-3}>0,05, χ^2=3,7; P_{4-4}>0,05 **χ^2=25,3; P_{5-5}<0,01**			
Note: *Age 7.22 ± 0.65 months* I-II Vladivostok-Khabarovsk I-III Vladivostok-Kazan II-III Khabarovsk-Kazan	I.-II. χ^2=0,04; P_{1-1}>0,05 χ^2=0,21; P_{2-2}>0,05 χ^2=0,5; P_{3-3}>0,05 χ^2=0,77 P_{4-4}>0,05 **χ^2=5,3; P_{5-5}<0,05**		I.-III. χ^2=0,97; P_{1-1}>0,05 χ^2=0,02; P_{2-2}>0,05 χ^2=0,4; P_{3-3}>0,05 χ^2=1,18 P_{4-4}>0,05 χ^2=0,02; P_{5-5}>0,05		II.-III. χ^2=0,31; P_{1-1}>0,05 χ^2=0,002; P_{2-2}>0,05 χ^2=2,31; P_{3-3}>0,05 χ^2=0,004 P_{4-4}>0,05 **χ^2=5,3; P_{5-5}<0,05**			

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WAY TO CREATE A SPONDYLODESIS

Nadyrov E.A.
Candidate of Medical Sciences, Associate Professor
Gomel State Medical University
Kirilenko S.I.
Candidate of Medical Sciences, Head of Neurosurgery Department No. 2,
Gomel Regional Clinical Hospital
Rozhin V.V.
Neurosurgeon doctor of Neurosurgery Department No. 2
Gomel Regional Clinical Hospital
Dobysh A.A.
Neurosurgeon doctor of Neurosurgery Department No. 2
Gomel Regional Clinical Hospital
Sivakova S.D.
Student
Gomel State Medical University
Belanova Y.V.
Student
Gomel State Medical University

Abstract. When conducting statistical analysis, it was found that spinal fusion was formed in 100% of cases when using bone marrow transplantation autologous mixture, while in the comparison group only in 75.0% of cases. The differences were statistically significant (p = 0.04). The percentage reduction in pain on a visually analogous pain scale for spinal fusion using bone grafting autologous mixtures was statistically significantly higher in comparison with the comparison group (p = 0.041). This technique has been shown to be effective in treating vertebral injuries.

Key words: transplantation, bone tissue, spinal fusion.

Spondylodesis – a single bone block between the vertebrae, is the goal of most operations performed during deformities, injuries and degenerative diseases of the spine. It was performed by Albee FH, 1911. Osteoplastic fixation of the posterior spine was proposed to immobilize the affected vertebrae with tuberculous spondylitis, which excluded the progression of kyphotic deformity [1]. In the Republic of Belarus, bone

grafting methods have been introduced and are actively used in the treatment of injuries, degenerative-dystrophic lesions, tumors of the spine, and musculoskeletal system [2, 3, 4].

The best method of spinal fusion formation is the use of a trabecular bone autograft [5]. The probability of spinal fusion with its use is up to 90%. Such a graft has the properties of osteogenicity, osteoinduction, osteoconduction, has a large area to volume ratio (due to the porous structure), contains mesenchymal and hematopoietic stem cells, and quickly grows in blood vessels. To obtain such a graft, a fragment of bone tissue is most often taken from the ileal crest of the patient.

The disadvantages of using a spongy transplant from a donor site are the additional time of the operation, blood loss during its formation. Complications are possible during graft collection in the form of an infectious process, damage to the skin nerve of the thigh, fracture of the ilium, bleeding, perforation of the abdominal cavity, the formation of a hernia, the formation of seroma, a cosmetic defect, pain in the early and late period after surgery [6].

The search for the optimal method for the formation of spinal fusion is an urgent task of modern vertebrology, since the occurrence of complications can lead to disability and impaired human social adaptation.

Purpose: to study the effectiveness of using transplant bone autologous mixture in the formation of spondylodesis.

Materials and methods

An analysis of the use of transplantation bone autologous mixture (main group) for spondylodesis was performed in comparison with the traditional method (control group). Clinical assessment of pain was carried out using the Oswestry scale and a visual analogue scale before surgery and after 3 months 6 months.

Statistical data processing was carried out using the software package “Statistica” 12.0 (Trial-version). The normality of the distribution of numerical data was assessed using the Lilliefors criterion. Descriptive statistics are presented in the form of Me (Q1; Q2), where Me is the median, Q^1 and Q^2 are the lower and upper quartiles, respectively, and also in the form M ± SD, where M is the average value and SD is the standard deviation. Depending on the nature of the distribution of numerical data, a comparative analysis was carried out using the Mann-Whitney U-test and Student t-test. For a comparative analysis of qualitative variables, the Fisher test was used. Differences were considered statistically significant at $p < 0.05$. The study included 50 patients. The main group consisted of 18 patients in whom transforaminal interbody fusion was performed using single-stage

bone autologous mixture and local autograft in the form of “bone chips”. The second (control) group consisted of 32 patients in whom spondylodesis was performed only at the expense of local autograft, heterotopic autograft or allosty. Surgery was performed for patients with the following pathology: spondylolisthesis of various etiologies, relapse of a herniated disc, degenerative spinal stenosis.

Results

Surgery began with preoperative marking using a mobile x-ray machine with the function of electron-optical conversion. After processing and delimiting the surgical field, a skin incision of the required size was performed, fascia was extracted and dissected, and vertebral arches were skeletonized. During the operation, hemostasis was performed. Control radiography was performed to finally determine the level of surgical intervention. The arches, joints, vertebral bodies were removed using a high-speed bone surgical cutter with the formation of a large amount of bone mass with a blood clot. The resulting material was aspirated using a device for filtering bone chips. The device for filtering bone chips was a flask with a filter element inside, connected in parallel to a vacuum system designed to aspirate the contents from the wound (patent of the Republic of Belarus No. 11383 12/08/2016). After cessation of aspiration, the contents were removed, mechanically squeezed out until the main part of the liquid content was removed. After access to the intervertebral disk and its removal (or removal of the vertebral body), decortication of the closure plates was performed until blood droplets appeared. Patients received a support interbody implant according to the technique. After implant placement, the rest of the interbody space was filled with autologous bone marrow transplant. Before suturing the wound, decortication of the transverse processes, facet joints, the remaining arches of the vertebrae, without using wax, and applying a transplant bone mixture to the bleeding surface were performed. The wound was stitched in layers, an aseptic dressing was applied.

A transplant bone autologous mixture is shown in Figures 1 and 2

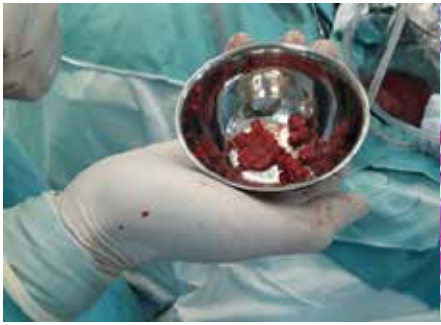

Figure 1. Appearance of transplant bone autologous mixture

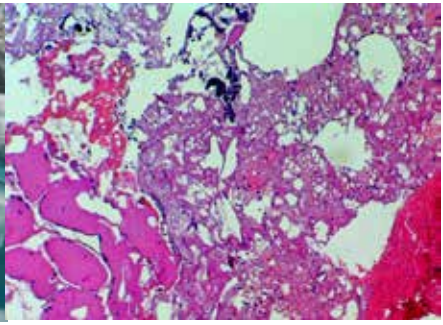

Figure 2. The histological structure of the transplant bone autologous mixture. Coloring: hematoxylin and eosin. Magnification: 100 ×

Macroscopically, the bone marrow transplant was a homogeneous red mass of a jelly-like consistency (Figure 1). During histological examination, bone trabeculae were visualized without necrotic and dystrophic changes (indicated by black arrows), osteoblasts were determined on the periphery of the trabeculae. Sections of bone marrow hematopoiesis were also determined (Figure. 2). Hematopoietic islets are indicated by white arrows.

In the early postoperative period, computed tomography was performed to monitor the decompression of neural structures and the correct position of the structure.

In the control group during the operation, the cutter and the device for filtering bone chips were not used. In the case of taking a heterotypic autograft, a separate surgical intervention was performed. Otherwise, the course of the operation in both groups did not differ.

After 1, 3 months, control radiographs of the corresponding spine in 2 projections were performed. Computed tomography of the corresponding segment was performed after surgery and after 6 months to confirm the formation of fusion. X-ray fusion was considered to be formed during the fusion of the facet joints (the joint gap was not visualized or was difficult to visualize), the formation of a "bone bridge" between adjacent vertebrae.

Control e-studies were performed within 6 months in 32 patients of the control group, x-ray confirmation of the formation of spondylodesis in 24 patients (75.0%). When conducting a statistical analysis, it was found that spondylodesis formed 100% of cases when using bone transplant autol-

ogous mixture (main group). The differences were statistically significant (p = 0.04).

A visual analogue scale and an Oswestry scale were used to assess the degree of pain reduction. The results of the study are presented in table 1.2.

Table 1. Oswestry scale indicators depending on the type of spondylodesis

Group	Before surgery	After 3 months	After 6 months
Control	42,0 [32,0;56,0]	20,0 [10,0;34,5]	8,5 [6,0;16,0]
Main group	43,0 [42,0;52,0]	20,0 [10,0;24,0]	8,5 [6,0;11,5]
P	0,62	0,39	0,13

Table 2. Indicators of a visual analogue scale depending on the type of spondylodesis

Group	Before surgery	After 3 months	After 6 months
Control	6,0 [5,0;7,0]	3,0 [2,0;3,5]	2,0 [2,0;2,0]
Main group	5,5 [5,0;7,0]	3,0 [2,0;3,0]	1,0 [1,0;1,5]
P	0,62	0,39	0,135

According to the results of the comparative analysis, after 3 and 6 months after the operation, there were no statistically significant differences between the Oswestry scale and the visual-analogue scale when using the transplantation bone autologous mixture and the control was not found (p> 0.05). However, the percentage reduction in pain syndrome on the visual-analogue scale in the main group was statistically significantly higher compared to the group with the control group (p=0.041).

Conclusion. The study showed that the use of transplantation bone autologous mixtures is a promising method for the formation of spondylodesis. This technique has been shown to be effective in treating vertebral injuries. The use of bone marrow transplantation allows to achieve the formation of spondylodesis in a remote period in 100% of cases.

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RENAL ARTERIES MORPHOLOGY (COMPUTER TOMOGRAPHY AND HISTOLOGICAL STUDY)

Nadyrov E.A.
Candidate of Medical Sciences, Associate Professor
Gomel State Medical University
Vvedensky D.V.
Candidate of Medical Sciences, Associate Professor
Gomel State Medical University
Mikulich A.O.
Assistant
Gomel State Medical University
Voysarov M.S.
Student
Gomel State Medical University
Larionova I.A.
Student
Gomel State Medical University

Abstract. The analysis of features of renal artery structure was performed in 44 patients as well. The methods of computer angiography and histological examination were used. Statistically significant differences in the diameter of the left renal artery, surgical length of the right renal artery, and length of the right and left renal artery were revealed - the indices were statistically significant higher in men regardless of their age group. We determined the frequency of atherosclerotic changes in the renal artery wall and the histological structure of the exit place of the renal artery from the abdominal aorta and renal artery itself. The results of the study can serve as a theoretical basis for assessing the degree of applicability of the donor kidney for subsequent transplantation.

Keywords: renal arteries, anatomy, atherosclerosis, transplantation.

Introduction

The relevance of the study of variant anatomy and histology of the renal arteries is due to great interest in practical medicine, as the number of

surgical interventions for kidney transplantation is increasing every year. According to WHO, more than 139 thousand organs are transplanted annually (2017). Of these, 36% are live kidney transplants [1].

Renal vessels, in particular, arteries, are very variable in topography, branching method, spatial relationships of branches, syntopy with other anatomical structures, morphometric characteristics and their number. For example, in addition to the main renal artery, additional renal arteries are found. The frequency of detection of additional renal arteries on both sides, only on the left or only on the right, varies noticeably from a minimum of 3.3% to a maximum of 47%, an average of 22.4% [2]. At the same time, individual researchers point to the existence of a relationship between the variant of anatomy of the organ arteries and the risk of developing circulatory disorders, which can lead to various diseases and their complications [3]. Particular attention should be paid to the extraorgan department, as it is important for modern methods of instrumental diagnostics and surgical practice.

Purpose

Determination of the morphology of the renal arteries and the peculiarities of their histological structure in male and female patients in various age groups.

Materials and methods

The study was conducted at the base of the Republican Scientific and Practical Center of Radiation Medicine and Human Ecology. The material for the study was computed tomography data of the abdominal aorta and renal artery of 44 patients aged 22 to 78 years. Patients did not have kidney pathologies. Patients were divided into 2 groups: the first - men (14 people), the second - women (25 people). The morphometric parameters were evaluated: the diameter of the mouth of the right and left arteries, the angle of the renal artery from the aorta, the anatomical length, and the surgical length of the renal artery. The diameter of the arteries of the right and left was measured.

For histological examination, sectional material of patients who died from somatic diseases that were not related to the pathology of the genitourinary system was used. Deceased patients were comparable in sex and age to patients who underwent computed tomography of the abdominal aorta and renal artery. Histological sections were stained with hematoxylin and eosin. In a histopathological study of the phenomena of atherosclerosis, the degree of renal artery stenosis with atherosclerotic plaque was not taken into account. When stained according to the Van Gieson method, the ratio of smooth muscle cells and elastic fibers was

determined.

Statistical analysis of the data was carried out using the program Statistica 12.0 (Trial version). Assessment of the normality of the distribution of characters was carried out using the Kolmogorov-Smirnov criterion. Depending on the nature of the distribution of numerical signs, the data were presented in the form of the median (Me), 25th and 75th percentiles: Me (25% -75%) and mean value (M) and its standard deviation (SD). Nonparametric methods were used to compare characteristics of characteristics: comparison of two independent samples — the Mann-Whitney U-test and, in the case of a normal distribution of characteristics, Student's criteria. Comparison of qualitative characteristics was carried out using the two-sided Fisher test. Differences were considered statistically significant at $p < 0.05$.

Results

Indicators of variant anatomy of the renal arteries in patients of different age depending on gender are presented in table 1.

Table 1. - Indicators of variant anatomy of the renal arteries in patients of different ages (men / women) (M ± SD; ME [Q1; Q3]).

Indicator	Group		p
	Men	Women	
Diameter of the exit places of the right renal artery from the abdominal aorta (mm)	9,80 [9,00;11,60]	9,10 [8,20;9,98]	>0,05
Diameter of the exit places of the left renal artery from the abdominal aorta (mm)	9,25 [8,50;10,90]	9,30 [8,40;10,10]	>0,05
Diameter of the right renal artery (mm)	6,16±1,13	5,67±1,03	>0,05
Diameter of the left renal artery (mm)	6,5±1,05	5,71±1,04	0,03
The angle between the aorta and the right renal artery (°)	136,29±10,86	137,76±11,62	>0,05
The angle between the aorta and the left renal artery (°)	123,79±9,74	122,56±15,58	>0,05
Surgical length of the right renal artery (mm)	46,18±11,97	34,85±12,38	0,006
Surgical length of the left renal artery (mm)	34,73±10,39	29,87±7,66	>0,05
Anatomical length of the right renal artery (mm)	75,06±8,17	64,75±14,49	0,015
Anatomical length of the left renal artery (mm)	63,76±7,82	53,20±13,57	0,002

As can be seen from table 1 in men, indicators such as the diameter of the left renal artery, the surgical length of the right renal artery, and the length of the right and left arteries of the renal arteries were statistically

significantly higher than in women. At the same time, the remaining indicators did not have differences in the comparison groups.

For a more detailed comparative analysis, all patients were divided into age groups older than 40 years and younger 40 years. As a result of a comparative analysis, it was found that, at the age of 40, the length of the left renal artery in men was almost 1.5 times longer in comparison with women (70.00 ± 6.33 mm and 55.02 ± 14.94 mm, respectively, p = 0.01). A similar tendency was revealed in the age category up younger 40 years: the length of the left renal artery was statistically significantly higher (p = 0.04) in men (60.30 ± 6.45 mm), compared with women (49.95 ± 10.74 mm).

A histological examination of the structure of the renal arteries was performed. Exit places of the renal artery from the abdominal aorta consisted of three layers. The inner layer included the endothelium lying on the basement membrane and a thin layer of loose connective tissue. Between the inner and middle layers, a clearly visible inner elastic membrane was located. The middle layer contained thick elastic fibers and smooth muscle cells. Up to 70% of the middle layer area was occupied by elastic elements. On the border between the middle and adventitia layer was a thin outer elastic membrane. The adventitia layer consisted of loose fibrous connective tissue, a large number of elastic fibers and vasa vasorum.

For histological examination of the structure of the renal artery wall, a place was selected at a distance of 2-3 centimeters from the exit places of the renal artery from the abdominal aorta. The inner lining had a histological structure similar to exit place of the renal artery from the abdominal aorta. The inner elastic membrane was well defined. Smooth muscle cells prevailed in the middle membrane; elastic fibers were present in 20-30%. A thin outer elastic membrane was located between the inner and outer shells. The adventitia of the artery consisted of loose fibrous connective tissue, elastic fibers, and vasa vasorum.

At the next stage of the study, a comparative analysis of the frequency of occurrence of atherosclerotic changes in the wall of the renal arteries was carried out. Atherosclerotic changes in the wall of the renal arteries in men in a group older than 40 years were determined in three patients from five cases. In the age group under 40 years old - in two patients out of nine cases. In women in the age group over 40, atherosclerotic changes were found in four patients out of fifteen cases. In the age group up to 40 years, only one patient out of nine cases. The results of the study are presented in table 2.

Table 2. - Indicators of the frequency of detection of atherosclerotic changes in the renal arteries in patients of various age groups (men / women)

Age	Men		Women		P
	Абс.	%	Абс.	%	
Older than 40 years					
	2	40,00	4	26,66	0,289
Younger 40 years					
	2	22,22	1	11,11	0,582

As can be seen from table 2, the percentage of detection of atherosclerotic changes in the renal artery in the age group older than 40 years in men in 40.0% of cases revealed atherosclerotic changes in the wall of the renal arteries, in women – only 26.66%. However, no statistically significant differences were found ($p > 0.05$). At the age younger 40 years, the percentage of detection of atherosclerotic changes was two times higher compared to the same age group in women (22.22% and 11.11%, respectively), but the comparison results were not statistically significant ($p > 0.05$). The absence of significant differences in indicators can primarily be explained by the small volume of patients.

Conclusions

1. In men, regardless of the age group ($p < 0.05$), the diameter of the left artery, the surgical length of the right renal artery, and the length of the right and left arteries are statistically significantly higher.

2. It was found that in age groups older than 40 years and younger than 40 years, the length of the left renal artery is statistically significantly longer in men compared with women ($p < 0.05$).

3. The differences in the histological structure of exit places of the renal artery from the abdominal aorta and renal artery were established.

4. Atherosclerotic changes in the walls of the renal arteries in men in all age groups were detected more often in comparison with women, these differences were not statistically significant, which can be explained by a small number of patients.

5. The revealed features of the variant anatomy of the renal arteries and the peculiarities of their histological structure can serve as a theoretical basis for assessing the degree of suitability of a donor kidney for transplantation.

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DIAGNOSTICS AND SOME FEATURES OF DEMODECOSIS IN DOGS OF THE SAMARKAND REGION

Nishanov Dilshod Khasanovich
Assistant professors of department "Parasitology and Organization Veterinary Job",
Samarkand Veterinary Medical Institute, Samarkand, Uzbekistan
Yulchiyev Jasurbek Bakhodirovich
PhD, Assistant professors of department "Veterinary Surgery and Obstetrics",
Samarkand Veterinary Medical Institute, Samarkand, Uzbekistan

Abstract. In this article was given results of scientific research on spreading, etiology and diagnostics, treatment and also preventing measures of demodecosis of a service dogs and under supervising of inhibitions of Samarkand city.

Keywords: demodecosis ticks, microscopic and acarologic research, otodectosis, antiacaracid drugs, desacarisation measures, clinical signs, treatment.

Introduction

A disease caused by ticks become a real pet problem. One of such diseases of small domestic animals, which is also dangerous for humans, is demodicosis. Demodecosis is one of the most common parasitic diseases of dogs. The causative agent of demodicosis is the tick *Demodex canis*. According to most researchers, *D. canis* is part of the normal skin fauna in dogs, and clinical manifestations of the disease occur if the animal's immune system has serious disorders, congenital or acquired and she is not able inhibit tick reproduction.

As a result of the increase in the number of sick animals and the damage they cause, the problem of demodicosis has become very urgent. The treatment of demodicosis is long, often ineffective and expensive.

In dogs, the *Demodex canis*, Leydig, 1859 Two more new species of ticks were identified - *Demodex injai* (Clifford and Hillier, 2003), which also parasitic in hair follicles and sebaceous glands in adult animals and – *De-*

modex cornei, (Hiller A. And Desch, 1997). *Demodex cornei* characterized by a short body, lives directly on the surface of the skin and can together parasitize with *Demodex canis*.

Materials and methods of research

The research was carried out in the laboratory of the Department of Veterinary Surgery of faculty Veterinary treatment and prevention and obstetrics and department Parasitology of the Faculty of Veterinary Diagnosis and Food Safety of the Samarkand Veterinary Institute, as well as in dogs with demodecosis, kept at the dog breeding and shelter “Terra”. Clinical, microscopic, hematological, morphological, and statistical methods were used during the study.

Results

When the age dependence of the disease was studied in dogs, the incidence was up to 36.3% in young dogs aged 7–12 months, 14% in dogs aged 13–18 months, 19.8% in dogs aged 2–3 years, and 3, in dogs older than 5 years 1% and 8.8% in dogs older than 8 years. The disease is less common in older dogs, when endocrine diseases, malignant tumors, and leishmaniosis in the dog's body lead to associative development of the disease. At the same time, a decrease in the activity of the immune system, immunosuppressive chemotherapy, corticosteroids can lead to the development of the disease.

Studies on the association of the disease with dog breeds have reported up to 55% in short-haired dogs and up to 45% in long-haired dogs. The incidence is 14.8% among Eastern European shepherds, 15.1% among German shepherds, and 14.4% among Rottweilers.

Up to 65% of female dogs and 30-35% of male dogs were infected. The disease is endemic in up to 80% of dogs, and some dog breeds, including Scotch Terrier, Sharpey, Afghan Dog, Dog, English Bulldog, West Highland White Terrier, and Doberman, have been found to be susceptible to the disease. At the same time, the disease has been shown to be passed from generation to generation.

Our experiments have shown that demodecosis occurs in dogs in chronic and generalized forms, the spread of the disease varies depending on the general condition of the dog, including intestinal parasitic infections, burns, childbirth, endocrine disorders, decreased immunity.

Scientists have suggested that the generalized form of the disease can cause other types of illness in dogs, such as malignant tumors, immunodeficiency, and metabolic disorders.

In dogs with demodecosis, the form of the disease was localized, generalized, depending on the breed, age and living conditions of the dogs,

and forms such as foot demodecosis and otodedectosis were noted.

Table 1. Change of hematological indicators of the dog during demodecosis

№	Parameters	Local form of diseases	General form of diseases
1	Erythrocyte 10^{12}/l	4,32±0,05	3,89±0,13
2	Hemoglobin, g/l	140,02±1,23	121,12±1,97
3	Leukocyte 10^{9}/l	8,42±0,43	14,13±0,15

This may be due to the development in the body of sick animals of inflammatory processes, intoxication, cell death, the entry of protein breakdown products into the bloodstream.

Counting the number of shaped elements showed that the number of red blood cells in animals of sick dogs is lower than in healthy animals. At the same time, a significant decrease in the number of red blood cells was observed in dogs of generalized forms in relation to physiological norms by 15.6%, to local form 10%.

Reducing the level of red blood cells in the blood of animals of sick dogs can be associated with the presence of chronic inflammatory processes that develop in the body during demodectic invasion. A decrease in the level of hemoglobin, as well as erythrocytopenia in the blood of dogs that got sick with demodecosis, indicates a decrease in oxygen supply to the tissue. That is, with demodecosis, hypoxia occurs.

Diagnosis of the disease is based on clinical signs, anamnesis, laboratory blood tests, pathological materials from the wound and microscopic examination of demodex canals.

As a result of our study, the following algorithm for the diagnosis of demodecosis was established: A thorough history: animal age, duration of the disease (primary or secondary), type of feeding, the presence and duration of glucocorticosteroid therapy in relapses - what therapy was used earlier, the period of remission (if observed), course of the disease, concomitant disease.

We have proposed a gentle method, characterized by the absence of side effects after laboratory diagnosis. Scraping is taken at the border of healthy and affected areas of the skin. It is based on the careful pulling of hair with a hair follicle using a hemostatic clamp used in cardiovascular surgery, and further microscopic examination. The contents of the colonies are transferred onto a glass slide in a drop of purified kerosene and the entire area of the preparation is examined under a small magnification of the microscope (objective 10, eyepiece 10).

Detection of small worm-shaped ticks of *D. canis* in skin scrapings allows you to accurately diagnose and differentiate demodecosis from sarcoptosis, otodectosis and other invasions. Soreness with this method of taking a scraping is practically absent, the hair is freely stretched due to lesions of his follicle *D. canis*. With demodecosis, ticks can be detected by microscopic examination of the secretions of the eyes, ears and prepuce.

For staging the diagnosis in scrapings should be detected a large number of ticks at all stages of development. Detection of a single tick should also not to be ignored and for the complete exclusion of demodecosis repeated, more thorough, scrapings are recommended. If necessary, a trichogram or biopsy is used as diagnostic methods. If otodectosis is suspected, a microscopic examination of earwax is performed. Suspicion of demodicosis should occur if the patient has pyoderma, alopecia or seborrhea, that is, every dog with skin problems should be scrapped.

Conclusions

1. The prevalence of demodecosis from skin parasitic diseases of dogs is on average 34-67%, and the disease is seasonal. It increases by 51% in the fall, 31% in the spring, 10% in the winter and 8% in the summer.

2. The prevalence of the disease is 14-36% among dogs aged 6-18 months, up to 55% in short-haired dogs, up to 45% in long-haired dogs, 14.8% in Eastern European dogs, 15.1% in German dogs, in Rottweilers it is up to 14.4%. Up to 65% of female dogs and 30-35% of male dogs can be infected.

3. There are local and generalized types of itching and pustules, depending on the number of affected foci, depending on the clinical course of the disease.

4. Dog demodecosis clinically proceeds in scaly, pustular and mixed forms. With any form of demodecosis, leukocytosis is observed due to the prevalence of lymphocytes, with a chronic course of the disease - lymphocytopenia, with a generalized form complicated by sarcoptosis - basophilia, eosinophilia and lymphocytosis.

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CRITICAL AND CATASTROPHIC NATURAL PROCESSES AND PHENOMENA IN THE TERRITORY OF THE RUSSIAN FAR EAST

Skrylnik Gennady Petrovich
Candidate of Geographic Sciences, Lead Research Officer
Pacific Geographical Institute, Vladivostok
ORCID 0000-0001-6318 5186

Abstract. The development of geosystems of the Russian Far East proceeds under a huge, but contradictory in nature, the double influence of the continent and the ocean and is carried out through the atmosphere.

The purpose - is to characterize dangerous natural phenomena, depending on the differentiated natural tension of the Far East (from maximum in the south to moderate in the north), often causing disaster.

Methods - comparative geographic, geophysical, informational, etc.

The main results. The dangerous natural phenomena that often recur and cover large areas of the Far East include:

a) in the North - "explosions" of cryogenesis and (or) "small" glaciogenesis activity, volcanic eruptions, earthquakes, landslides, mudflows and mud-stone flows;

b) in the South - abnormal showers and floods, hurricane winds, droughts and dry winds, "explosions" of linear erosion, avalanches, ice, fires (in continental areas); a combination of abnormal showers and floods (summer-autumn); severe storms, stormy waves (in autumn and winter); tsunami; earthquakes; landslides, landslides, talus (in coastal zones); catastrophic showers; avalanches, ice, mudflows; hurricanes, severe storms, storm surges; earthquake tsunamis (on islands); western transport of aeolian dust (within the entire south of the Far East).

A wide manifestation of a variety of extreme and catastrophic processes at certain age lines has been established: forest fires (about 5.5 thousand y.a., 2.8 thousand y.a., 1.87 thousand y.a., 0.5 thousand y.a. - in the river basin of Samarga, Yedinka, Partizanskaya, Kievka, etc.); storm surges (about 4.7 thousand y.a., 2.4 thousand y.a., 1.3 thousand y.a., 0.6 thousand y.a.) and tsunamis (about 4, 8 thousand y.a., 3.6 thousand y.a., 2.8 thousand y.a., 0.94 thousand y.a.) - South Kuril Islands.

Further strengthening of the natural continentality of the climate determines the directional increase in the relief formation of the role of hazardous natural processes.

Conclusions. Crisis situations are predictable to a certain extent, which can help optimize rational nature management.

Keywords: relief, climate, continentality, dangerous processes, risks, disasters, the Far East.

Introduction

The development of geosystems of the Russian Far East proceeds under the enormous, but contradictory in nature, double influence of the continent and the ocean [1], because their development occurs in the tectonically and climatically active zone of contact between the mainland and the ocean. Such an influence is manifested directly or indirectly - through the peculiar Far Eastern climates. For the latter, the characteristic features are:

1) great importance in their formation of circulation factors;

2) the dominant role of oceanic influence in the warm season, when the summer monsoon is in effect, and continental - in the cold period, when the monsoon circulation is superimposed on the western transport of air masses;

3) sharp and multidirectional (intra- and inter-seasonal, annual, perennial, age-old rhythms, etc.) and diverse (regional, local, altitudinal-belt) contrasts of heat and moisture against a pronounced wind background. In the course of the multifaceted interaction of continentality and oceanicity, ultimately, special biometeo-energetic prerequisites are created for the development of specific geosystems and at the same time geo-morphological landscapes - peculiar regulators of the stability of common geosystems.

Purpose of the study – characterize dangerous natural phenomena, often recurring, covering significant territories and depending on the differentiated natural tension of the Far East (from maximum in the south to moderate in the north) causing risks and disasters.

Materials of the study – data from long-term geomorphological and geoecological studies of the author in Chukotka and Wrangel Island (1957-1959, 1971-1972) were used; in the river basin of Kolyma and in Priokhotye (1971-1972, 1974-1975); in the lowlands (1974-1979), in the mountains (2007-2011), coastal areas and islands of the south of the Far East; as well as available literary and stock sources.

Methods – comparative geographic, informational, paleogeographic.

Research results and discussion.

The predominance of continental or oceanic influence on the development of the topography of the South and North of the Russian Far East is always expressed, as follows from the materials of our studies, in the activation characteristic of each of the influences of exogenous processes. Thus, in the first case, exogenous morphogenesis activates arid and permafrost relief-forming processes, and in the second, humid and glacial-nivational processes. These processes can be used as a diagnostic sign of the first or second predominant effect on exogenous relief formation. In addition, an integrated indicator of the intensivity, orientation and correlation of "arid and permafrost - humid and glacial-nivational" relief-forming processes helps to reveal trends in the development of the surface relief of the Far East. In general, the influence of the mainland on the development of the relief of the Far East is constant and affects mainly through winter continentality. In the future, it will increase significantly.

Factors and processes involved in the creation and further development of geosystems in the south of the Far East differ in intensity and time of manifestation [1].

According to these signs, they are separated into 2 groups: a) typical; and b) abnormal. The latter include extreme (critical and crisis) and catastrophic.

Typical processes – such, the intensity of which varies within the usual limits for a given territory, controlled by biometeoenergy within the framework of the seasonal and, in part, long-term rhythm of landscapes of a particular region; their impact on geosystems is manifested in dynamics, without changing the type of functioning.

Extreme (critical and crisis) processes cause a permissible maximum or minimum deviation from the norm of one or another factor indicator, which is unusual for a given place reflected during the development of geosystems (floods, avalanches, etc.).

Extreme critical processes lead to a significant, but short-term, change in the structure of geosystems, which is often reversible, but requires a significant length of time for relaxation;

Extreme crisis processes (extremely rarely reversible, often irreversible) in terms of impact are generally comparable to catastrophic ones.

Catastrophic processes – sudden, leading to complete or partially significant **destruction** of the main systemic-organizing components. All stages of catastrophes are characterized by contrast (simultaneous preparation of extreme situations - increasing and "summing up" the effects of critical states - crisis "explosions").

Against the background of the significant contribution of *typical processes* to the evolutionary development of geosystems (especially geomorphological), *anomalous processes* play a noticeably significant role. Moreover, the latter are not always "bad" for the development of geosystems. Thus*, extreme critical processes* and partially *extreme crisis processes* "intelligently" adjusting the organization of geosystems increase their overall stability. With the action of *extreme crisis processes*, "taking objects out of equilibrium, the beginning of a possible restructuring of the entire organization of geosystems (up to a change in the development path) is connected, which leads to their destruction - catastrophes. We note that the latter, noted at the lower levels of the organization of the geographic envelope, do not destroy the geosystems of higher levels. These latter, possessing relatively high stability, not only "heal" their flaws, but often "help" local geosystems recover.

The frequency of occurrence of *extreme critical processes* and their effects on geosystems in the high-energy-stressed continental margins of the Russian Far East (as in southeast Asia and the Atlantic sector of the south of North and Central America) has been increasing in recent decades. As a result, organization becomes more complicated and stability is increased, i.e. directionally, a higher level of organization of common geosystems arises. *Anomalous processes* for geosystems are becoming more and more typical, that is, the scope of "natural risks" and (or) disasters is expanding.

In the development of geosystems of continental areas, there is a tendency to a decrease in changes in equilibrium and nonequilibrium states (under the dominance of equilibrium) and, thereby, to an increase in the natural stability of geosystems; in coastal ones, there is a tendency to increase these shifts (while the balance of equilibrium and nonequilibrium states is still preserved), which stimulate an increase in the number and scale of natural anomalies and, thereby, a decrease in the overall stability of geosystems [2, 3]. This is consistent with a further modern increase in the overall continentality of the Far East. Therefore, the assessment (especially quantitative) of the characteristics of continentality and oceanicity, as a tool for "revealing" areas with varying degrees of "environmental risk and possible crises," is now relevant [1].

Since the hygrothermodynamic characteristics of the anomalous processes in the North and South of the Far East are contrastingly different, these regions are considered separately in the thematic plan below.

NORTH OF THE FAR EAST

At the regional-local level, among the processes that are thermodynamically significant (relative to the most energy-intensive, leading to a relatively significant effect), the organization and possible anomalous change in the geosystems of the Russian North of the Far East may include [1]: “explosions” of cryogenesis activity and (or) “small” Glaciogenesis (Fig. 1), volcanic eruptions, earthquakes, landslides, mudflows and mud-stone flows; anthropogenic activity.

Fig. 1. Ice on the river Hani (the thickness of the layers of "longline" ice – up to 2 m).
Photo by T. A. Akhmetov.

As an analysis of all the materials at our disposal (published [4, 5], stock and own observations) shows, abnormal processes and phenomena in the North in the organization and abnormal change of geosystems against a natural background are noted in relatively limited areas.

In modern climatic conditions in most of the North of the Far East, against the background of traceable different-period fluctuations in the natural zonal and provincial heat and moisture ratios, the activity of all natural processes is still noted within the background norm - mainly within typical and, rarely, critical levels (in extremely rare cases - shortly before the crisis and back to critical). The catastrophic transformations of landscapes in natural settings take place in certain areas, but in general still in limited spaces. Under conditions of anthropogenic press, the frequency of their manifestation increases sharply.

Polar landscapes do not withstand extreme (only crisis) and catastrophic impacts on their active surfaces - due to a sharp change in the

balance of heat and moisture previously established here (during rapid and significant warming; increased precipitation; mechanical and pyrogenic transformations of the land cover ; and etc.). Natural risks arise here with high probability as a result of a complex combination of factors and processes that are different in stability: typical (due to the cumulative effects of their effects) and destructive combinations and transitions "from extreme to catastrophic". Moreover, the levels of these risks (exo- and endodynamic) are predetermined by the multifaceted effects on the geosystems of the corresponding anomalous factors and processes.

In addition, we note that these landscapes are highly vulnerable from anthropogenic influences. This is especially significant in the following cases. Thus, economic activity in the Arctic includes the construction of power plants with multi-kilometer power lines. At the same time, on huge areas (a strip of several hundred meters on both sides of the power transmission line), phenomena arise associated with the so-called effect of biological stimulation by the electric corona. As a result, vegetation acquires the properties of increased productivity, in connection with which, on the one hand, the degree of shadowing of the earth's surface increases and snow retention increases, and on the other, a more intensive accumulation of organic matter on the surface. The latter leads to a change in the subsod and subsoil runoff. All this causes multidirectional fluctuations in the thickness of the active layer and a violation of the thermodynamic state of permafrost, which, in turn, leads to its local degradation or aggradation. If the emerging global climate warming manifests itself in the North of the Far East in a systemically significant framework (for example, according to various estimates - an increase in average annual temperatures of air and soil by 1-2 ˚C, an increase in liquid atmospheric precipitation by more than 50-100 mm, and sea level rise to 1-2 m or more), the processes of thermal abrasion and thermal denudation along the seashores will certainly be activated, and in the rest of the territory - thermokarst, solifluction, landslides and mudflows (up to crisis and catastrophic areal geosystem destruction).

SOUTH OF THE FAR EAST

We associate this region with one of the most active thermohydrodynamic cells of the energy grid of the complex physical and geographical shell [1]. This is expressed in the complex and contradictory diversity and interweaving of natural boundaries. At the same time, the latter make it possible to determine the most important zones: northern and western continental influences – southern and eastern oceanic influences, which

is also confirmed by the work of other researchers. In the formation of landscapes throughout the south of the Far East, anomalous factors, phenomena and processes (both natural and anthropogenic) played and still play a huge system-forming role (Fig. 2, 3).

Fig. 2. Traces of the impact of the 1993 tsunami – "changes" in the beach (Mirror Bay, Eastern Primorye).
Photo by A.M. Korotky.

Fig. 3. Modern landslide on the Krabbe peninsula (southwestern Primorye).
Photo by A.M. Korotky.

In general, anomalous effects on geosystems are becoming more and more typical, i.e. the scope of “natural risks” is expanding here. The relative decrease in the total effect of the outlined natural intensification of anomalous processes is due to the “getting used” to them of geosystems (morphogenetic - due to the general tendency to reduce the rate of deep erosion and flatten the system of valley valleys, in the mountains, and thanks to stabilization of the ocean level and the formation of a dynamic equilibrium profile “cliff - bench”).

A further increase in the natural continentality of the climate determines a directed increase in the relief formation of the role of anomalous processes and catastrophes.

Similar changes were noted in the Late Wurm [1, 6]. In the near future, if anthropogenic climate warming occurs, a rise in the level of the World Ocean is possible. This will cause in the coastal zone of the Sea of Japan and the Sea of Okhotsk the strengthening of many relief-forming processes (abrasion and landslide, etc.).

The natural risks in the South of the Far East, in comparison with the spaces of the North, are uniquely one or two orders of magnitude higher in frequency and intensity. And the appearance

Their occurrence here is mainly associated with gigantic floods after the passage of powerful typhoons and with the “shock” system-forming effects of the tsunami (Fig. 4) caused by intense deep-focus underwater earthquakes.

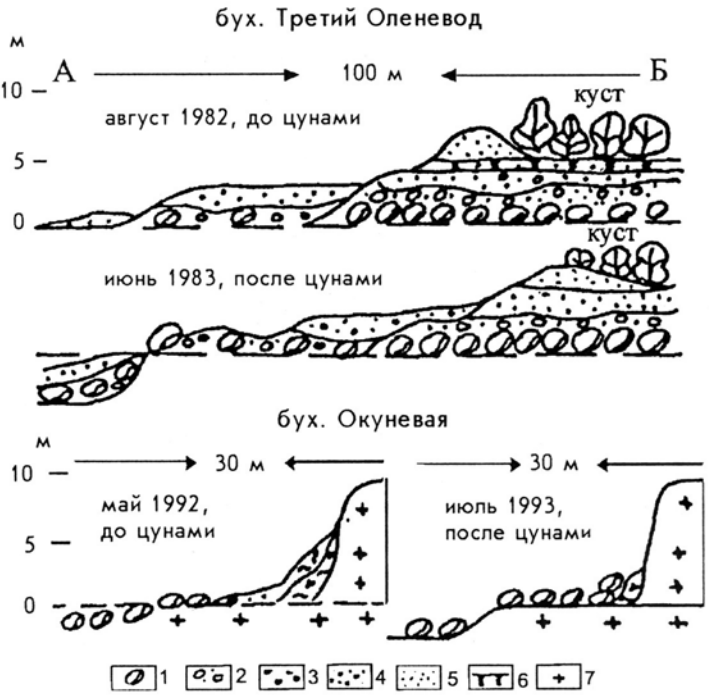

Fig. 4. Traces of the impact of the tsunami (1983 and 1993) on the coast Peter the Great bay.

*Legend: 1 – boulders; 2 – pebbles with sand; 3 – gravel; 4 – sand with gravel; 5 – sand; 6 – soil; 7 – bedrock***.**

Compiled by A.M. Korotky and G.P. Skrylnik.

Among these dangerous phenomena, “river rebuilding” stand out. They cause and support the long-term development of abnormal landscape-transforming processes.

Conclusion

An assessment of the intensity of anomalous geomorphological processes and natural phenomena within the territory of the Russian Far East allows us to attribute the coast of the Sea of Japan and the Sea of Okhotsk, Kamchatka, the top belt of mountains, deeply incised and steep river valleys and island territories to the dynamically most active zones with very unstable landscapes.

The spatial and temporal nature of natural risks within the North and

the South of the Far East is clearly differentiated: in the North, this is primarily the relatively slow emergence of a new exogenous appearance of polar landscapes (mainly due to the emerging contrasts in the balance of heat and moisture, which cause crisis transformations of the cryosphere); in the South, the abrupt emergence of exoendodynamic forms (due to the rapid — more often pyrogenic, cardinal restructuring of the land cover in the continental part and “simultaneous” neoplasms and formations of coastal landscapes). Therefore, the sharply distinct (both in form and in size) environment-forming effects of spatial-temporal natural risks in various regions of the Far East are completely understandable.

The outlined further strengthening of the natural continentality of the climate (according to the materials of V.V. Nikolskaya, 1976) determines a directed increase in the role of hazardous natural processes in relief formation, and an increase in the contrasts between continental and oceanic influences leads to the extremalization of natural processes. This causes the threshold frames to approach the typical and abnormal phenomena and processes. At the same time, due to the increased conservatism of geomorphological and plasticity of phytogenic subsystems, the geosystems of the regions still manage to adapt to changing conditions. Therefore, directional areal destruction of geosystems in natural conditions is not observed now. If sharp anthropogenic warming occurs, an accelerated rise in sea level is possible, which will cause increased abrasion, landslides in the coastal zone.

Under the conditions of a modern anthropogenic press on geosystems, the risks of exogenous processes increase, which we traced, in particular, on the coastal section of the "East Siberia – Pacific Ocean" oil pipeline.

On the whole, exogenous crisis situations and catastrophes, indicated by the basic levels of stability in the organization of geosystems [7], are predictable to a certain extent, which allows some adjustments to be made in the practice of rational nature management. The choice of the latter’s strategy in the considered areas should be comprehensively “sparing”, taking into account the existing natural risks and the environmental restrictions that they determine.

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POPULATION DE L'OBLAST DE KOURGAN AU DÉBUT DU 3ÈME MILLÉNAIRE: DYNAMIQUE ET SCÉNARIO

Solodovnikov Alexandre Yurievitch
Docteur en Géographie, professeur associé
chef de la division de la recherche écologique
Département de Tioumen "SourgoutNIPIneft"
Solodovnikov Dmitriy Alexandrovitch
maîtrise en écologie
école secondaire № 70, Tioumen
Solodovnikova Zlata Alexandrovna
étudiante
Université médicale d'état de Tioumen

Annotation. L'article examine la dynamique de la population de l'oblast de Kourgan dans la période initiale du XXIe siècle. À la suite de l'étude, il a été établi que la population de la région diminuait. La baisse est constatée aussi bien dans les zones rurales que dans les zones urbaines. De plus, la population diminue dans presque toutes les municipalités, ce qui n'est le cas que dans les territoires dépressifs de la Fédération de Russie. En même temps, on constate une concentration de la population dans le centre régional et les centres des municipalités. Il est également noté que la partie majeure de la population habite le long des couloirs routiers reliants l'oblast de Kourgan avec les régions voisines de la Fédération de Russie. Les couloirs routiers vers la République du Kazakhstan après l'effondrement de l'URSS ont perdu leur attractivité.

Mots-clés: l'oblast de Kourgan, nombre de la population, municipalités, urbains et campagnards.

L'oblast de Kourgan est une oblast la plus petite de la région de l'Oural de la Fédération de Russie. Sa superficie est de 71,5 mille km2, soit 0,4% de la superficie du pays. Parmi les sujets de la Fédération de Russie en superficie, il occupe la 46ème place. Par exemple, en ce qui concerne l'Europe, l'oblast de Kurgan n'est pas tellement petite. Sa superficie dépasse celle de 24 états européens, y compris tels états que l'Irlande, la

Belgique et les Pays-bas. En nombre de la population – un peu plus de 800 m. pers. (en 01.01.2020), elle est inférieure aux sujets nombreux de la Fédération de Russie et plus encore aux états de l'Europe. Le centre administratif est la ville de Kourgan. Géographiquement, l'oblast est située à la jonction de l'Oural et de la Sibérie occidentale, dans la partie Sud-ouest de la plaine de Sibérie Occidentale. Du nord au sud, elle s'étend sur plus de 290 km, à l'ouest - 430 km. Distance du centre régional de la capitale de Moscou – 1973 km. Selon le gouvernement de l'oblast de Kourgan [1] à la date 04.03.2020, à l'intérieur des forntières des unités administratives de l'oblast de Kourgan il y a 2 districts municipaux, 24 municipalités, 13 localités urbaines et 353 conseils ruraux.

La population de l'oblast de Kourgan au début de 2020 fesait 827,2 mille pers., dont 62% sont des urbains et 38% des campagnards. Depuis le début du 3ème millénaire, le nombre d'habitants a diminué de 1,3 fois. La population urbaine a diminué de 87,5 mille hab., ou de 14,5%, la population rurale - de 172,3 mille pers., ou 1,55 fois (table. 1). En général, le nombre des habitants diminue annuellement.

Table 1
Population de l'oblast de Kourgan en 2001-2020 (début de l'année)

Année	Total, mil. pers.	Part, %	Urbain, mil. pers.	Part, %	Rural, mil. pers.	Part, %
2001	1087,0	100,0	602,0	55,3	485,0	44,7
2002	1074,4	100,0	594,4	55,3	480,0	44,7
2003	1016,2	100,0	572,8	56,4	443,4	43,6
2004	999,4	100,0	569,8	57,0	429,6	43,0
2005	981,0	100,0	565,4	57,6	415,6	42,4
2006	961,8	100,0	561,8	58,4	400,0	41,6
2007	946,1	100,0	557,7	58,9	388,4	41,1
2008	934,5	100,0	553,8	59,3	380,7	40,7
2009	925,2	100,0	550,8	59,5	374,4	40,5
2010	918,6	100,0	549,9	59,9	368,7	40,1
2011	908,8	100,0	547,8	60,3	361,0	39,7
2012	896,3	100,0	541,1	60,4	355,2	39,6
2013	885,8	100,0	537,7	60,7	348,1	39,3
2014	877,1	100,0	536,3	61,1	340,8	38,9
2015	869,8	100,0	535,3	61,5	334,5	38,5
2016	861,9	100,0	532,6	61,8	329,3	38,2
2017	854,1	100,0	527,7	61,8	326,4	38,2
2018	845,5	100,0	522,8	61,8	322,7	38,2
2019	834,7	100,0	518,5	62,1	316,2	37,9
2020	827,2	100,0	514,5	62,2	312,7	37,8

Source: établi selon: [2].

Les habitants urbains habitent 14 municipalités, ceux ruraux - 24. Dans les districts municipaux, 100% d'habitants sont urbains, plus de 50% de la population urbaine habite quatre municipalities – Kourtamychsky, Petoukhovsky, Kataisky et Choumikhinsky. La population rurale n'est enregistrée que dans 12 municipalités.

En nombre d'habitants dans les villes, les villes à population de 10 à 20 mille (66,7%) sont les plus nombreuses, les villages de type urbain – à nombre d'habitants de 5 à 10 mille (83,3 %). La majorité de la population urbaine habite des villes à nombre d'habitants de 250 à 500 mille habitants (60,7 %), la partie plus petite dont la population ne dépassant pas 5 mille habitants (0,8 %).

Parmi les localités rurales les plus peuplées sont ceux à nombre de la population de 101 à 500 habitants. Leur part fait 44,7 %. Ensuite, dans l'ordre décroissant – 51-100 pers. (18,1 %), 11-50 (14,6), 51-1 000 (11,2), 1-10 (5,5), 1 001 et plus (3,8) et sans habitants (2,1 %). En même temps, la majorité de la population habite des localités à nombre d'habitants 101-500 pers. (37,1%), la partie plus petite, où la population ne dépasse pas 1-10 habitants (0,1 %). Les localités à nombre d'habitants de 101 à 500 pers,, ce sont généralement les centres des conseils ruraux et d'autres localités aux objets industrielles et d'infrastructure.

Le nombre de la population urbaine a augmenté de 4% pendant la periode inter recensement de 2002 et 2010. Dans tous les districts municipaux à la population urbaine sa part a augmenté lors du décroissement de la part de la population rurale (tab. 2).

Table 2
Proportion de la population urbaine et rurale par municipalités, % du nombre total

Municipalités	Population urbaine		Population rurale	
	2002	2010	2002	2010
Districts				
Almenevsky	–	–	100,0	100,0
Belozersky	–	–	100,0	100,0
Vargachinsky	42,8	46,5	57,2	53,5
Dalmatovsky	42,6	47,2	57,4	52,8
Zverinogolovsky	–	–	100,0	100,0
Kargapolsky	37,1	39,8	62,9	60,2
Kataisky	56,4	58,4	43,6	41,6
Ketovsky	–	–	100,0	100,0
Kourtamychsky	47,6	53,2	52,4	46,8

Lebyajevsky	32,5	39,0	67,5	61,0
Makouchinsky	41,5	46,0	58,5	54,0
Michkinsky	40,4	45,4	59,8	54,6
Mokroousovsky	–	–	100,0	100,0
Petoukhovsky	52,2	55,1	47,8	44,9
Polovinsky	–	–	100,0	100,0
Pritobolny	–	–	100,0	100,0
Safakoulevsky	–	–	100,0	100,0
Celinny	–	–	100,0	100,0
Tchastoozersky	–	–	100,0	100,0
Chadrinsky	–	–	100,0	100,0
Chatrovsky	–	–	100,0	100,0
Choumikhinsky	57,7	62,5	42,3	37,5
Tschoutchansky	40,2	46,6	59,8	53,4
Urgamychsky	32,7	36,5	67,3	63,5
Districts municipaux				
Kourgan	100,0	100,0	–	–
Chadrinsk	100,0	100,0	–	–
Oblast de Kourgan	56,3	60,3	43,7	39,7

Source: établi selon: [3].

Le déclin de la population est constaté dans toutes les municipalités, à l'exception du district Ketovsky (tab. 3). En même temps, la plus forte baisse a été enregistrée dans la région Safakoulevsky – de 1,7 fois. Dans les districts municipaux, la diminution de la population est beaucoup plus faible – de 7 à 9 % (tab. 4). Ce sont les causes principales: solde migratoire négatif, déclin naturel, situation économique défavorable (bas salaires, chômage, etc.), etc.

Table 3

Nombre de la population de l'oblast de Kourgan par municipalities en 2002–2019 (début de l'année), mil. pers.

Municipalités	Année							2019/ 2001, %
	2002	2010	2015	2016	2017	2018	2019	
Districts								
Almenevsky	15,2	12,6	10,4	10,1	9,9	9,6	9,4	61,8
Belozersky	21,2	17,0	15,3	15,1	15,0	15,1	15,0	70,6
Vargachinsky	23,2	20,0	19,0	18,9	18,9	18,9	18,7	80,6
Dalmatovsky	35,2	29,8	26,8	26,3	25,8	25,4	24,9	70,7
Zverinogolovsky	11,8	9,6	8,2	8,0	7,8	7,6	7,4	62,7
Kargapolsky	34,9	31,9	30,5	30,2	30,2	30,2	30,1	86,2
Kataisky	28,0	24,4	22,1	21,9	21,6	21,4	21,0	75,0

Ketovsky	56,5	55,2	61,0	61,1	61,8	61,8	61,5	108,8
Kourtamychsky	38,2	32,4	30,0	29,8	29,3	29,0	28,5	74,6
Lebyajevsky	21,2	16,8	14,4	14,0	13,7	13,5	13,2	62,3
Makouchinsky	24,0	18,4	16,1	15,9	15,6	15,5	15,2	63,3
Michkinsky	22,0	17,9	16,1	15,8	15,6	15,3	14,9	67,7
Mokroousovsky	15,4	13,2	12,0	11,8	11,7	11,6	11,4	74,0
Petoukhovsky	24,3	20,8	18,2	17,9	17,7	17,3	16,8	69,1
Polovinsky	16,3	12,4	10,8	10,7	10,6	10,6	10,3	63,2
Pritobolny	17,6	14,6	13,6	13,4	13,3	13,2	12,8	72,7
Safakoulevsky	17,0	13,3	11,3	10,9	10,6	10,3	10,0	58,8
Celinny	23,0	17,4	15,4	15,2	15,1	14,9	14,5	63,0
Tchastoozersky	7,8	6,0	5,4	5,3	5,3	5,3	5,2	66,7
Chadrinsky	33,3	27,5	26,0	25,8	25,7	25,4	24,9	74,8
Chatrovsky	23,0	18,8	16,6	16,2	16,0	15,8	15,4	67,0
Choumikhinsky	33,0	28,7	26,3	26,0	25,8	25,4	25,0	75,8
Tschoutchansky	26,4	23,7	21,4	20,7	20,0	19,8	19,5	73,9
Urgamychsky	24,7	21,0	19,7	19,4	19,3	19,3	19,0	76,9
Total	593,2	503,4	466,6	460,4	456,3	452,2	444,6	74,9
Districts municipaux								
Kourgan	345,5	334,5	326,3	325,2	322,0	318,0	315,3	91,3
Chadrinsk	80,9	78,0	77,0	76,4	75,6	75,3	74,9	92,6
Total	426,4	412,5	403,3	401,6	397,6	393,3	390,2	91,5
Total pour l'oblast	1019,6	915,9	869,9	862,0	853,9	845,5	834,8	81,9

Sources: [2-4]

Table 4

Le déclin (–) et la croissance (+) du nombre de la population dans les municipalities de l'oblast de Kourgan en 2002-2019, fois

Municipalités	Déclin (–), croissance (+)	Municipalités	Déclin (–), croissance (+)
Districts		Polovinsky	–1,58
Almenevsky	–1,61	Pritobolny	–1,37
Belozersky	–1,41	Safakoulevsky	–1,70
Vargachinsky	–1,21	Celinny	–1,58
Dalmatovsky	–1,41	Tchastoozersky	–1,50
Zverinogolovsky	–1,59	Chadrinsky	–1,33
Kargapolsky	–1,15	Chatrovsky	–1,49
Kataisky	–1,33	Choumikhinsky	–1,32
Ketovsky	+1,08	Tschoutchansky	–1,35
Kourtamychsky	–1,34	Urgamychsky	–1,30

Lebyajevsky	–1,60	Districts municipaux	
Makouchinsky	–1,57	Kourgan	–1,09
Michkinsky	–1,47	Chadrinsk	–1,07
Mokroousovsky	–1,35	En moyenne	–1,22
Petoukhovsky	–1,44		

Sources: [2-4]

Environ 38% de la population de l'oblast de Kourgan habite la ville de Kourgan. C'est le noyau d'habitation principal de l'oblast. Presque 9% de la population est concentrée dans la ville de Shadrinsk. Ainsi, les districts urbains représentent 47% de la population totale de l'oblast. Parmi les districts municipaux, la population la plus élevée est dans le district Ketovsky - 13,8%, la plus faible - dans le district Tchastoozersky – 1,2 % (tabl. 5).

Table 5

Partition du nombre de la population de l'oblast de Kourgan par municipalités au début de 2019., %

Municipalités	Part, %	Municipalités	Part, %
Districts	100,0	Petoukhovsky	3,8
Almenevsky	2,1	Polovinsky	2,4
Belozersky	3,4	Pritobolny	2,9
Vargachinsky	4,2	Safakoulevsky	2,2
Dalmatovsky	5,6	Celinny	3,3
Zverinogolovsky	1,7	Tchastoozersky	1,2
Kargapolsky	6,8	Chadrinsky	5,6
Kataisky	4,7	Chatrovsky	3,5
Ketovsky	13,8	Choumikhinsky	5,6
Kourtamychsky	6,4	Tschoutchansky	4,2
Lebyajevsky	3,0	Urgamychsky	4,2
Makouchinsky	3,4	Districts municipaux	100,0
Michkinsky	3,4	Kourgan	80,8
Mokroousovsky	2,6	Chadrinsk	19,2

Source: établi selon: [4]

Trois de vingt-quatre municipalites se classent au groupe à nombre de populatioon 5 000 et 10 000 pers. (12,5%), onze - 10 001 - 20 000 (45,8 %), huite - 20 001 - 30 000 (33,3 %) et par une (4,2%) - 30 001 - 40 000 et 60 001, et plus (tabl. 6). En même temps, la population moyenne de l'oblast de Kourgan, selon le Recensement panrusse de 2010, fait 296,7 pers./SNP (51 place dans la Fédération de Russie) (SNP – localités ru-

rales). La part des localités rurales avec population fesait 97,87 %, sans population – 2,13 %. En valeurs absolues, 26 localités sont restées sans population. Au total, pendant la periode d'interrecensement 2002-2010, 13 localités ont été retirées du registre et ce processus n'est plus réversible.

Table 6

Le groupement des municipalities par nombre de la population, au début de 2019

Groupes de nombre de la population, pers.	Total	Districts	Population au total	
			mil. pers.	part, %
Pré- 10 000	3	Almenevsky, Zverinogolovsky, Tchastoozersky	22,0	4,9
10 001–20 000	11	Belozersky, Vargachinsky, Lebyajevsky, Makouchinsky, Michkinsky, Mokroousovsky, Petoukhovsky, Polovinsky, Pritobolny, Safakoulevsky, Celinny, Chatrovsky, Tschoutchansky, Urgamychsky	196,4	44,2
20 001–30 000	8	Dalmatovsky, Kataisky, Kourtamychsky, Chadrinsky, Choumikhinsky	134,6	30,3
30 001–40 000	1	Kargapolsky	30,1	6,8
50 001 и более	1	Ketovsky	61,5	13,8
Total			444,6	100,0

Source: établi selon: [4]

La plupart de la population habite le long des couloirs routiers latitudinaux, y compris les autoroutes et les voies ferrées d'importance fédérale Moscou - Tcheliabinsk – Kourgan – Omsk et d'importance régionale Ekaterinbourg – Shadrinsk–Kourgan. Un groupe nombreux des localités se situe également au long du couloir routier méridional d'importance fédérale Tyumen-Kourgan–Koustanai. Dans la période post-soviétique, en particulier au 21ème siècle, les autoroutes vers la République du Kazakhstan ont perdu leur attractivité précédente. La population quitte les territoires frontaliers et se concentre autour de la capitale régionale ou se dirige vers la région de Tioumen, où le niveau de vie est beaucoup plus élevé, même dans les zones rurales, sans parler des villes.

La densité moyenne de la population dans les municipalités est 6,23 pers./km2, la plus élevée – dans le district Ketovsky – 18,5, la plus faible – dans le district Tchastoozersky – 2,69 pers./km2. Dans les localités urbaines, la densité de la population est de deux fois plus élevée (tabl. 7).

Table 7

Densité de la population dans les munisipalites de l'oblast de Kourgan en 2018

Municipalités	pers./km²	Municipalités	pers./km²
Districts	6,23	Petoukhovsky	6,06
Almenevsky	3,78	Polovinsky	3,77
Belozersky	4,37	Pritobolny	5,57
Vargachinsky	6,27	Safakoulevsky	4,38
Dalmatovsky	7,11	Celinny	4,21
Zverinogolovsky	5,46	Tchastoozersky	2,69
Kargapolsky	9,31	Chadrinsky	6,11
Kataisky	7,86	Chatrovsky	4,34
Ketovsky	18,50	Choumikhinsky	8,91
Kourtamychsky	7,26	Tschoutchansky	6,83
Lebyajevsky	4,16	Urgamychsky	7,36
Makouchinsky	4,38	Districts municipaux	688,55
Michkinsky	4,95	Kourgan	802,25
Mokroousovsky	3,69	Chadrinsk	431,46

Source: établi selon: [4]

Conclusions principales:

1. La population de l'oblast de Kourgan diminue annuellement. Entre 2001 et 2019, son nombre a diminué de 1,3 fois. Le déclin est constaté tant dans les villes que dans les zones rurales. En plus dans les zones rurales, elle diminue plus rapidement, 3 fois plus vite que dans les zones urbaines.

2. La population urbaine est principalement concentrée dans les villes de plus de 250 mille pers. (60 %). Les habitants des zones rurales habitent le plus souvent des localités de 101 à 500 pers. (environ 45 %). Le déclin de la population rurale a conduit au dépeuplement des localités. Pendant la période 2002-2010, environ 30 localités sont restées sans habitants, soit plus de 2 %.

3. Les causes principales de la diminution de la population sont celles-ci: solde migratoire négative, déclin naturel, situation économique défavorable (salaries bas, chômage, etc.), etc. La plupart de la population déménage dans l'oblast de Tioumen et l'oblast de Sverdlovsk voisins, où le niveau de vie est beaucoup plus élevé et où le marché de l'emploi est plus actif.

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TECHNOGENIC-MINERAL RESOURCES "HIGH SULFIDATION" OF THE EPITHERMAL CU-AU-AG DEPOSIT CHELOPECH (BULGARIA). PART 1. GEOLOGICAL FEATURES AND TECHNOGENESIS

Goldyrev Vitaly Nikolaevich
Engineer
Institute of Natural Sciences of the Perm State University, Perm
Naumov Vladimir Aleksandrovich
Doctor of Geologo-Mineralogical Sciences, Full Professor, Director
Institute of Natural Sciences of the Perm State University, Perm

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

The first part of the study analyzes the data of geological materials for the Chelopech, Elazite, Asarel, Medet, Radka, Elshitsa, Tsar Asen deposits, as well as ore occurrences located in the Panagyur ore district. Data indicate a close genetic relationship between them. The hypothesis of their belonging to a single porphyry-epithermal system is considered.

By the example of the analysis of geological data and the development technology of the Chelopech copper-gold deposit, the basic mechanisms of the formation of technogenic and mineral resources (technogenesis), the volume and forms of finding polymetals, rare and precious metals are shown.

Keywords: porphyry-epithermal systems, epithermal gold deposits, Chelopech, Bulgaria, technogenesis, Srednegorsky volcanic belt.

Introduction

The largest gold mining company in Bulgaria, the Chelopech mine, is located in western Bulgaria, 70 km east of Sofia on the southern slope of the Balkan Mountains. The enterprise is located in the northern part of the Panagyurishte mining region, in which a number of deposits of massive sulfide ores and porphyry deposits are known. Minerals in the area were discovered back in the XIX century, however, the development of the field itself began in 1954. Until 1990, sulfide concentrate was transported from the enterprise to a metallurgical plant in the nearby town of Pirdop. Due to the increased arsenic content in the concentrate, in 1992 the Chelopech mine was put into maintenance operation. In 1993, Navan resumed operations and organized the processing of concentrate at plants in other countries around the world. Since 2003, the Dundee Precious Metals (Canada) field has been developing the field [4]. The mineral and raw material base of the Chelopech mine (Table 1) provides ore mining until 2027 [16].

Table 1

Mineral and raw material base of the Chelopech mine for 2019 according to [16]

Mineral reserve and mineral resource	Ore	Gold		Silver		Copper	
	Volume, mill.tons	Content, g/t	Volume, t	Content, g/t	Volume, t	Content, g/t	Volume, t
Proven and Probable	16.9	3.03	46.6	7.55	115.9	0.90	152.4
Measured and Indicated	14.2	2.86	37.1	8.00	103.65	0.94	134.2
Inferred	1.9	2.02	3.5	6.57	11.31	0.84	0.4

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

Formed TMFs are the main source of changes in the composition of the environment, the appearance of increased concentrations of elements unusual for the environment and heavy metals, and the formation of the hydromineral part. TMF, concentrated in the tailings of the study area, we consider as large complex technogenic deposits containing significant technogenic and mineral resources of polymetals, rare and precious metals.

To assess the prospects for the development of technogenic and mineral resources, it is necessary to identify the main types of TMF in solid and hydro-mineral form. Based on the practice of conducting such works [9], 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 that affect the processes of technogenesis are the shape and depth of formation of ore bodies, their composition (content of quartz, carbonates, sulfides, noble metals), gold characteristics (morphology, size, fineness, form of its location). These features determine the choice of technology for the development and concentration of ores, which determine the volume, material composition and prospects of industrial development of TMF. The study of technogenesis processes is the main goal of this study.

1. Geological Features

1.1. Geological and structural position

The deposit is located within the Srednegorky volcanic belt, where the largest gold-containing highly sulfidized (HS) epithermal and copper-porphyry deposits are established in Bulgaria. About 90% of the country's copper ore reserves are concentrated in this region [2].

According to the composition and localization conditions, porphyry copper deposits (Botevgrd-Etropole ore district) are grouped into three types of porphyry copper deposits: among volcanic and subvolcanic rocks (Asarel deposit), in hypabyssal intrusions (Medet deposit), at the contact of intrusive massifs and metamorphic (Elazite deposit) [2]. The formation of porphyry copper deposits is associated with the introduction of small subvolcanic - hypabyssal intrusions of quartz-diorite, monzonite-diorite composition, accompanying andesite-dacitic volcanism. Stock-like ore bodies occupy the apical parts of hypabyssal intrusives (Medet) or penetrate the cover of effusive rocks above subvolcanic eruptive bodies (Asarel). In the presence of structural contact with a wide substitution zone between granites and shales (Elazite), the ore body is stratiform. The main ore minerals are pyrite, chalcopyrite, molybdenite, magnetite, hematite, sphalerite and galena are less common. The most typical rock changes are potassium feldsparization, silicification, chloritization, sericitization, and zeolitization [3].

HS-epithermal deposits (Panagyur-Etropole ore region) are spatially associated with two subparallel volcanic zones of north-western strike [2]. They are confined to dacitic and andesitic agglomerate tuffs or to the contact of tuffs with dyke-shaped bodies of rhyodacites. Ore bodies of

epithermal (Radka, Chelopech, Elshitsa deposits) and epithermal polymetallic (Radka deposits) genesis steeply dipping tape-like [3].

The deposits are associated with volcanic-plutonic centers, which are products of subduction magmatism of the Early Cretaceous (Turon-Senon) [2], and are located in the Panagyur submeridional deep-penetrating ore-concentrating structure [7].

Mineralization is associated with the Lower Chelek Formation (Upper Cretaceous) and is characterized by typical epithermal, highly sulfide metasomatic changes. Metasomatic changes and mineralization has zoning. In the center are rich bodies composed of stockworks and / or massive sulfide mineralization. These bodies are surrounded by poor halos of metasomatic changes with a predominance of silicification and diffuse sulfide mineralization. These two zones: “stockwork” (hydrothermal breccia or massive sulfide ore) and “quartz-sericite alteration envelope” are ore bodies (Fig. 1) of the deposit and are used in calculating resources and reserves [14].

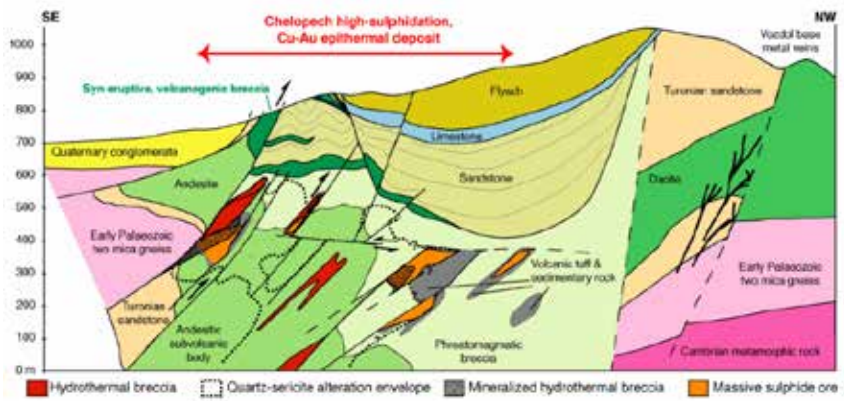

Fig. 1. Section of the Chelopech and Vozdol deposits based on surface and underground mapping, drilling, description and observations [19], as well as information [20]. At present, the production level is ~ 200 m. The rocks belong to the Late Cretaceous, unless otherwise is indicated

It was previously believed [5] that the Chelopech deposit is part of the Chelopech andesitic stratovolcanic structure, which was formed in an underwater environment. Proceeding from this, Chelopech, as well as the majority of nearby deposits, was classified as copper-pyrite type, in the foreign literature a massive sulfide copper-pyrite type. However, recent

studies [14, 19] prove the metasomatic formation of mineralization associated with the replacement of volcanic rocks.

Chelopech is a highly sulfidized epithermal deposit. Mineralization is associated with both sulfides and sulfosalts-rich silica zones surrounded by mudstones. Ore bodies are complex branched stockworks ranging from 40–200 meters in length, with a thickness of 20–130 meters, which can extend 390 meters in depth [16].

According to the authors, the Panagyur ore region (OR) is a large-volume porphyry-epithermal system (PES) [17, 18, 22], the leader of which is Asarel (Fig. 2). Similar objects on the territory of the Russian Federation include the Bystrinskoye skarn-porphyry Cu-Au-Fe deposit located in East Transbaikalia, which, along with the Malmyzh (Priamurye) and Peschanka (Chukotka) deposits, is one of the largest Cu-Au-porphyry ore fields in Russia. Field data by many authors [1, 6, 12] are considered as large-volume PES. Therefore, the consideration of the Panagyur OR as a PES from the forecast and search point of view is justified.

1.2. The material composition of the ores

Ore bodies (stockworks, stocks, lenses) are located among "volcanogenic-tufogenic and dyke rocks of andesite-dacite composition subjected to hydrothermal changes (silicification, sericitization, pyritization)" [8]. The main rock-forming minerals are quartz, plagioclases, potassium feldspars, epidote, chlorite, sericite, and barite (Table 2).

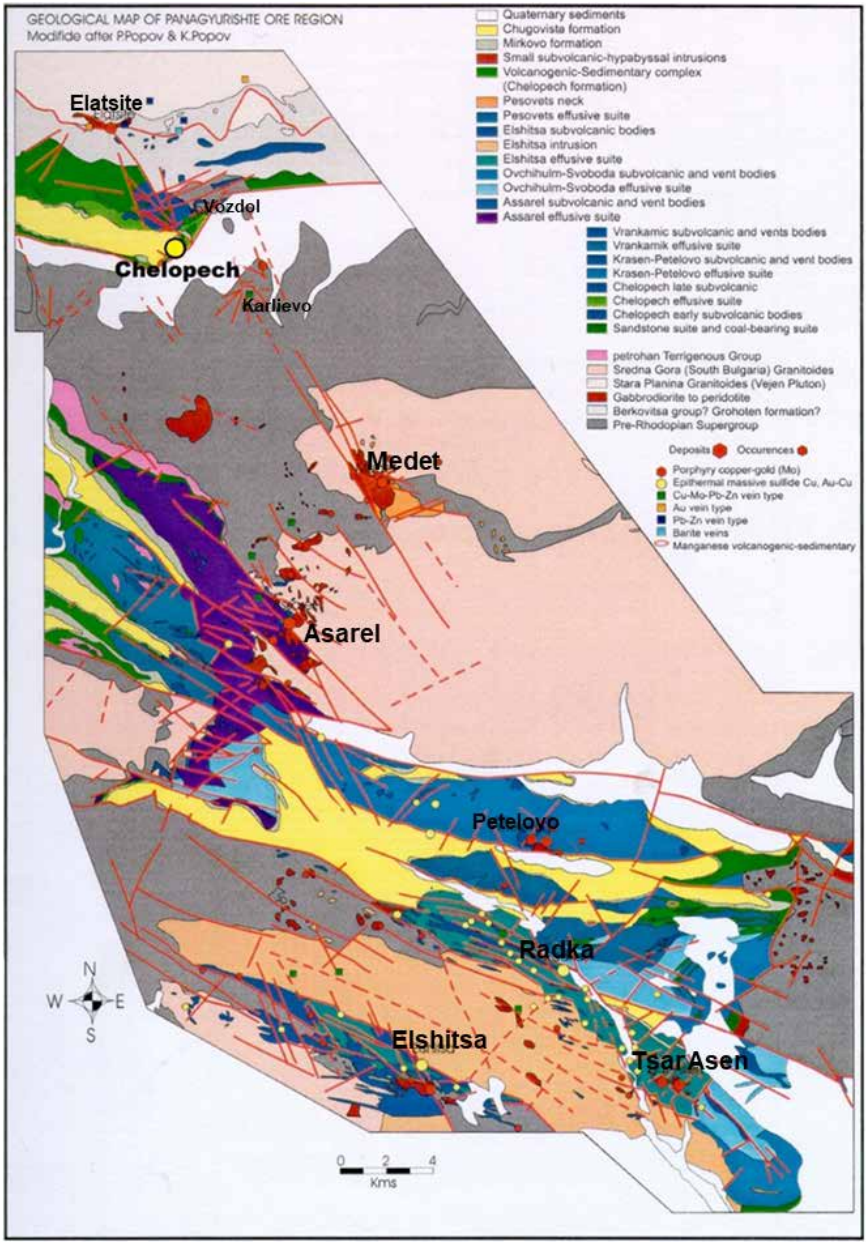

Fig. 2. Panagyur porphyry-epithermal system according to [21]

Table 2

The mineral composition of the ores of the Chelopech deposit according to [5]

Minerals	Metallic	Non-metallic
Main	Pyrite, tennantite, chalcopyrite, enargite, luconite, bornite, sphalerite, galena	Quartz, barite, sericite, anatase, chlorite, epidote, albite, alunite
Minor and rare	Tetrahedrite, marcasite, famatinite, covelin, chalcosine, gold	Kaolinite, fluorite, chalcedony, gypsum

At the Chelopech deposit, according to V.A. Kovalenker [8], the following mineral paragenesis (zones) can be distinguished (in the order of formation), which replace each other in the indicated order: chalcopyrite-tennantite-pyrite, chalcopyrite-tennantite, luconite-enargite-pyrite and bornite-pyrite. Many rare-metal line minerals have been found in ores: galium, indium sulfides, enargite family sulfosalts (enargite, luconite, arsenosulvanite, colusite), renerite, bismuth sulfosalts, faded ores, as well as rare tellurium minerals: goldfieldite, altaite, sylvanite, tellurium bismuthite, native tellurium [10]. The presence of As, Hg, S, Se minerals is probably due to the presence of these components in volcanic gases, and V, Sn, Ge, Ga, In, Mo due to leaching from host rocks [11]. The chemical composition of the ores is given in table. 3-4.

About 45% of copper is in the form of arsenides and sulfosalt, 50% in the form of chalcopyrite and 5% in the form of oxides. Intergrowths of copper minerals are widespread, both in the form of aggregates and in the form of complex structures with several minerals [14].

Table 3

The chemical composition of the ores of the Chelopech deposit [16]

Component	Mass fraction,%
SiO_2	75.11
Al_2O_3	10.92
Fe_2O_3	4.76
MnO	0.01
MgO	0.49
S%	5.00
CaO	0.22
Na_2O	0.22
K_2O	2.74
TiO_2	0.39
P_2O_5	0.14
H_2O	5.26

Table 4

Concentration of associated, rare and trace elements in the ores of the Chelopech deposit [16]

Element	Mass fraction, g	Element	Mass fraction, g
V	91	La	22.0
Ga	17	Ce	38.4
Co	30	Pr	3.8
Nb	6	Nd	13.9
Zr	91	Sm	3.2
Sr	182	Eu	1.3
Ba	2.427	Gd	4.4
Rb	115	Dy	5.1
Pb	264	Ho	1.0
Th	6	Er	2.7
U	2	Tm	0.4
Cu	72	Yb	2.3
Zn	110	Lu	0.3
As	110	Sc	7
Ag	8	Y	29
Au	3.78		

Gold is paragenetically associated with arsenic and minerals of base metals and is found in various forms. The main share of gold is in bound form, forming forms resistant to enrichment: intergrowths with pyrite, chalcopyrite and sphalerite (~ 45%), enargite, luzonite, tennantite, tetrahedrite and bornite (~ 25%) and small intergrowths with chalcedony silica (~ 20 %) [14].

The proportion of free gold is ~ 10% (Table 5). *Free gold* is fine-grained (from 5 to 300 microns, most from 5 to 20 microns). The average value of the composition of free gold is Au - 94.14 wt. %, Ag - 5.27%, Cu - 0.53% 0.10%. native metal with an admixture of silver in stoichiometric form, close to Au_3Ag and in gold-bearing tellurides [14]. No other components were detected. The fineness of gold (1000*Au/(Au+Ag) usually ranges from 900-1000, with an average value of 947 [13].

Table 5

Phase analysis of gold and silver according to [14]

The form and nature of the relationship of precious metals with ore and rock-forming minerals	Distribution	
	Gold	Silver
	%	%
Gold in the form of free grains with a clean surface. Silver in Gold composition	10	23
In open splices	25	15
Sulfide bound	45	44
Bound with acid-soluble and rock-forming minerals	20	18
Content	**3,8**	**8,0**

2. Ore Development And Treatment Technology

Chelopech — is an underground mine. Previously, a subsurface caving system was used to conduct mining operations; at the moment, the enterprise switched to a subsurface excavation with breaking through deep wells. Ore bodies are grouped into two mining zones (Fig. 3). The central zone consists of eleven mineralized bodies, while the western zone contains nine more such bodies (Fig. 4). Of these, seven are considered significant and are defined as mineral resources [16].

A feasibility study was developed based on the on-board grade in the gold equivalent of 3.2 g/t, calculated by the formula AuEq=Au(g/t)+2.5xCu (%) [16].

Fig. 3. Plan of the Chelopech mine with plotted projections of ore zones according to [16]

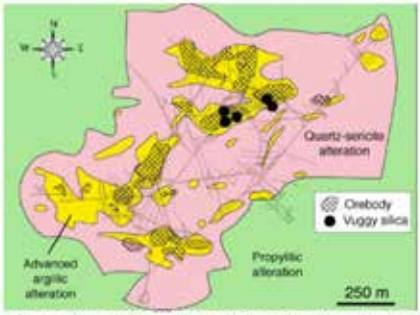

Fig. 4. Plan of the Chelopech deposit, "Zapadnaya" zone, horizon 405 [19]

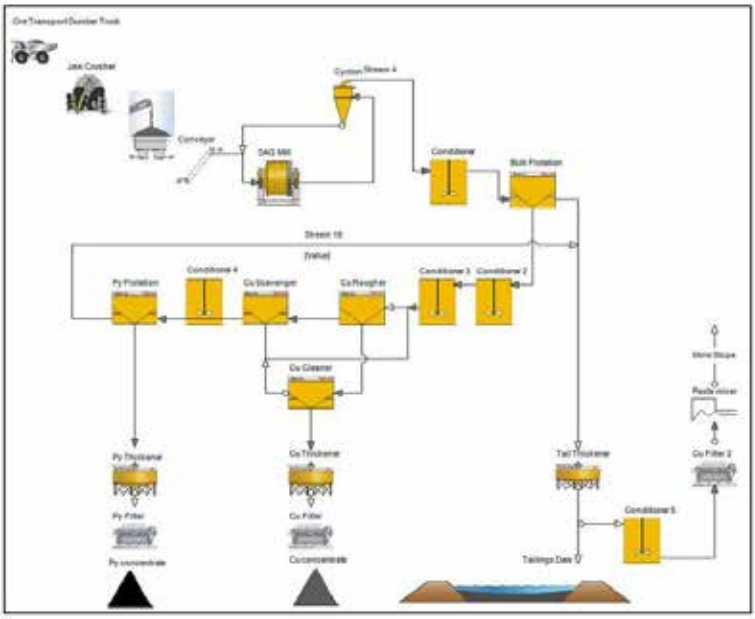

Fig. 5. Ore beneficiation scheme of the Chelopech MPP [16]

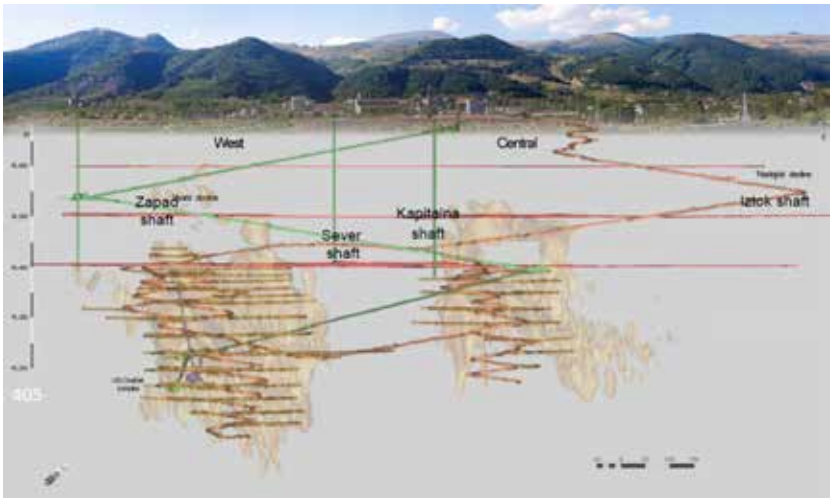

Fig. 6. Open pit mines and ore zones of the Chelopech mine [16]

The capacity of the mining and processing plant (MPP) is 2.2 million tons of ore per year. Ore beneficiation is carried out according to the following scheme (Fig. 5): 1) primary crushing (jaw crusher) of ore is carried out directly in the mine (Fig. 6), after which the crushed material is conveyed by conveyors and stored in dumps on the surface; 2) grinding in a mill semi-grinding in a closed cycle with a battery of hydrocyclones; 3) collective sulfide flotation; 4) selective flotation with obtaining copper-gold flotation concentrate. Pyrite concentrate is made from the tails of the copper flotation cycle; 4) thickening of concentrates and tails; 5) filtration (vacuum filters) of concentrates.

Concentrates are shipped by rail to the port of Burgas, from where they are transported to the company's plant in Namibia and to third parties. Tails are sent via a 2.6 km long pipeline to a 86 ha tailing dump or used as backfill material.

At present, the MPPa technological scheme makes it possible to extract about 70% of gold, 91% of copper, and 63% of silver into a marketable product [16].

Conclusion

An analysis of the mineral resource base of the Chelopech mine allows us to conclude that economically viable reserves will be depleted in the next decade. One of the ways to extend the life of the mine is the competent use and processing of technogenic and mineral resources.

The following features are the most important, influencing the processes of technogenesis: form (stockwork, massive sulfide ores, halo of metasomatic changes) and the depth of formation (200-700 m) of ore bodies; their composition (quartz content of about 75%, carbonates - 0.2%, sulfides - 5%, gold - 3-4 g/t); gold characteristics (prevails from 5 to 20 microns in size, fineness 947, mainly associated with sulfides - 45%). These features determined the choice of the underground mining method and flotation concentration technology.

The “High sulfidation” of the Chelopech Epithermal Field is part of the bulk PES. This fact is important not only from the forecast 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, materials, an analytical research algorithm obtained by analyzing the technogenesis of the Chelopech deposit, can be used to evaluate and forecast the development of technogenic and mineral resources of other ore objects of the Panagyur ore district.

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TECHNOGENIC-MINERAL RESOURCES "HIGH SULFIDATION" OF THE EPITHERMAL CU-AU-AG DEPOSIT CHELOPECH (BULGARIA). PART 2. TECHNOGENIC MINERAL FORMATIONS, TECHNOGEOGENESIS AND TECHNOGENIC ORE GENESIS

Goldyrev Vitaly Nikolaevich
Engineer
Institute of Natural Sciences of the Perm State University, Perm
Naumov Vladimir Aleksandrovich
Doctor of Geologo-Mineralogical Sciences, Full Professor, Director
Institute of Natural Sciences of the Perm State University, Perm

Abstract. The second part of the study is devoted to the identification of the main types of technogenic-mineral formations (TMF) in solid and hydromineral form of the Chelopech copper-gold deposit. The analysis of forecast resources is carried out and the prospects for the development of the mine are determined to extend its life and reduce the environmental load on the territory of the district. The ways of controlling geological processes and the material composition of precipitation TMF (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 the ores of the Chelopech deposit, TMF of two genetic types are distinguished: mining and mineral processing in solid and hydro-mineral forms. The content is estimated and the volume of useful components contained in them is calculated. The results of the theoretical forecast of the physicochemical parameters of the hypergenic mineral formation of the solid part of TMF and changes in the chemical composition of the 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, Chelopech, Bulgaria, technogenesis, technogenic-mineral formations

Introduction

The largest gold mining company in Bulgaria, the Chelopechh mine (Dundee Precious Metals, Canada) is located in western Bulgaria, 70 km east of Sofia on the southern slope of the Balkan Mountains. The company is developing the “high sulfidation” of the epithermal Cu-Au-Ag deposit of Chelopech. The mineral resource base of the Chelopech mine provides ore mining until 2027 [10].

Purpose of the work*:* on the basis of well-known geological materials, identify the main types of technogenic and mineral formations (TMF) in solid and hydro-mineral form, evaluate their forecast resources and development prospects for extending the life of the mine and reducing the environmental load on the territory of the region. To substantiate the ways of controlling geological processes in TMF (technogenic ore genesis).

Based on the practice of carrying out such work, 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 form of finding useful components, the development method and technology of ore dressing, but also the types, composition and conditions of formation of TMF, especially the changes in the composition of TMF in the new conditions of the geological environment (processes of technogeogenesis) [5].

1. Technogenic and mineral formations

In addition to concentrates, in the process of field development (including enrichment), numerous technological products (enrichment "tails") or technogenic-mineral formations (TMF) are formed. We consider them as an invaluable mineral resource that is in solid and liquid form. The following types of TMF are highlighted:

1.1 TMF of mining operations

MPP ore yard. The zone of the ore yard, industrial site (Fig. 1), where the ore is located, is not actually a waste of production, but, nevertheless, it forms an independent type of TMF in solid and hydro-mineral form.

The ore mined in the mine comes from the ore passage system to horizon 195, where it is crushed to a size of 800 mm x 800 mm, and then transported via conveyors to an ore warehouse on a surface of 6000 tons [10]. Under the influence of precipitation, primary sulfide ores are destroyed, resulting in the formation of process waters enriched with gold and other metals. The amount and mineralization of process water depends on the amount of precipitation and the time spent by the ore in the ore warehouse.

1.2. TMF of enrichment industry

Sediments of tailing dump. During hydrometallurgical processing of

gold ore as waste (TMF), waste ore material (tail pulp) is formed, which in mineral and chemical composition is almost similar to the material composition of the starting material. The ore was crushed and worn. The material composition of TMF differs from primary ores in the almost complete absence of sulfides after flotation containing copper and noble metals, as well as in the decrease in the content of minerals of reduced hardness (low hypergenic stability), “frayed” during abrasion and carried out as a suspension in water.

Judging by the previous work, sludge storages formed during the development of gold ore deposits are characterized by the preservation of hypergene resistant minerals that are difficult to abrade. Among the light fraction minerals, quartz, partially feldspars, and clay-hydromica minerals will prevail. Among the minerals of the heavy fraction are magnetite, rutile, zircon, epidote and pyrite. There are also noble metals not recoverable by flotation in free form.

After flotation the tail pulp thickens. Most (60%) of the pulp is used to fill the mine's worked out space, and the rest (40%) is transported to the tailing dump (Fig. 2). According to the project of works [8], at the final stage of operation, the volume of pulp entering the tailing dump will be increased to 60%.

Fig. 2. Chelopech tailing dump location

Fig. 1. Ore yard of MPP "Chelopech" [10]

Based on the above data, as well as known materials [10], the balance of the distribution of gold, as the most valuable component of ores, was calculated at MPP Chelopech in 2009-2019 (Table 1). According to the table, the gold content in the tail pulp varies from 1.36 to 2.20 g/t (the average content for the billing period is 1.69 g/t). The tailing dump has been operating since 2006, for the period 2006-2009, 3.7 million tons of ore were processed with a grade of 3.9-4.3 g/t with 58-65% gold recovery.

This means that during this period about 2.3 tons of gold were delivered to the tailing dump [8].

In addition, taking into account the data of CSA Global [8], the amount of metals that will enter the tailing dump in 2020–2027 was predicted (Table 2). According to the company's forecasts, gold production will gradually decrease (it will reach 4.1 tons by 2022), while copper production will remain stable. 8.9 tons (1.06 g/t) of gold, 9819 tons (0.11%) of copper, 28.4 tons (3.4 g/t) of silver will be delivered to the tailing dump. These metal losses can still be affected.

Tailing dump of the mine is located at 620 m above sea level, the height of the embankment of the dam is 70 m. According to DPM forecasts, by the end of field development (2027), the level of tailing dump will increase to 630 m, and it will contain 21.6 million tons of TMF. According to rough estimates, the technogenic and mineral resources of gold in the tailing dump will be at least 23.1 (11.9+8.9+2.3) tons. Most of them are concentrated in the places where the pulp is discharged (Fig. 3), since facies TMF has a certain zoning of the distribution of minerals. The heavy fraction does not move away from the lavatory, and the light fraction is carried away from it. In 2018, the cost of reclamation of tailing dump was calculated - 9.4 million euros [8]. These costs can be avoided, or offset by the extraction of technogenic and mineral resources.

Fig. 3. Halo of elevated concentrations of precious metals in tailing dump Chelopech

The filled space of the mine. Mines are filled with “pasty aggregate” obtained from shredded tailings (pulp) to which cement is added. The mixture is fed by gravity to the ground through a system of wells and pipes to fill the faces [10].

Analysis of the tables 1-2 allows us to conclude that in 2009-2020 18 tons (1.69 g/t) of gold "returned" to the mine. As a result of filtering the tail pulp and a certain amount of cement, the gold content will slightly decrease. Despite this, a new (technogenic) gold ore deposit is currently being formed in the mine shaft.

Recycled water of MPP. Fig. 4 depicts options for a circulating water supply scheme at MPP. According to the results of the study [9], the option “2” was selected as optimal from the point of view of maximum extraction of copper as the main useful component in ores. The water obtained after filtration (filtrate) of the concentrate and tail pulp, intended for laying the developed space, is returned to the process.

An analysis of the TMF study of other gold-bearing epithermal deposits (Kupol, Valunistoye) [2] allows us to conclude that about 10% and 40% of the total amount of lost gold and silver, respectively, fall on liquid products - technological waters of gold extraction factories. According to rough estimates, for the period of 2009-2019, 1.8 tons (2.4% of production) of gold passed through the water recycling system. However, it is worth considering that this metal is not lost, but is returned to the enrichment cycle.

Table 1

Gold distribution during ore processing at MPP Chelopech (2009-2019), according to [10]

Indicator	Year											Amount, average
	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	
Primary ore intake and processing												
million tons	2,20	2,22	2,22	2,21	2,05	2,08	2,03	1,82	1,35	1,00	0,98	20,16
Au content, g/t	3,35	3,72	3,74	3,43	3,7	3,72	3,5	3,69	3,85	3,86	4,34	3,67
Au mass, t	7,4	8,3	8,3	7,6	7,6	7,7	7,1	6,7	5,2	3,9	4,3	74,0
Production of copper concentrate												
million tons	0,10	0,1	0,10	0,10	0,11	0,13	0,13	0,12	0,10	0,08	0,07	-
Au mass, t	3,4	4,0	4,0	3,3	3,2	3,5	3,9	3,4	2,6	1,8	2,5	35,5
Au fraction,%	45,6	48,1	47,6	43,7	42,4	45,0	54,3	50,3	50,6	47,5	58,2	-

Indicator	Year											Amount, average
	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	
Production of pyrite concentrate												
million tons	0,25	0,26	0,25	0,21	0,24	0,16	Pyrite concentrate is not produced					-
Au mass, t	1,5	1,7	1,6	1,3	1,5	1,0						8,6
Au fraction,%	20,3	20,1	19,0	17,4	20,2	13,2						-
Obtaining tail pulp (TMF)												
million tons	1,85	1,86	1,87	1,90	1,70	1,79	1,90	1,70	1,25	0,92	0,91	17,65
Au content, g/t	1,36	1,41	1,48	1,55	1,67	1,81	1,71	1,96	2,06	2,20	1,95	1,69
Au mass, t	2,5	2,6	2,8	2,9	2,8	3,2	3,2	3,3	2,6	2,0	1,8	29,9
Au fraction,%	34,1	31,8	33,3	38,8	37,3	41,8	45,7	49,7	49,4	52,5	41,8	-
Enters the tailing dump (40% of the tail pulp):												
million tons	0,74	0,74	0,75	0,76	0,68	0,72	0,76	0,68	0,50	0,37	0,36	7,06
Au content, g/t	1,36	1,41	1,48	1,55	1,67	1,81	1,71	1,96	2,06	2,20	1,95	1,69
Au mass, t	1,0	1,1	1,1	1,2	1,1	1,3	1,3	1,3	1,0	0,8	0,7	11,9

2. Forecast of technogeogenic conversion of mineral sediments and chemical composition of technological waters

In the formed TMF sludge storage facilities located in the hypergenesis zone, unstable minerals are transformed due to interaction with precipitation, industrial waters, with the participation of microorganisms, fungi, and bacteria. There is a natural geological process of hypergenic (technogenic) mineral and rock formation, “adaptation” of precipitation to new conditions of the geological environment [5].

The territory of the deposit is located in the zone of temperate continental climate with a fairly cold winter and an average air temperature of +2°C. In winter, air rarely cools down to -6°C, and in summer it averages + 0°C; precipitation - from 571 to 650 mm/year.

Table 2

Forecast of metal production and losses at MPP Chelopech in 2020-2027 according to [8]

Indicator	Share, content in the product	Mass of metal, t
Primary ore arriving		
million tons	16,9	-
Copper	0,9 %	152100
Gold	3,03 g/t	51,2
Silver	7,55 g/t	127,6
Extraction with copper concentrate		
Copper	81,72 %	124296
Gold	49,94 %	25,6
Silver	38,24 %	48,8
Extract with pyrite concentrate		
Copper	7,52 %	11438
Gold	21,04 %	10,8
Silver	24,66 %	31,5
Losses, entering the tail pulp (TMF)		
Copper	10,76 %	16366
Gold	29,02 %	14,9
Silver	37,1 %	47,3

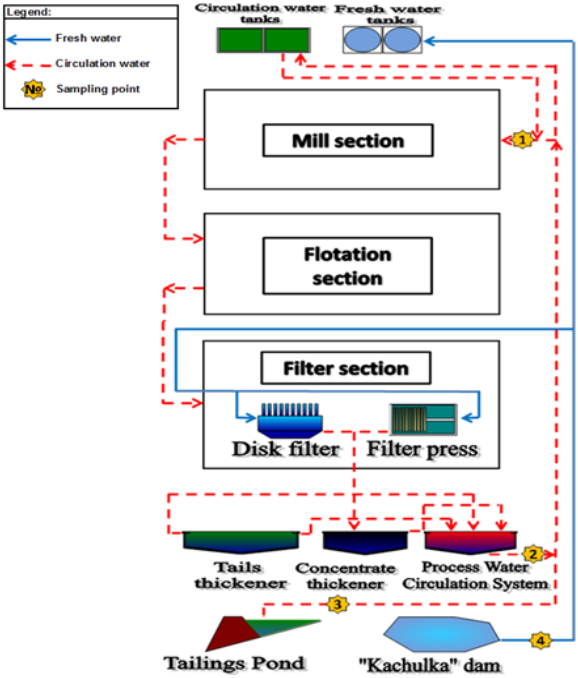

Fig. 4. Water recycling options of MPP "Chelopech"; scheme 2 is in effect [9]

The solid part of TMF. The primary composition of the solid part of TMF after crushing and abrasion changes its structure. The specific surface area increases, the chemical activity increases. Milled and liberated from the rock minerals become unstable to the processes of physical, chemical and biogenic weathering. In places of storage of ores and rocks (ore yard of MPP, rainfall tailing dump) under the influence of air and precipitation, oxidation, leaching, interaction with bacteria and microorganisms occurs; process water enriched with metals of primary ores is formed and hypergene mineral formation proceeds.

The behavior of the minerals within the tailing dump depends on their hypergenic stability. Hypgenesis resistant silicates do not change much. Sulfides decompose intensively. Pyrite decomposes first on the crystalline hydrates of iron sulfates, then, to hydrogetite and sulfuric acid. Sphalerite decomposes to zincite, bornite immediately turns into tenardite, and galena is replaced by hematite and anglesite, respectively, quartz, muscovite, kaolinite are formed from feldspars [1].

Obvious signs of changes in the sulfide part of the tails are the presence of newly formed phases and the presence of vertical and lateral zoning. Outwardly, zonality is expressed in the fact that in some places the upper part of TMF consists of a fine-grained yellow-quartz quartz material, which overlaps the gray sulfide fine-grained mass. Newly formed crusts, consisting of crystalline hydrates of iron sulfates, almost completely cover the sulfide mass in hot weather [1]. Secondary signs of sulfide mineralization are expressed as decomposition products of sulfides in the form of crystalline sulfate iron hydrates (rosenite, smolnokit, melanterite, coquimbit) [6]. These zones of hypergenic changes and neoplasms are interesting for further study, since gold and other metals are released from gold-containing sulfides and their intergrowths at the location of sulfate iron crystalline hydrates [7]. Metals can be released both in the solid phase in the form of micro- and nanoparticles, and converted to ionic form or solution.

Cryogenic processes of freezing and thawing TMF activate the decomposition of sulfides and the release of gold. In a single freezing and thawing cycle, up to 20% of primary sulfides pass into sulfate phases in the form of metal hydrates. And gold forms a thin film among small particles of metal sulfides and sulfates [6].

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 arise from the decomposition and conversion of unstable minerals into TMF.

The decomposition of unrecovered sulfides slows down over time. Films of crystalline hydrates of metal sulfates are formed on the surface of sulfides. But the general tendency remains for the gradual decomposition of primary sulfides, the release of metals and their entry into solutions. Sludge storages are known in Russia in which the content of primary TMF metals was reduced by 40-60%. The following types of objects can be attributed to the hydromineral part of TMF.

Ore warehouse process waters are formed during the destruction of hypergene unstable minerals during the period of temporary storage of material in the "ore warehouse". Despite the short period of time the rocks were in the place of temporary storage of ore, the removal of metals into solutions is intensive.

Waters of tailing dump. Tail pulp - sludge fraction, entering the sludge repository, is gradually divided into solid and liquid phases (Fig. 9). The total salinity of industrial 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 also high. The predominant form of finding for all metals is ionic, in addition, up to 40% can be in sulfate form. In stagnant technogenic waters, the main minerals that form the sediment are hematite and anglesite [1].

Due to the sulfide composition of the ores and the low carbonate content, tailing dump waters are believed to have a slightly acidic environment. In the sulfuric acid process, gold and associated metals are intensively redistributed, migrating from some horizons and accumulating in others, which is controlled primarily by the sulfide content of primary ores, pH and Eh of hypergenic solutions.

Of great importance for the distribution of gold is the combination of various geochemical barriers [4]: biogenic, reducing, electrochemical, alkaline, acidic, sorption. The most favorable conditions for the secondary concentration of gold are neutral and slightly alkaline environments. Weakly acid and alkaline oxidizing conditions contribute to the active migration of gold [3].

Mine waters. During the development of mines by the underground method, the conditions for the formation of water flow change. Groundwater, circulating inside the Chelopech deposit, dissolves metal sulfides, resulting in the formation of acid sulfate waters that carry a large amount of iron, heavy metals and ore elements. These waters fall into hydrosphere objects and create a new composition of the natural-technogenic system.

Mine water transforms the region's waters into calcium sulfate (sodium) with increased mineralization (increased relative to the natural levels

of all cations of the basic salt composition).

Waters in the pond "Kachulka". The pond is the final catchment of the technological waters of mining (mine water, runoff from the ore yard, tailing dump water is possible) and integrates various chemical compounds. Some of them are neutralized and deposited on natural geochemical barriers and sorbents. The beneficial 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 initial rocks of the field. Suspension is sorbed by silt-clay substance.

3. Suggestions for management of sediment and technological water composition, ecological condition of the territory

For " flowing tails" - the TMF generated by the currently adopted technological scheme for ore dressing, the following must be evaluated: 1) gravity separation of sludge material with the release of gravity concentrate containing heavy minerals and aggregates of ores, and barren product, which is dominated by hypergene-resistant (abrasion) minerals (quartz, sericite, alunite); 2) separate storage of ore and barren parts; 3) the launch of the ore part in the technological redistribution with the extraction of useful components; technological solutions can be found through experimental enrichment and special mineral-chemical and technological research; 4) the launch of the barren part into technological redistribution with the production of innovative products from sludge of hypergene-resistant minerals, worn to a micrograin state (71-74 microns); 5) the possibility of organizing the enrichment of process water using sorption-ion exchange columns, filter systems for the deposition of metals from process water; parameters of technological conditions, selection of reagents for sorption and ion exchange can be obtained by conducting a special research complex.

For "stale tails" - TMF accumulated and stored in the tailings, 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, basic and rare components; 2) determination of the forms of finding useful products, the principal methods of their separation; 3) justification of the feasibility of processing tailing dump material; 4) search and analysis of technological solutions for the scheme of studying the "current tailings" with the separation of the ore and barren parts, the allocation of process water and systems for extracting useful products.

Conclusion

As a result of studying the material composition of ores, mining technology, technological schemes for beneficiation and production at the

Chelopech epithermal deposit, various types of TMF were identified that contain a large amount of technogenic and mineral resources. Gold in TMF sludge storage facilities already contains at least 14.2 tons and during subsequent mining (taking into account the filling of the mine's developed space), at least 8.9 tons will be received; about 9.8 thousand tons of copper will be supplied, and 28.2 tons of silver (Table 2). The mass of gold accumulated in TMF corresponds to the level of its production over an 8-year period.

The use of the substance of TMF Chelopech deposits is possible in various fields of industry and the national economy. And at the tailing dump, which will contain from 20.2 to 23.1 tons of gold by the end of mining, a special set of studies should be carried out to justify the production of an additional spectrum of liquid products in both solid and liquid form. It is necessary to provide technological solutions for the separation of gold from TMF, which is supplied for the laying of the developed space. Extraction of metals from tailing dump, use of technogenic waters as hydro-mineral raw materials with associated extraction of dissolved metals, management of sulfide decomposition processes will reduce the environmental load on the territory of the deposit area. Revaluation of mineral resources taking into account the solid and liquid parts of the TMF of the Chelopech deposit, development of technological solutions for involving unaccounted resources in the economic turnover will bring significant economic and environmental effects.

Additional income for the enterprise will be provided by measures, such as those conducted in Russia, within the framework of the "best available technologies" to reduce emissions, reduce fees for the amount of waste, income from the sale of other useful components, and increase the extraction of gold and silver.

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DISTRIBUTION OF RADIONUCLIDES IN URBANOZEMS AND VIRGIN SOILS OF IRKUTSK AND ITS SUBURBS

Gritsko Polina Pavlovna
Candidate of Geologo-Mineralogical Sciences, Senior Engineer
Vinogradov Institute of Geochemistry SB RAS
Grebenshchikova Valentina Ivanovna
Doctor of Geologo-Mineralogical Sciences, lead Research Officer
Vinogradov Institute of Geochemistry SB RAS

In urbanozems and virgin soils of Irkutsk and its outskirts, variations in the specific activity of heavy natural radionuclides with the highest geochemical value were determined: ^{232}Th, ^{238}U (Ra), ^{40}K, and ^{137}Cs (radiocaesium) - an indicator of the level of radiation exposure to environmental components. The studied problem is relevant for the Baikal region, in which the concentration of TERN in the soil cover is determined both by the composition of the geological formations composing its territory and the anthropogenic component.

Increased relative to the background values of the specific activity of radionuclides in urbanozems of Irkutsk are confined mainly to the territories where industrial enterprises are located - thermal power plants, small boiler houses, the Irkutsk aircraft plant, military base, as well as summer and garden plots. Potash and phosphorus fertilizers introduced into the soil lead to an increased concentration of ^{40}K and ^{232}Th in it, respectively. Fluctuations in the surface specific activity of ^{137}Cs were noted in urbanozems and virgin soils of the outskirts of the city, but the results are lower than the global background of Siberia, which generally indicates the relative radiation well-being of the study area.

Keywords: Urbanozems, natural soils, radionuclides, radioactivity.

Introduction

The radioactivity of soils is due to the presence in them of radioelements of natural and technogenic genesis. Of the common long-lived heavy natural radionuclides (HNRN), the most geochemically significant

are ^{238}U, ^{232}Th, ^{40}K, since these nuclides in the soil cover make a significant contribution to its radioactivity and to the total radiation background of the study area. The soil cover is a deposition medium for radionuclides and serves as a marker of the radioecological situation.

As is known, the level of radioactive elements in soils is significantly affected by the geological situation. The concentrations of uranium, thorium, radium, and potassium in the components of the natural environment of the Baikal region are determined by the composition of the geological formations composing its territory, mainly ancient metamorphic rocks and granitoids with a high content of HNRN. According to [1], the maximum U contents in the bedrock of the Baikal region are 20 mg/kg, Th – 97 mg/kg, with the regional background values of 1.3 mg/kg and 3.8 mg/kg, respectively. Irkutsk is geologically confined to the Jurassic coal basin with industrial coal deposits used in the region's energy sector.

Along with the natural component, anthropogenic impact makes a significant contribution to the formation of the radiation environment. With the intensification of urbanization processes, the issue of human exposure to the soil cover of urban areas is becoming particularly relevant. Soils in cities are most affected by the urban press, resulting in a decline in the quality of environmental components and an increase in environmental risk.

A decrease in landscaping areas and an increase in the "sealing" of territories by buildings, structures and artificial coverings (asphalt, etc.) leads to a decrease in the surface of biologically productive soil cover, a change in the nature of soil-forming processes, a deterioration in soil-hydrological conditions, soil contamination, and excess of recreational norms use and degradation of ecosystems in general [2]. So, in the central part of Irkutsk there is a restructuring of the soil cover up to its complete destruction and the formation of technogenic-surface formations. Moreover, the city center is characterized by a prolonged accumulation of pollutants and the absence of dispersion of them along the periphery of urban areas due to the hollow type of relief and, thereby, difficult flow of air masses. Soil degradation is noted in all administrative districts of the city.

Significant sources of radioactive contamination of the city are enterprises that process or transport radioactive raw materials, and territories where military facilities are located. Natural radionuclides of the thorium-232 and uranium-238 families enter the city's environment with ash and slag emissions or the wind transfer of dust particles and aerosols from coal-mining enterprises, as well as non-commercial coal burning in the private sector. The man-made radioactive component should include

fertilizers introduced during the cultivation of agricultural crops. Such pollution is mainly local in nature within the zones of influence of polluting enterprises and the environs of nearby territories, it is well established in winter by the content of radionuclides in the snow cover, which is also an indicator of the composition of atmospheric emissions. Russian and foreign researchers have noted the enrichment of snow water and soil with uranium and thorium around oil and gas refineries and coal power plants, which indicates the aerotechnogenic supply of radionuclides [3, 4, 5].

As an indicator of the level of radiation exposure in Russia and abroad, the content of technogenic long-lived radionuclide - ^{137}Cs is used. The content of radiocaesium in the soils of the Baikal region, due to transregional transport by atmospheric fluxes during nuclear tests 1949-1963 at the Semipalatinsk test site, reaches 350-410 Bq/kg with a regional background of 4-6 Bq/kg [6].

Transformation of pollutant flows and their accumulation in the thickness of the soil cover - is an important function of urban soils, as a result of which the problem of radioactive contamination is especially relevant for industrial areas where the self-cleaning ability of soils is reduced.

Thus, the main purpose of the work - is a quantitative assessment of the level of radioactive contamination of the soil cover of Irkutsk and adjacent territories according to a study of the contents of HNRN: uranium-238, thorium-232, potassium-40, as well as artificial cesium-137. The objective of the study - is to determine the level of specific activity (SA) of radionuclides in the soils of the city and to study the nature of their spatial distribution.

Objects and research methods

Most urban soils are characterized by the absence of genetic horizons and the presence of layers of artificial origin that are different in color and thickness. According to the modern classification [7], most urban soils and nearby territories with agricultural lands are represented by anthropogenically transformed soils - urbanozems. And only undeveloped, gently sloping tracts of taiga and woodlands outside the city can be conditionally considered as the location of virgin soil. Thus, the main objects of study were urbanozems located in various functional areas and undisturbed soils in the immediate vicinity of the city.

Taking into account the landscape-geochemical and natural features in the territory of Irkutsk and the adjacent areas, a sampling network was established in the "Google Earth" program on a scale of 1x1 km, if possible adapted to the patency of urban areas (Fig. 1). In areas of increased values of radioelements, repeated testing was carried out with a network

thickening of 500x500 m.

The selection of soil samples was carried out according to the standard methodology, based on experimental material obtained in the study of pollution of Altai Krai and Novosibirsk Oblast in 1991 - 1994 [8]. During the research, informative factors were taken into account that affect the level of ^{137}Cs, namely: the degree of preservation and position of the soil cover sections in the relief, which is an extremely difficult task in urban conditions. Virgin soils with an inclination angle of less than 10° and the absence of mechanical drift of the upper layer are the main qualitative identifier of the content of radiocesium.

Spot soil samples were taken with a steel ring with a radius of 82 mm and a height of 50 mm in layers, every 50 mm, to a depth of 150 mm, where conditions allowed. The volume of the measured sample was 300 ml. After performing routine procedures with sample preparation, the test soil sample was placed in a container, sealed, and kept for two weeks until measurement to establish equilibrium between the decay products of the radium family isotopes.

Most of the samples were taken to the root zone of urban vegetation, since the morphological features of urbanozems practically do not correspond to the classification and morphological features of soil division along the profile. This approach is recommended by many researchers when studying urbanozems with mixed layers of soils, construction debris, clay inclusions [9]. Moreover, the vertical migration of radionuclides in the soil is insignificant - up to 90-95% of radionuclides remain in the upper soil layer [10].

The measurements were carried out on a low-background gamma-ray spectrometer in the department of solid state physics of the Vinogradov Institute of Geochemistry SB RAS on the Finnish NOKIA pulse analyzer. Before measurements, the analyzer was calibrated in accordance with the methodology used in the software. Quantitative gamma-spectrometric analysis is based on the methodological developments of V.A. Bobrova and A.M. Hoffmann [11]. A NaJ-TI crystal of 150x150 mm with a well of 75x100 mm was used as a detector. Type of photomultiplier - PMT - 125. As reference sources, Ra, Th and Cs sources of three densities certified by the Institute of Metrology were used. The library of spectra obtained from these sources was used later to decompose the hardware spectra of the studied sample and determine the ^{137}Cs content in soil samples. To protect against external gamma radiation, a standard protection kit made of lead bricks with a total thickness of 10 cm was used. For each measured spectrum, an individual energy calibration was performed for

two well-defined peaks - peak K and peak of the Th series (0.239 MeV, 50% yield). The basic error did not exceed ± 30%. The detection limit is, Bq: ^{232}Th - 5, ^{40}K - 30, ^{226}Ra - 6, ^{137}Cs - 2. The duration of measurements of one sample is an average of 60 minutes. Uranium is determined by radiation. To control the reproducibility of the analysis, 5% of the samples were measured repeatedly; the measurement error does not exceed 10%. Data was processed using Microsoft Excel and Statistica for Windows.

External control showed good convergence of the results (Table 1) and was carried out according to certified methods in modern accredited laboratories of the Institute of Earth's Crust SB RAS, the analytical laboratory of the Baikal branch of "Sosnovgeologiya" FSUE "Urangeologorazvedka" and the radiation control laboratory of the Irkutsk branch of the Siberian Territorial District branch FSUE "RosRAO", which carries out the activities of transportation, collection, processing, long-term storage of radioactive substances and radioactive waste in the territory of Irkutsk Oblast.

Table 1. Interlaboratory comparison of the results of gamma-spectrometric analysis in determining the isotopic content of radioelements, Bq/kg.

Radioelement	Soil analysis facility			
	IGC SB RAS (1)	IEC SB RAS (2)	SE "Sosnovgeologiya"	FSUE "RosRAO"
U (Ra)	31,2	31,4	31,5	31,8
	27,6	27,5	27,0	27,0
^{232}Th	38,2	38,0	38,3	38,0
	30,8	31	30,5	30,7
^{40}K	470,1	470,0	470,2	470,3
	420,6	420,1	420,1	420,4
^{137}Cs	22,7	-	22,5	22,5
	9,5	-	9,4	9,7

The values of the specific mass activity of radionuclides (A, Bq/kg) obtained during the study were converted to the values of the surface specific activity (As, Bq/m^2), which represents the actual content of the radioelement in the soil, using the following conversion formulas:

$$S=\pi r^2, \text{ (1), where}$$

S – surface area (in our case, of the sampler rings), m^2;

π - math constant equal to 3.14;

r – radius of a circle (in our case, a sampler ring), m^2.

Further calculations are performed according to the formula:

$$As = A \times m / S, \text{ (2) where}$$

As – specific surface activity of radionuclide, Bq/m^2;

A – specific activity of the radionuclide per unit mass, Bq/kg;

m – sample weight, kg;

S – surface area (sampler rings), m^2.

The studied material is represented by 217 samples of the soil cover of the functional zones of Irkutsk, of which 31 samples were taken from adjacent areas at different distances from the city.

Research results and discussion

The city of Irkutsk is located in the south of the Central Siberian Plateau in the Angara river valley, on both its banks. The landscape of the territory is represented mainly by plains with subtaiga pine grass and grass-grass forests. According to soil zoning, the study area is part of the Irkutsk-Cheremkhovsky forest-steppe region of gray forest soils, chernozems and sod-podzolic soils of the Central forest-steppe and steppe region [12]. Currently, a significant part of the landscapes of the suburban zone of Irkutsk has undergone significant changes associated with anthropogenic impact, since the city has numerous stationary sources of industrial enterprises that adversely affect the environment and the population.

The typical morphological profile of most of the studied urban soils is formed by layers with a thickness of 0-5 cm (U_1), 5-10 (U_2). The soil layer U_1, as a rule, is dark brown, friable, penetrated by plant roots, with multiple inclusions of fine pebbles, mixed with anthropogenic inclusions, industrial waste, and organic matter. U_2, mainly brownish-gray, friable, practically does not contain organic matter. In general, we can say that in the city almost all soils have a disturbed morphological profile compared to some marginal soils.

The range of organic matter in the studied soils is quite wide (0.3-15%), which is a characteristic feature of urban soils. Plots with the maximum content of the C_{org} indicator occur in park areas, possibly due to the litter of green spaces and grass cover. The soils of the central part of the city are characterized by elevated C_{org} values, which, apparently, is promoted by emissions of soot into the atmosphere, various oils sorbed by soil particles, gasoline containing a large amount of organic matter, as well as imported peaty soils. High organic matter increases the absorption capacity of urbanozems. The lowest levels of organic carbon are characteristic of special purpose areas, which, as a rule, are devoid of vegetation.

Irkutsk city urbanozems in terms of acidity are mainly neutral (pH above 6), turning into slightly alkaline (pH = 7.1-7.8). The highest pH values were found in the central part of the city, as well as in the Leninsky district, in the Irkutsk-II region in the territory of the aircraft plant. Previous studies

have shown elevated concentrations of uranium (23.3 mg/kg) in this area [13].

The lowest values of specific activity (SA) ^{238}U were recorded in the humus-accumulative soil horizon of the Sverdlovsk and Oktyabrskiy districts, as well as the soils of the outskirts of the city. The maximum values of SA ^{238}U were found in the Leninsky district in the Irkutsk-II region: in urbanozems of the territory of the Irkutsk Aviation Plant and near a coal-fired power plant, where, according to previous studies [13], elevated uranium contents were detected - 23.3 and 15.8 mg/kg respectively. The activities of ^{226}Ra and ^{232}Th in local coals are from 3 to 50 Bq/kg. When coal is burned, radionuclides pass into combustion products, the specific radioactivity of which is significantly higher than the radioactivity of the starting material [21].

The maximum SA ^{232}Th values were identified at several points located in the Pravoberezhny District: in one of the summer cottages of the Union of Teachers in the Kuibyshevsky District, as well as in the territory near the military base of the Zeleny microdistrict. As is known, the source of environmental pollution ^{232}Th is the widespread use of phosphorus fertilizers, where its content varies from 1.5 to 25 Bq/kg [14, 15].

Local increases in SA ^{40}K values were found mainly on the outskirts of the city: in private sector plots, gardens and dachas, which is apparently due to the active use of potash fertilizers in these territories. The results of the studies are summarized in table 2.

Table 2. The main statistical parameters of the distribution of ^{238}U (^{226}Ra), ^{232}Th, ^{40}K in the soil cover of Irkutsk and adjacent areas, Bq/kg

Administrative territorial divisions (districts)	$^{238}U(^{226}Ra)$	^{232}Th	^{40}K	Number of samples
	$\frac{min - max}{m}$			
Leninsky	$\frac{24,4 - 120,4}{35,8}$	$\frac{32,1 - 45,7}{37,1}$	$\frac{356,6 - 502,6}{370,1 \pm 79,8}$	49
Pravoberezhny	$\frac{22,5 - 37,3}{25,2}$	$\frac{33,7 - 93,9}{40,4}$	$\frac{443,1 - 527,3}{450,3}$	60
Sverdlovsky	$\frac{12,8 - 27,2}{22,5}$	$\frac{35,3 - 42,1}{37,6}$	$\frac{450,1 - 478,2}{452,7}$	45
Oktyabrskiy	$\frac{15,6 - 34,1}{25,7 \pm 5,0}$	$\frac{37,2 - 45,1}{39,5}$	$\frac{487,3 - 523,2}{502,1}$	32
City outskirts	$\frac{2,4 - 3,6}{1,8}$	$\frac{21,1 - 35,3}{9,2}$	$\frac{420,6 - 772,5}{502,3}$	31
World soil background [16]	25	25	370	-
Clark [17]	30	33	-	-

Background content in soils of Moscow [18]	22	40	-	-
Soils of Tomsk [19]	30,5 – 53,3	13,1 – 32,4	356 – 492	-
Soils of Altai [20]	34,8	25,5	487,4	-

Note: min – max: minimum – maximum value; m – average value.

Since the maximum permissible concentrations of the studied radionuclides for the soil are not standardized, it is not possible to accurately assess the degree of radioactive contamination of the territory.

In the course of the research, it was noted that the values of SA ^{238}U (^{226}Ra) and ^{232}Th in urbanozems of the urban area decrease with depth in a directly proportional relationship, which is typical of technogenic altered soils. While the soil cover of the outskirts of the city is characterized by increased values of SA soils mainly at a depth of 10-15 cm.

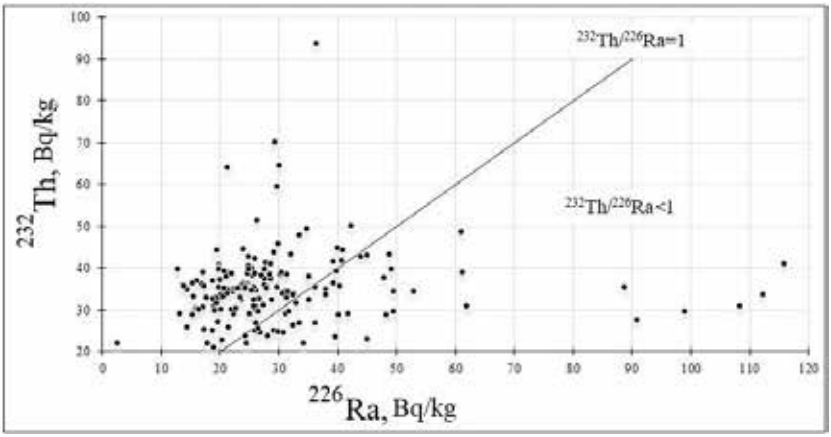

Fig. 1. The ratio of activity values of $^{232}Th/^{226}Ra$ in the soils of the city of Irkutsk and adjacent territories.

According to [18], technogenic soils differ from natural ones in their radionuclide composition, first of all, with a ratio of activity values of $^{232}Th/^{226}Ra$ <1, which can serve as an indicator of technogenic load. The studies revealed soil samples taken in the central part of the city, as well as in Leninsky and Pravoberezhny districts near industrial facilities, characterized by $^{232}Th/^{226}Ra$ <1 (Fig. 1).

The final values were compared with the regional background obtained as a result of many years of targeted studies of the soil cover in the Baikal region, which for ^{232}Th, as well as ^{238}U, is estimated at about 0.2 kBq/m^2 in

the upper soil layer [21]. The results revealed significant variations in the values of specific surface activity of ^{232}Th: urbanozems are characterized by fluctuations in As from 0.1 to 1.9 kBq/m^2; virgin soils surrounded by the city - 0.2 - 1.2 kBq/m^2. The limits of the specific surface activity of ^{238}U are: urban soils from 0.1 to 2.5 kBq/m^2, virgin soils - 0.1-0.8 kBq/m^2.

In terms of the average As value, urban soils are the same as natural ones for both radionuclides - 0.6 kBq/m^2 and, thus, exceed the regional background level by 3 times. The publication [21] also noted that the highest ^{238}U contents in the upper soil layer (more than 1.5 kBq/m^2) are observed in the vicinity of Irkutsk, Angarsk and Shelekhov.

In the studied soils, an assessment was made of the accumulation level of technogenic long-lived ^{137}Cs, which is a kind of marker for normalizing the territory according to the degree of contamination with radionuclides. The soil cover surrounded by the city, represented mainly by gray forest undisturbed soils, is characterized by a spread in the values of the surface specific activity of the radionuclide 0.002-0.3 kBq/m^2, urban soils - 0.01-0.6 kBq/m^2 (Fig. 2).

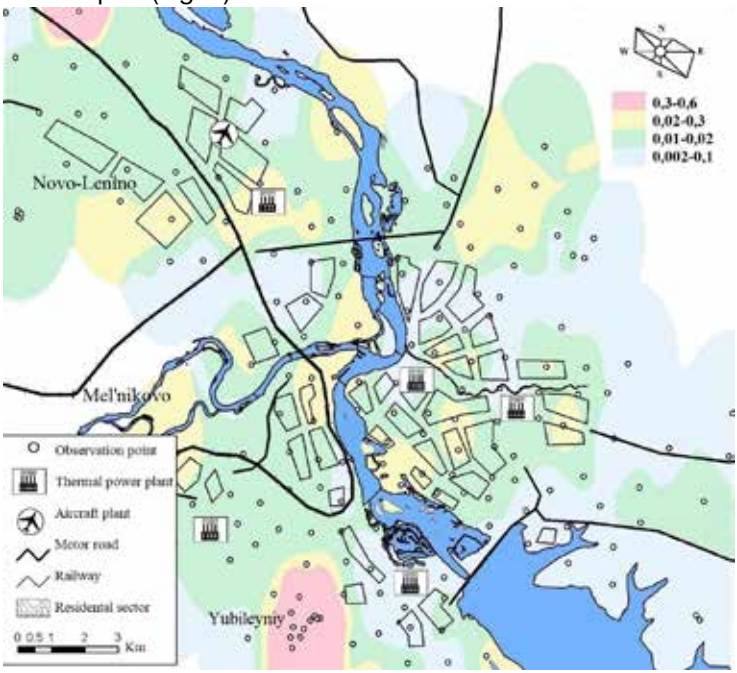

Fig. 2. Surface specific activity of ^{137}Cs in soils of Irkutsk and its surroundings, kBq/m^2.

The main accumulation of ^{137}Cs is concentrated in the upper 0-10 cm of the organogenic horizon, which indicates the absence of pronounced radial migration of the isotope along the soil profile. ^{137}Cs coming from the atmosphere is adsorbed by the organic matter of the soil and is also absorbed by the solid phase; therefore, up to 80–90% of this isotope is fixed in the upper 10 cm layer [21].

In general, the values of surface SA in the soils of the city and its surroundings are 2 times less than the values of the global background, which for both North-Eastern and Southern Siberia is 1.5 kBq/m^2. For urbanozems, the values of surface SA ^{137}Cs are mainly in the range 0.08 - 0.3 kBq/m^2. In the Sverdlovsk district, 2 km from the city, on the territory of the cottage villages Nikolov Posad and Berezovy, soil samples were identified with an SA value of 0.3-0.6 kBq/m^2, probably due to imported humus-accumulating soils. In the Leninsky District, at the summer cottages of the "Batareynaya" settlement, several soil samples with a value of SA ^{137}Cs of 0.3-0.6 kBq/m^2 were also found.

Local insignificant increases relative to the average value of surface SA ^{137}Cs in the urban area are geographically confined mainly to park recreational zones, which can be attributed to the lack of soil cultivation, and, apparently, to imported fertile soils.

The distribution of surface SA ^{137}Cs in urbanozems and soils of the outskirts of the city is characterized by heterogeneity, however, the recorded ranges do not exceed the standard - the global background of Siberia. Thus, the content of the radioisotope in the upper layer of gray forest soils of Tomsk [19] is 30.5 Bq/kg, Irkutsk - 37.5 Bq/kg.

In general, all the above radionuclides are characterized by their greatest accumulation in the upper horizon of urbanozems, while for natural soils, outside the urban area, the greatest accumulation of radionuclides is observed at a depth of 10-15 cm.

The average specific effective soil activity is an important parameter characterizing the radiation environment of an environmental component. This value is determined by the content of radionuclides, expressed in units of specific effective activity, and is calculated by the formula:

$$Aeff = A_{Ra} + 1.31A_{Th} + 0.085A_K,$$

where A_{Ra}, A_{Th}, A_K – specific activity in Bq/kg of isotopes ^{226}Ra, ^{232}Th and ^{40}K.

Thus, the average specific effective activity of the soil cover of Irkutsk and its environment is 115.7 Bq/kg and borders on the category of potentially dangerous and safe studied object.

Conclusions

The current level of SA HNRN and ^{137}Cs in urbanozems of Irkutsk and soils adjacent to the city does not pose a potential danger. In the city, zones located near industrial enterprises with a slight excess of radionuclide contents relative to the global background were found.

Elevated values of radioelements in urbanozems of the city are due to the use of imported soil, the activities of thermal power plants, small boiler houses and enterprises such as the aircraft factory, military base. The identified “sources - pollutants” do not occupy a large area on the territory of Irkutsk, but, nevertheless, require regular systematic monitoring.

Cottage and garden plots are characterized by increased concentrations of ^{40}K and ^{232}Th due to the use of potash and phosphorus fertilizers. The maximum values of surface SA ^{137}Cs are possessed by summer cottages and garden plots located on the outskirts of the city.

In general, in the city, the accumulation of the studied radionuclides occurs in the upper layer of the soil cover. In the soils of the outskirts, the highest contents of radioelements fall to a depth of 10-15 cm.

Owing to the modern technogenic press in the city, the average SA value reflecting the radiation situation of the soil cover as a whole is on the border between potentially dangerous and safe.

The identification of such negative processes (sources) in the soils of the city territory of Irkutsk will make it possible to objectively develop promising measures to improve and restore the soil cover, preserve its natural functioning in the city’s ecosystem.

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META-ALGORITHM FOR DIGITAL SOIL CLASSIFICATION

Rozhkov Vyacheslav Alexandrovich
Doctor of Agricultural Sciences, Head Research Officer
Dokuchaev Soil Science Institute

Existing diverse structures describing national and international sets of soils, strictly speaking, are not classifications. These are nothing more than lists of soil names arranged in a certain order: by natural zones and vegetation, series, etc. The necessary provisions of the scientific concept of classifications are not used: indicators of similarity - soil differences, assessments of the information content of attributes, quality criteria and comparison of classifications, formal recognition rules for new soils, etc.

Therefore, the mentioned lists of soils should be considered as source material for the creation of these classifications. Such lists are absolutely necessary to represent the real diversity of soil profiles and take into account the opinions of various scientists and practitioners, to determine soil characteristics for the subsequent formation of the required attributes of formalized classifications.

The article presents a complete algorithm (meta-algorithm) for constructing a formal classification of soils as an addition and completion of traditional constructions. The meta-algorithm software includes a variety of software modules, tested over many years of use in solving real problems.

Keywords: structure of the concept of classification, informativeness of soil features, canonical classification, assessment of the quality and comparison of classifications, soil recognition.

Existing soil classifications from N.M. Sibirtseva (1898, cited from 1914) and K.D. Glinka (1908) to Classification and Diagnostics ... (1977; 2004), Classification Guidelines ..., issue IV (1967), Soil Science (1988) and Soil Taxonomy (Keys to Soil Taxonomy, 1997) are rather arbitrary schemes, lists of soils natural areas, series, combinations of factors and / or soil characteristics. Numerical classification methods (multidimensional statistics and cluster analysis) allow us to solve these problems. The result of

their application will be a "digital" classification of soils. And we are talking about attracting mathematical methods and algorithms necessary for all stages of this work.

In modern classiology (Rozhkov, 2013), the idea of the duality of the concept of *classification* has formed (Meyen, Schreider, 1976; Schreider, Sharov, 1982; Rozhkov, 2012, 2014, 2015) - two aspects distinguished in it: *taxonomy* and *meronomy* (Fig. 1).

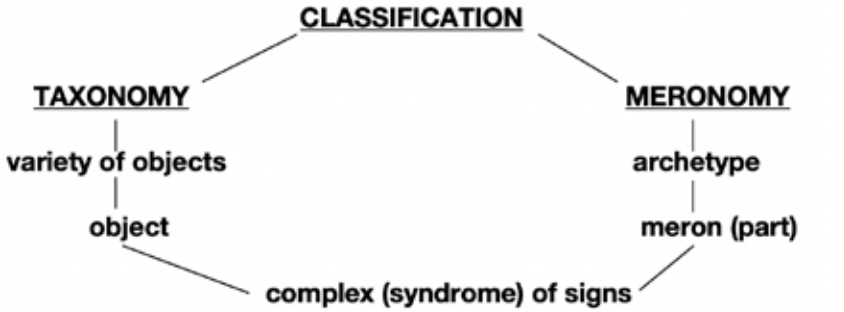

Fig. 1. The duality of the concept of classification

A taxon in the natural classification system is a class of objects that share a common archetype. Examples of archetypes include “podzolization”, “swamp”, “chernozem”, “alluviality” of soils, etc. Merons are associated with the archetype of "podzolization", indicating, for example, the podzolic horizon. "Black earth" includes a dark color profile, a high content of humate humus.

Taxonomic classification – is a system of disjoint classes or equivalence classes. It considers the set-theoretic relations of taxa and objects, i.e. objects as taxon elements[1].

By the nature of the presentation and visualization, it can be hierarchical or ordinate.

The similarity of objects and classes (groups, taxa) is visualized by the well-known *dendrograms* and *dendrographs* reflecting the ratio of the average intra- and interclass similarity of objects. For example, three given classes of soil objects are characterized by the following similarity relations (Rozhkov, 1989).

The information basis for constructing a formalized classification system is a database of soil descriptions from their list, which is accepted for

1 The article discusses only the taxonomic classification, which is the majority of existing soil classifications. Meronomic classifications require separate and special discussion.

classification. From the variety of soil characteristics, those are selected that are directly related to the goal and reflect the ideas related to it in the best way. The most tested and available assessment methods are described (Rozhkov, 2018) for creating sign information systems (SIS).

A simple measure of informativeness can be the correlation coefficient between the attributes (E. Mach (1838-1916)). Of the two strongly correlating attributes, it is advisable to leave only one that does not have high correlations with other soil attributes (The Newest Philosopher. Dictionary, 2008, p. 608).

As an example, Fig. 2 shows the correlation graph between 11 indices of sod-podzolic soil (Rozhkov, Simakova, 1973)

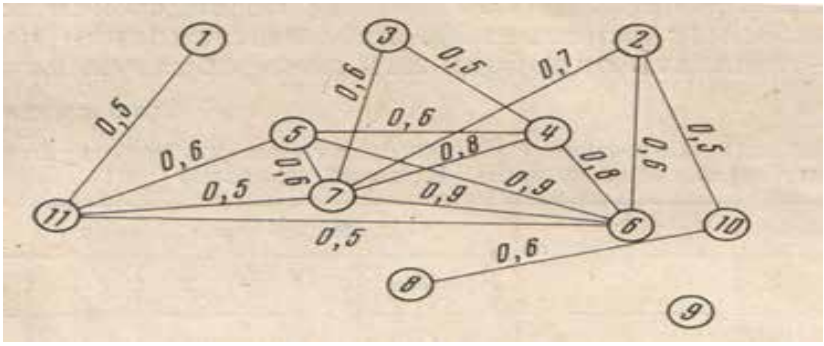

Fig. 2. The correlation graph between the signs of sod-podzolic soil: 1. Depth, 2. pHsol, 3. humus, 4. hydrolyte. acidity, 5. absorption base, 6. degree of saturation, 7. degree of unsaturation, 8. sludge content, 9. clay, 10. emissions of sludge, 11. emissions of Ca+Mg.

Those that are with others from 0.8 and higher are rejected. These are 1, 5-7, the remaining 7 signs are presented in table 1 to demonstrate some other calculations.

Table 1. Characterization of samples from the profile of sod-podzolic soil

№	Genetic horizon	Characteristic Values						
		pH	Humus, %	HA, mEq	silt	phys. clay	Emissions, %	
					%		silt	Ca-Mg
		1	2	3	4	5	6	7
1	Aplowed	5.0	1.8	4.0	13	30	-56	-46
2		5.0	2.2	4.6	13	35	-54	-89

№	Genetic horizon	Characteristic Values						
		pH	Humus, %	HA, mEq	silt	phys. clay	Emissions, %	
					%		silt	Ca-Mg
		1	2	3	4	5	6	7
3		5.0	1.8	3.8	9	40	-62	-52
4	A_2	4.8	0.4	2.6	9	30	-69	-76
5		4.4	0.3	3.1	14	31	-52	-76
6		5.4	0.5	2.2	7	34	-69	-57
7	A_2B	4.2	0.5	4.2	26	44	-10	-42
8		4.1	0.4	5.1	39	54	36	-25
9		4.9	0.5	4.7	35	54	3	-33
10	B	4.7	0.3	2.6	33	52	17	=18
11		4.2	0.4	4.4	32	48	1	-9
12		4.3	0.4	4.3	31	49	16	-17

Figure 3 shows the dendrogram of similarity of these objects.

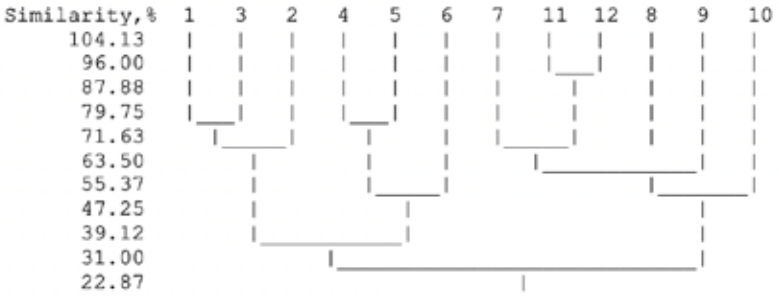

Fig. 3. Dendrogram of the similarity of descriptions of samples of sod-podzolic soil.

Groups of samples from horizons A (1-3) and A_2 (4-6) are clearly distinguished. The horizons A_2B and B are mixed, which is quite explainable by the difficulty of selecting “pure” samples there.

Properties under the numbers pH, humus, and HA - hydrolytic acidity characterize horizons identically, because their similarity is 100%. Presumably, only one of them can be saved, and which one is up to the researcher or the use of additional methods.

The method of principal components (MPC) allows us to evaluate the generalized information load of signs (Rozhkov, 2018). You can exclude signs that have not shown a significant contribution to the diversity

of objects. However, this is possible when there is a differentiation of the sample into classes. Otherwise, the weight of the signs will be of the approximately the same order.

A statistical characteristic of signs, a correlation matrix of descriptions[2], eigenvalues and vectors, and also the distribution of samples in space + are printed.

Correlation matrix of signs:
1 : (2) 0.50 (3***)*** -0.47 (4) ***-0.68*** (5) -0.49 (6**)** ***-0.70*** **(**7) -0.48
2 : (3) 0.26 (4) -0.50 (5) -0.41 (6) -0.50 (7) -0.34
3 : (4) 0.55 (5) 0.49 (6) 0.52 (7) 0.41
4 : (5) ***0.93*** (6) ***0.98*** (7***) 0.84***
5 : (6) ***0.93*** (7) ***0.85***
6 : (7) ***0.85***

Eigenvalues - are the variances of properties on ***HA1*** and ***HA2***. Their sum is more than 70% of the total, which promises a clear separation of groups of samples.

i	Eigenvalues	%
1	4.69	67
2	1.26	85

Eigenvectors of the correlation matrix

HA1 - 1:	-0.34	-0.24	0.26	***0.45***	***0.43***	***0.45***	***0.40***
HA2 - 2:	-0.09	***-0.73***	-0.67	-0.01	-0.04	0.02	-0.04

The parameters of the new coordinates ***HA1*** and ***HA2*** are the weights of the signs and indicate (underlined) the most informative of them. On ***HA1***, this is the content of sludge, physical clay and the emissions of sludge and Ca + Mg%. On ***HA2***, humus was the most informative (2).

Therefore, of the three signs (1-3), 100% similar to the dendrogram of Fig. 2, the second one should be left (humus) and signs 1 and 3 should be excluded. It is the distinguished features with the highest weights that determined the distribution of samples in the component plane (Fig. 5):

2 The correlation matrix differs from the graph indicators, since it is not calculated from the full sample, but only from the data in table 1.

Samples of horizons in the space of the main components:

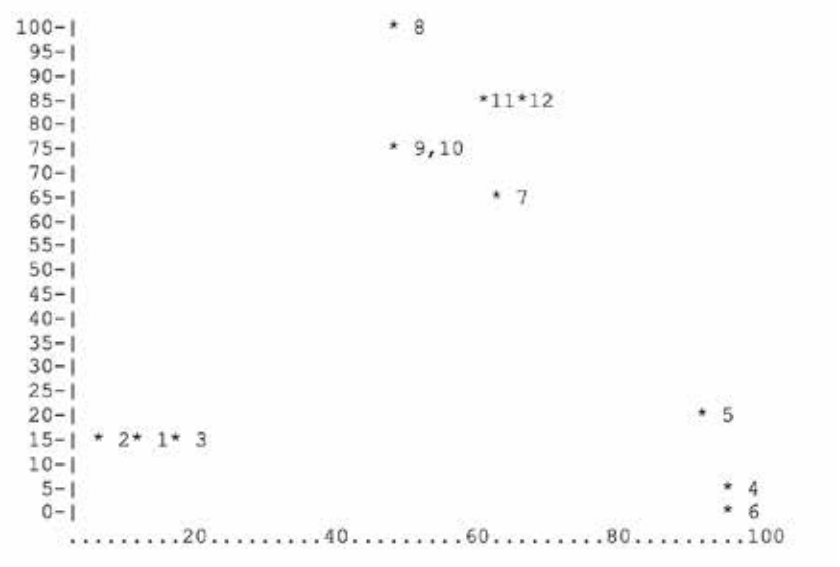

Fig. 5. Samples from table 1 in the field of the main components.

The picture is fully consistent with the dendrogram of properties (Fig. 5): compact groups 1–3, 4–6 and more blurry 7–9 and 10–12.

The simplest method for evaluating the information content of signs of multidimensional objects is based on evidence. Figure 6 shows the dendrograms of objects constructed by decreasing amounts of features. It shows that reducing the number of indicators from 38 to 13 does not change the appearance of the dendrogram, therefore, the excluded indicators do not carry information about the structure of many objects (about their relationships). Further exclusion of signs leads to a sharp disorganization of this structure, i.e. the exclusion of signs must be stopped:

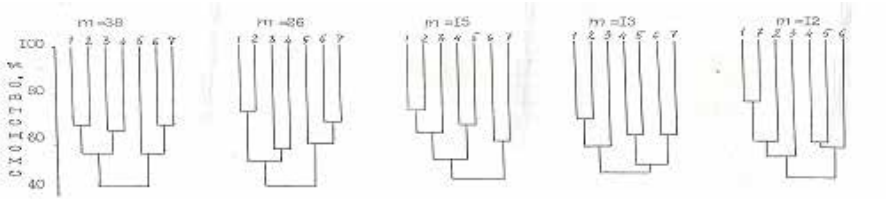

Fig. 6. Assessment of the information content of signs by exclusion.

The given example demonstrates the evaluation of features in the entire set of data without taking into account its possible division into classes.

Assessment of the informative value of features that separate classes of objects using multidimensional statistical criteria. One of them is based on a comparison of the distances of Mahalanobis between classes according to the complete and reduced set of features (Rao, 1968; Rozhkov, Simakova, 1973).

The following method is based on the criterion of information loss calculated using multivariate analysis of variance (Rozhkov, 2011). The solution is to assess the loss of information by comparing the variation (similarity) of attributes for a complete and reduced set of indicators.

In real problems, it was possible to reduce the space of signs depending on conditions by 40-80%. In addition to saving on analyzes, minimizing descriptions carries an important methodological function of saving thinking and generating new ideas.

The apparatus of statistical analysis allows you to establish the relationship of various soil properties, as well as the relationship between them and soil formation factors, the purpose of classification and the corresponding features. The use of paired or multiple regression is especially common. Regression analysis is further developed in the method of canonical correlation (CCR), designed to assess the conjugacy of two sets of features (Webster, 1979; Rozhkov, 1989; Canonical Correlation Analysis, 2012).

The study of the contiguity of the aggregates of soil and weather indicators was carried out according to the literature data, which are summarized in table 2.

Table 2. Initial data for assessing the relationship of soil properties and weather.

№	Soil	Properties of horizon A_1 (5 - 10 cm)				Weather	
		humus, %	Ca^{2+}	Mg^{2+}	pH_{wat}	precipitation, mm	evaporation, mm
			mEq/100 g of soil				
1	Sod-strongly podzolic	3,2	6,0	2,0	4,6	600	450
2	Gray forest	5,2	11,0	0,1	6,7	550	575
3	Powerful chernozem	10,5	38,0	6,6	6,9	450	450
4	Chestnut	2,8	26,0	8,0	7,5	350	500
5	Gray earth	1,6	7,3	1,8	8,0	175	750
6	Brown forest (subtropical)	6,8	1,3	0,7	4,7	900	600

The results of canonical correlation calculations are presented in Fig. 7. The dependence of some properties of the humus-accumulative horizon A_1 on the average annual amount of precipitation and evaporation (mm), found by the canonical correlation method (Rozhkov, 1989), is illustrated.

Y=1,01*Q-0,2*I

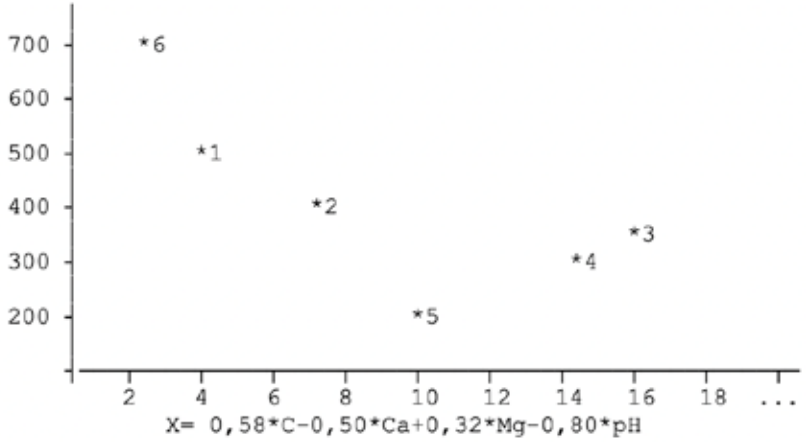

Fig. 7. The relationship between soil properties and meteorological conditions.

The A_1 horizon properties of six soil types revealed a close correlation with precipitation and evaporation (*CR* = 0.99). In the field of generalized coordinates, the soils are distributed according to a second-order parabola, at the inflection point of which is serosem (it has the greatest difference between the amount of precipitation and evaporation). Two upward parabola branches are formed by soils with a small (left) and high (right) content of exchange cations. The latter include chernozem and chestnut soil.

Thus, the presented results show the wide possibilities of the CCR method for studying the relationships between the sets of internal properties of soils and their relationship with the conditions of soil formation.

The quality of ordinate classifications can be evaluated by 6 criteria (Fig. 8):

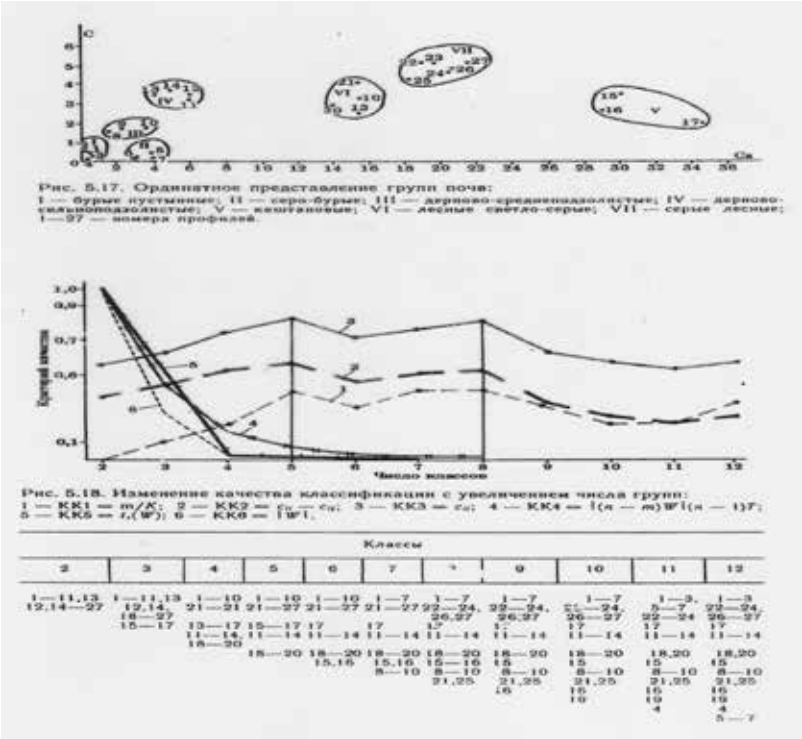

Fig 8. Assessment of the quality of classifications.

The most common of these criteria is the ratio of the average intraclass similarity of objects to the interclass one: the larger it is, the more distinct is the division of objects into classes (Rozhkov, 2011).

Comparison of classifications of floodplain soils according to G.V. Dobrovolsky (1968), V.I. Shragu (1969) and ordinate automatic classification. Table 3 shows the comparison criteria — coefficients of association (***CA***) and polychoric communication indicators (***CI*** *in brackets).*

Table 3. Association and connection criteria for CA (CI) classifications

Classification	V.I. Shrag	Computer
G.V. Dobrovolsky	0,27 (0,30)	0,53 (0,56)
V.I. Shrag	-	0,25 (0,12)

As follows from the data in table 3, a reliable similarity can be noted only between the automatic classification and G.V. Dobrovolsky. The rest

of the connections are pretty weak. However, the main thing here is the very possibility of quantitatively comparing various classifications. The debatability of the choice of levels of compared classifications is obvious. This was also noted in the development of digital classification by Australian soil scientists (Geoderma Regional. Vol. 11, December 2017, Pages 123-140). However, in the future, such an approach will be a worthy *replacement* for the *synonymy* of soil nomenclature.

Discriminant analysis allows you to explore the relationship between classes, including their inclusion or intersection, described in the arithmetic scale.

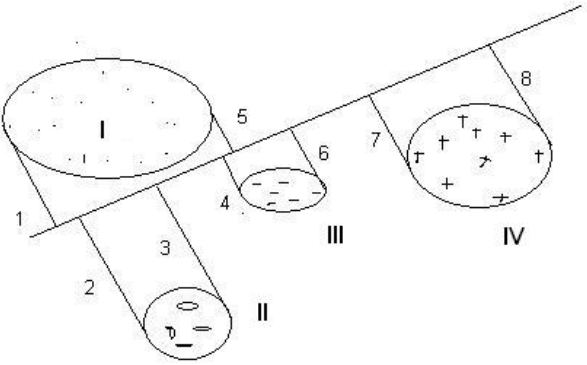

Fig. 12.

It is assumed that a hyperplane is found separating the classes of soil objects in the space of the system of informative features and the projections of these objects on the digital axis are calculated, which visualizes the relations between the objects of the classes. As a result, the following relations of classes (contours) are revealed:

In our version, the discriminant is combined with multidimensional statistical analysis - the distances of Mahalanobis between classes and the projections of objects on the numerical axis of the discriminant function are determined.

Compared with traditional methods of data analysis, multidimensional statistical methods can extract significantly more information from morphological descriptions and analytical data of soils, due to the fact that the most informative features of soils and their relationships are used. (Rozhkov, Simakova, 2016)**.** On the example of chestnut soils, their capa-

bilities in studies of the role of genetic horizons in the formation of profiles are shown. Three subtypes of chestnut clay soils are characterized by 25 signs. Fig. 11 shows F-criteria corresponding to the distances of Mahalanobis between: I - dark chestnut, II - chestnut and III - light chestnut subtypes. The high reliability of differences in the selected characteristics corresponds to the accepted division of soil into subtypes.

Conclusion

To date, the necessary software modules have been prepared and tested to perform all the required calculations when creating a taxonomic classification of soils. In other words, tools have been created for constructing digital classifications of any purpose.

In this case, the source data are lists of soils of traditional classifications represented by their descriptions.

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