SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

Proceedings of the International Conference

Date: September 8

Beijing, China 2023

上合组织国家的科学研究：协同和一体化国际会议

参与者的英文报告

International Conference “Scientific research of the SCO countries: synergy and integration”

Part 2

2023 年 9 月 8 日。中国北京
September 8, 2023. Beijing, PRC

Proceedings of the International Conference
“Scientific research of the SCO countries: synergy and integration” - Reports in English

(September 8, 2023. Beijing, PRC)

ISBN 978-5-905695-82-7

这些会议文集结合了会议的材料 – 研究论文和科学工作者的论文报告。 它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。
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ISBN 978-5-905695-82-7

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DOI 10.34660/INF.2023.48.63.073

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ECONOMETRIC MODELS OF QUOTATIONS OF MAJOR CRYPTOCURRENCIES AND AN ASSESSMENT OF THEIR VOLATILITY IN 2022-2023

Byvshev Viktor Alekseevich
Doctor of Engineering, Professor
Financial University under the Government of the Russian Federation

Koverina Darya Sergeyevna
Student
Financial University under the Government of the Russian Federation

Nigoyan Yury Vasilovich
Student
Financial University under the Government of the Russian Federation

Pankrashkina Irina Sergeyevna
Student
Financial University under the Government of the Russian Federation

Chekinyova Maria Aleksandrovna
Student
Financial University under the Government of the Russian Federation

注解。 本文根据 NP 国家支付委员会的指示，构建了世界主要加密货币报价的计量经济学模型，并估计了其波动性。 统计信息由 2022 年至 2023 年期间每月加密货币报价的非平稳时间序列水平提供。 主要发现： 1. 最不稳定的加密货币是比特币现金。 比特币是加密货币中波动性最低的。 然而，比特币的高价值会导致其绝对波动性很高，换句话说，在拥有比特币时，它会给投资者带来巨大的可能平均损失。 2. 所有加密货币的报价计量经济学模型为 。

关键词：加密货币、非平稳时间序列、货币报价计量经济学模型。

Annotation. *In this paper, performed on the order of NP National Payment Council, econometric models of quotations of the world's major cryptocurrencies are constructed and оценена their volatility is estimated. Statistical information nwas provided by the levels of non-stationary time series of monthly cryptocurrency quotes in the time period 2022-2023. Key findings: 1. The most volatile cryptocurrency is Bitcoin Cash. Bitcoin has the lowest volatility among*

cryptocurrencies. However, the high value of bitcoin generates a high measure of its absolute volatility, that is, in other words, it generates large possible average losses for an investor when owning bitcoin. **2.** *The econometric model of quotes for all cryptocurrencies is* the ARIMA(0,1,0).

Keywords: *cryptocurrency, non-stationary time series, econometric models of currency quotes.*

1. Introduction

In 2009, a qualitatively new type of currency appeared-digitalая currencya, otherwise called» cryptocurrency", which has no physical embodiment and is not controlled by any state or central bank. Cryptocurrencies have a number of features that in some situations make their use for international payments more attractive than traditional methods.

It should be emphasized, that the use of cryptocurrencies is also of particular interest и to the domestic financial and economic system, as currently citizens and companies of the Russian Federation беспрецедентного количества западных are experiencing certain difficulties associated with making foreign trade settlements due to the unprecedented number of Western sanctions, which forces them to switch from traditional payment mechanisms to settlements using cryptocurrencies. The validity of what has been said is indirectly confirmed by the appearance in Russia of a third form of national currency-the Digitalго Rubleя, которая с 1 апреля 2023, which is being tested by the Bank of Russia starting from April 1, 2023 России. True, the digital ruble and cryptocurrencies are fundamentally different assets. Cryptocurrencies do not have a single issuer and there is no single center that would bear obligations under it.

Experts of the Bank of Russia note several serious drawbacks in the use of cryptocurrencies in the international settlement system, and one of the main drawbacks is the high volatility of курсовcryptocurrency exchange rates [1, p. 2]. In other words, at given time intervals, the price of cryptocurrencies can fluctuate greatly, which creates risks for investors and complicates the use of cryptocurrencies for international settlements.

Many researchers, analyzing в прошлые периоды времени the dynamics of quotations of major cryptocurrencies in past periods of time, came to the conclusion that there are bubbles and noted high price volatility in the cryptocurrency markets [2 – 9]. The volatility of major cryptocurrencies in the second decade of the 21st century was studied in the works [10] and [11]. What is the current volatility of major cryptocurrencies? It is the assessment of the volatility of quotes (prices) of major cryptocurrencies in 2022 and in the first three months of 2023, as well as the construction of econometric models of their quotes for short-term forecasting that are the main objectives of this work.

2. Major cryptocurrencies and their quotes in 2022-2023

At this point, we will note the main cryptocurrencies traded on global crypto exchanges, the quotes of which will be the object of research in this paper.

Bitcoin (BCU)

Here is a colorfule description of the appearance of this first cryptocurrency. "There are many ways to get money: you can earn it, find it on the street, fake it, steal it. And if you're Satoshi Nakamoto, a super-talented computer programmer, you can invent them. This is exactly what Satoshi did on January 3, 2009, by tapping a keyboard key and creating a new currency called "Bitcoin". But there were only bits, and no coins. No paper, no copper, no silver – just 31 thousand lines of code and an ad on the Internet."[1]

Bitcoin Cash (BCH)

Bitcoin Cash is a cryptocurrency, one of the branches of bitcoin, which separated from it on August 1, 2017. In November 2018, Bitcoin Cash was also split into several branches.

Monero (XMR)

Monero is a cryptocurrency focused on increased transaction privacy. The cryptocurrency appeared on April 18, 2014, as a branch of Bytecoin (not to be confused with Bitcoin).

Dash (DASH)

Dash is a secure and anonymous cryptocurrency developed as an alternative to Bitcoin in 2014. The Dash cryptocurrency, also known as Darkcoin or XCoin, is completely decentralized and does not depend on external regulators. In 2017, Dash became one of the most popular altcoins and was among the top ten largest cryptocurrencies by capitalization.

Table 1 shows the quotes (prices) for the first date of each month 2022–2023 for cryptocurrencies BCC, BCH, XMR and DASH, expressed in US dollars.

Table 1.

Prices (quotes) of cryptocurrencies in US dollars (https://www.calc.ru/)

Data	BTC	BCH	XMR	DASH
01.01.2022	46805	435	232	136
01.02.2022	36471	285	147	95
01.03.2022	43085	332	172	100
01.04.2022	45064	376	212	127
01.05.2022	37961	278	225	86
01.06.2022	31898	204	197	66
01.07.2022	20363	105	116	43
01.08.2022	23456	142	156	52

[1] Joshua Davis, «The Crypto-Currency», New Yorker, October 10, 2011.

01.09.2022	20159	116	152	45
01.10.2022	19420	119	148	42
01.11.2022	20571	116	150	42
01.12.2022	17137	113	143	43
01.01.2023	16548	97	147	42
01.02.2023	23110	134	176	61
01.03.2023	23335	133	153	72
01.04.2023	28761	126	157	59

3. Models ARIMA(p,d,q) of cryptocurrency quotes

Let's start our study of the volatility of cryptocurrencies by building the ARIMA(p,d,q) models of these asset quotes. These models, on the one hand, have a certain advantage in predicting asset prices for future periods of time. On the other hand, they demonstrate the non-stationary time series of asset quotes.

We denote by the symbol p_t the price of the asset on date t, where t discretely changes with a constant step Δ in the interval $[t_0, t_f]$ between the dates t_0 and t_f; for example, $t_0 = 01.01.2022,\ t_f = 01.04.2023, \Delta = 1$ month. The symbol $t-1$ indicates the date preceding the date t. For example, $t_f tf - 1 = 01.03.2023.$

Table 2 shows the meshes constructed from the data from Table 1 in the statistical appendix R using the auto.arima() function. Table 2 shows that all models of cryptocurrency quotes turned out to be the ARIMA(0,1,0) random walk model with the specification

$$\begin{cases} p_t = p_{t-1} + \varepsilon_t \\ \varepsilon_t \in WN(0, \sigma_\varepsilon) \end{cases}. \quad (1)$$

Here, the symbol ε_t denotes a stationary time series with uncorrelated levels, zero expected value and the corresponding mean squared expectation σ_ε; such a series is commonly called "white noise". We add that the hypotheses about the non – stationary quotes p_t of these assets were investigated by the Dickey-Fuller test. Model (1) means that the best forecast of the asset quote for any future date is equal **to the last observed value of the asset quote**, and the standard error of such a forecast is determined by the rule [1-6, p. 83]:

$$\sigma_h = \sigma_\varepsilon \cdot \sqrt{h}. \quad (2)$$

Here h is the forecast horizon (the number of time periods of duration Δ from the last observed value of the asset quote to the forecast date). Note that the values $of\ \sigma_\varepsilon$ are in the last column of Table 2.

Table 2.

Models of cryptocurrency quotes over the time interval [01.01.2022, 01.01.2023]

Asset	Crucial rule of the Dickey-Fuller test of the hypothesis of non-stationary asset quotes (significance level $\alpha = 0.05$)	ARIMA (p, d, q) model asset quotes p_t актива	Mean square deviation σ_ε of white noise in the (1)
BTC	p-value = 0.9353. The non-stationarity hypothesis is not rejected.	ARIMA(0,1,0)	$ 5667
BCH	p-value = 0.5634. The non-stationarity hypothesis is not rejected.	ARIMA(0,1,0)	61 $
XMR	p-value = 0.086. The non-stationarity hypothesis is not rejected.	ARIMA(0,1,0)	$ 37
DASH	p-value = 0.6135. The non-stationarity hypothesis is not rejected.	ARIMA(0,1,0)	$ 20

Let's illustrate the predictions based on model (1) for bitcoin. From Table 1, we select the last observed value: $BTC_{1.04.2023} = \$\ 28761$. Let the forecast horizon be two times the month, i.e., h = 2. This means that we are going to predict the value $of\ BTC_{1.06.2023}$. The optimal forecast for $\widehat{BTC}_{i\varepsilon 1.06.2023} = \$\ 28761$. According to (2), the standard error of this forecast $\sigma_{h=2} = 5667 \times \sqrt{2} = \$\ 8014$.

The volatility of p_t cryptocurrency quotes is examined below.

4. Evaluating the volatility of cryptocurrency quotes

The task is to estimate a measure of the volatility of the variable p_t over the interval $[t_0,t_f]$. In the theory of finance, there are several rules for calculating the measure of asset volatility, a review of which is presented in [15, p. 4]. Here we will discuss the most популярную popular measurey of volatility, which is called "realized volatility", which is accepted by many researchers [11]-[14] and is determined by the rule

$$RV = \sqrt{\sum_{t=t_0+1}^{t=t_f} (\ln \frac{p_t}{p_{t-1}})^2}\ . \qquad (3)$$

The value $\ln pt \frac{p_t}{p_{-1}}$ in formula (3) is called the "logarithmic profit" of the asset over the time interval $[t-1, t]$. The name is based on the approximate equality:

$$\ln \frac{p_t}{p_{t-1}} = \ln \left(\frac{p_{t-1}+(p_t-p_{t-1})}{p_{t-1}}\right) = \ln\,(1+r_t) \approx r_t. \qquad (4)$$

Below symbol r_t will denote either the value $\ln \frac{p_t}{p_{t-1}}$, or the value $r_t = \frac{p_t-p_{t-1}}{p_{t-1}}$, which should not lead to misunderstandings. Table 3 shows the values of the profitability of cryptocurrencies calculated according to (4) according to Table 2.

Table 3.

Cryptocurrency profitability values

t	rBTC	rBCH	rXMR	rDASH
01.02.2022	-0,25	-0,42	-0,46	-0,36
01.03.2022	0,17	0,15	0,16	0,05
01.04.2022	0,04	0,12	0,21	0,24
01.05.2022	-0,17	-0,30	0,06	-0,39
01.06.2022	-0,17	-0,31	-0,13	-0,26
01.07.2022	-0,45	-0,66	-0,53	-0,43
01.08.2022	0,14	0,30	0,30	0,19
01.09.2022	-0,15	-0,20	-0,03	-0,14
01.10.2022	-0,04	0,03	-0,03	-0,07
01.11.2022	0,06	-0,03	0,01	0,00
01.12.2022	-0,18	-0,03	-0,05	0,02
01.01.2023	-0,03	-0,15	0,03	-0,02
01.02.2023	0,33	0,32	0,18	0,37
01.03.2023	0,01	-0,01	-0,14	0,17
01.04.2023	0,21	-0,05	0,03	-0,20

Let us return to formulas (3) and (4). We state that the values a *RV* are dimensionless, that is, they do not depend on the units of measurement the values of pt**.** Measure (3) is an estimate of the asset's volatility over the time interval $[t_0,t_f]$. Table 4 shows the values *of the RV measure* of volatility (as a percentage) of assets discussed in paragraph 2. For example, bitcoin's volatility is 77% over the time interval [01.01.2022 - 01.04.2023] lasting 15 months.

Table 4.

Measures of volatility of major cryptocurrencies in 2022-2023

Volatility measure	BTC	BCH	XMR	DASH
RV (%)	77	105	85	94

5. Outputs

1. The most volatile cryptocurrency is Bitcoin Cash. Bitcoin has the least volatility among cryptocurrencies Bitcoin. However, the high value of bitcoin generates a high measure of its absolute volatility, that is, in other words, it generates large possible average losses for an investor when owning bitcoin.

2. The econometric model of quotes for all cryptocurrencies is the ARIMA(0,1,0) with specification (1). The accuracy of the optimal forecast for model (1) is calculated according to rule (2).

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DOI 10.34660/INF.2023.21.91.074

现代条件下科米共和国的实体经济部门
THE REAL SECTOR OF THE ECONOMY OF THE KOMI REPUBLIC IN MODERN CONDITIONS

Gadzhiev Jusif Alimovich
Candidate of Economic Sciences, Head of Laboratory
Institute of Socio-Economic and Energy Problems of the North
FRC "Komi Scientific Centre of the Ural Branch of the Russian Academy of Sciences", Syktyvkar, Russia

注解。 考虑了科米共和国实体经济发展的主要趋势和特点。 揭示了"实体经济部门"概念内容的理论和方法论基础。 分析了科米共和国实体经济部门增加值、固定资本投资和年平均雇员人数的部门结构动态。 据透露，在科米共和国，实体部门的比例非常高，略高于俄罗斯所有北部地区的平均水平。 实体部门的高度重要性归因于原材料工业的发展，特别是石油和天然气，这是该地区的竞争优势。

关键词：实体经济部门、金融部门、工业、贸易、增加值、投资、雇员人数、科米共和国。

Annotation. *The main trends and features of the development of the real sector of the economy of the Komi Republic are considered. The theoretical and methodological foundations of the content of the concept of "real sector of economy" are revealed. The dynamics of the branch structure of the added value, investments in fixed capital and the average annual number of employees of the real sector of economy of the Komi Republic is analysed. It is revealed that in the Komi Republic the share of the real sector is very high and somewhat higher than the average for all northern regions of Russia. The high importance of the real sector is due to the development of raw material industries, in particular oil and gas, which is a competitive advantage of the region.*

Keywords: *real sector of the economy, financial sector, industry, trade, value added, investments, number of employees, the Komi Republic.*

At present, the deterioration of the economic situation in Russia and its regions, caused by the introduction of wide-ranging sanctions by foreign countries, is characterised by a drop in production volumes, changes in the logistics of foreign trade turnover, the withdrawal of many companies from the Russian market,

a rise in the inflation rate, a decrease in real incomes of the population and other negative circumstances. The way out of this situation is the development of the real sector of the economy. The study of this sector of the Komi Republic has an important theoretical and practical significance. Its relevance is determined by a number of circumstances: 1) the lack of a clear interpretation of the term "real sector of the economy" in macroeconomic theory in the presence of an established concept in Russian economic practice, 2) the lack of a well-developed concept of the development of the real sector of the economy on the scale of the country and its regions, 3) the need to take into account the impact of globalisation processes on the development of the real sector of the economy of the country and its regions; 4) the importance in the theory of economic growth and regulation of the real sector of the economy; 4) the large scale of the real sector in the economy of the Komi Republic, where, in the

Today the concept of "real sector of the economy" is used very actively both in economic science and in economic practice. However, it appeared relatively recently. It was first used in official documents by V.N. Cherkovets in the joint report of the Ministry of Economy and Goskomstat of Russia "On the results of socio-economic development of the Russian Federation in 1996 and prospects for its development in 1997-2000" dated 5 February 1997. Meanwhile, in such generalising official materials as annual handbooks of the Goskomstat of Russia, the concept in question does not appear. Nor does it appear in the System of National Accounts (SNA). In addition, the definition of the concept of "real sector of the economy" is practically absent in most educational, reference and encyclopaedic publications [1].

In economic theory and practice of recent years, various approaches to the definition of the essence of the concept of "real sector of the economy" and its composition of branches are widely used.

For example, in the "Financial and Credit Encyclopaedic Dictionary" [2] offers such a definition, according to which the real sector includes industrial production, consisting of enterprises of extractive and processing industries, agriculture, the sphere of industrial, household and other services. In this definition, the criterion for attributing branches of the economy to the real sector is compliance with the principle of participation in the production of GDP. However, the composition of industrial, household and other services is not specified. For example, it is not clear whether trade is included in the sphere of industrial services, etc.

Y.B. Zelensky notes that the real sector of the economy includes enterprises and organisations of the sector of non-financial corporations (according to the SNA methodology), in which all goods and services are reproduced, except for financial intermediation services sold on the free market [3]. Trade activities that provide market circulation of goods, as well as customer service in the process

of transactions, delivery of goods, their storage are an integral part of the real economy. The criterion for attributing this or that sector to the real economy is the production and consumption of publicly demanded goods and services. Therefore, the sector of non-financial corporations can be safely called real [3]. In general, we can agree with Y.B. Zelensky's position on the content and structure of the real sector of the economy. However, the issue related to the development of information economy and new types of organisations that are formed and developed in its depths remains debatable.

I.B. Rodina writes that when they talk about the real sector, they mean, first of all, material production of all industries plus trade and the sphere of intangible services. The basis for such a broad understanding of the real sector is the creation of GDP, where all types of economic activity are taken into account [4]. In our opinion, we cannot agree with the author in attributing all branches of GDP to the real sector of the economy with the criterion of value added creation, as in the branches of the social sphere (education, health care, culture, art, etc.) no value added is created, and only their expenditures are taken into account in the calculation of GDP. We cannot agree with the main conclusion of I. B. Rodina, which should be made from the consideration of the concept of "real sector of the economy". It consists in the fact that its fundamental difference from the spheres lying beyond the boundary of the real sector lies in the ability to create surplus product.

Co-authors of the modern economic dictionary B.A. Raizberg, L.S. Lozovsky and E.B Starodubtseva define the real sector of the economy as a set of industries producing tangible and intangible goods and services, except for financial and credit and budgetary operations [5]. This definition does not show what criteria the authors used to form this interpretation - productive labour, value added, etc. The positive side here is the exclusion of budgetary operations (industries) from the real sector, since their funds belong to public finance.

Thus, according to the analysis of the above definitions, the real sector of the economy is a set of economic sectors producing tangible and intangible goods and services, except for financial and credit, budgetary and exchange operations. The main criterion for singling out the real sector is the creation of added value or value creation of goods and services.

Based on the above mentioned, the following branches of economy can be included in the real sector of the economy: - agriculture, forestry, hunting, fishing and fish farming; - mining; manufacturing; provision of electric energy, gas, steam, air conditioning; water supply; water disposal, organisation of waste collection, utilisation, pollution elimination activities; construction; wholesale and retail trade, public catering; transportation and storage; information and communication activities.

The following indicators can be used for the above-mentioned sectors of the economy: gross value added, turnover of the organisation, balanced financial result, volume of investments in fixed assets, average annual number of employed persons, commissioning of residential and non-residential premises, total floor area of buildings (only in construction).

The share of the real sector in the structure of the gross value added of the economy of the Komi Republic is high. However, it is much lower than the share of the real sector in the average value of the Northern regions, but higher than in Russia as a whole (tab. 1). In 2016-2022, the share of this sector slightly decreased from 71.6 to 69.0%, which is due to the reduction of the specific weight in mining, construction, transport and storage.

Table 1

*Dynamics of the sectoral structure of gross value added of the real sector of the Komi Republic for 2016-2020,%**

Industries	2016	2017	2018	2019	2020
Economy, total	100	100	100	100	100
Agriculture, forestry, hunting, fishing and fish farming	1,7	1,6	1,4	1,6	2,1
Mining and quarrying	33	35	42,3	43,8	32,8
Manufacturing industries	11,1	11,1	11	9,3	11,2
Electricity, gas and steam supply, air conditioning	2,5	2,7	2,4	2,4	2,6
Water supply, wastewater disposal, organisation of waste collection and disposal, pollution elimination activities	0,5	0,5	0,4	0,5	0,7
Construction	9,5	6,8	5,6	4,1	6,5
Wholesale and retail trade	4,7	5,1	4,5	4,3	5
Transport and storage	7,2	7,6	6,6	6,4	6,8
Information and communication activities	1,4	1,4	1,1	1,1	1,3
For reference:					
Real sector of the economy of the Russian Federation	*67*	*67,0*	*68,5*	*68,7*	*66,2*
Real sector of the economy of the North, total	*74,4*	*74,7*	*76,4*	*72,7*	*75,1*
Real sector of the economy of the Komi Republic, total	*71,6*	*71,8*	*75,3*	*73,5*	*69*

* Sources: Gross Regional Product https://rosstat.gov.ru/statistics/accounts (circulation date 02.09.2022)

As can be seen from tab. 1, the dominant position in the structure of the added value of the real sector of the Komi Republic is occupied by the extraction of minerals and manufacturing industries, and the shares of these industries have

not changed much over this period. This is due to the sectoral specificity of the economy of the Komi Republic, the priority development of industries related to the extraction of raw materials and fuel, as well as the timber industry (production of board, paper, plywood, etc.). It should be noted that in the conditions of crisis and uncertainty of economic development, such specialisation ensures the competitiveness of the region, i.e. it is the main competitive advantage.

A comparative analysis of the structure of the US and Russian economies shows that there is a sharp difference between them. Thus, the structure of the US economy is characterised by a pronounced post-industrialism. Most of the American GDP (79.4% in 2004) is generated in the service sector, which includes, first of all, education, health care, science, finance, trade, various professional and personal services, transport and communications, and government services. The share of material production (agriculture, forestry and fishing industry, mining and processing industry, construction) remains 20.6 per cent of GDP: agriculture generates about 0.6 per cent of GDP; industry - less than 20 per cent of GDP. The reason for the low level of material production or the real sector is the outsourcing abroad of production by American companies due to increased competition with countries that have cheaper labour.

In the structure of investments in fixed capital of the economy of the Komi Republic the share of the real sector is very high, it is much higher than the average value of the real sector in the regions of the North and in Russia as a whole (tab. 2). At the same time, over 2017-2022, the share of this sector insignificantly decreased from 95.3 to 90.6%, which is due to the reduction in the specific weight of mining, transport and storage. A similar picture was observed in Russia as a whole and in the regions of the North. This is due to the specifics of the economy in the North, the priority of industries related to the extraction of raw materials and fuel, as well as the production of energy and materials due to the use of natural resources, primarily mineral resources, in the national economy. This situation allows the regions of the North to remain competitive.

Table 2

*Dynamics of the sectoral structure of investments in fixed capital of the real sector of the Komi Republic for 2017-2020,%**

Industries	2017	2018	2019	2020
Economy, total	100	100	100	100
Agriculture, forestry, hunting, fishing and fish farming	1,1	1,2	2,1	1,3
Mining and quarrying	55,6	50,4	53,7	52,2
Manufacturing industries	5,3	8,1	8,1	8,4
Electricity, gas and steam supply, air conditioning	3,8	6,9	8,9	6,3

Industries	2017	2018	2019	2020
Water supply, wastewater disposal, organisation of waste collection and disposal, pollution elimination activities	0,1	0,3	0,2	0,4
Construction	0,5	1,0	0,9	0,6
Wholesale and retail trade	0,5	0,8	0,6	0,5
Transport and storage	26,3	25,6	18,2	18,4
Information and communication activities	1,9	1,4	1,6	2,4
For reference:				
Real sector of the economy of the Russian Federation	*79,3*	*79,5*	*77,4*	*75,6*
Real sector of the economy of the North, total	*87,4*	*87,8*	*85,8*	*85,6*
Real sector of the economy of the Komi Republic, total	*95,3*	*95,6*	*94,3*	*90,6*

* Sources: Gross Regional Product https://rosstat.gov.ru/statistics/accounts (circulation date 02.09.2022)

The share of the average annual number of employed in the real sector of the Komi Republic is slightly lower than the average for Russia as a whole and for the northern regions (tab. 3). Over 2017-2020, the share of this sector slightly decreased from 58.3 to 57.7%, which is mainly due to a decrease in the share of mining, transport and storage. A similar picture was observed in Russia as a whole and in the regions of the North.

Table 3

*Dynamics of the sectoral structure of the average annual number of employed in the real sector of the Komi Republic for 2017-2020, %**

Industries	2017	2018	2019	2020
Economy, total	100	100	100	100
Agriculture, forestry, hunting, fishing and fish farming	5	4,8	4,8	4,5
Mining and quarrying	6,6	6	5,8	6,1
Manufacturing industries	7,6	8	8,1	8,3
Electricity, gas and steam supply, air conditioning	4,3	4,3	4,4	4,1
Water supply, wastewater disposal, organisation of waste collection and disposal, pollution elimination activities	1,3	0,9	0,9	1
Construction	6,9	7,6	7,7	7,4
Wholesale and retail trade	13,6	13,9	14,2	14,1
Transport and storage	11,5	11,2	11,1	10,8
Information and communication activities	1,5	1,6	1,6	1,4
For reference:				
Real sector of the economy of the Russian Federation	*63,3*	*63,4*	*63,3*	*63,1*
Real sector of the economy of the North, total	*61,3*	*61,1*	*61,2*	*61,0*
Real sector of the economy of the Komi Republic, total	*58,3*	*58,3*	*58,6*	*57,7*

* Sources: Gross Regional Product https://rosstat.gov.ru/statistics/accounts (circulation date 02.09.2022)

Thus, the analysis of the dynamics of the sectoral structure of the economy of the Komi Republic according to the considered indicators characterising the state of the real sector - gross value added, investments in fixed capital and the average annual number of employees - has led to the following main conclusions:

- in the Komi Republic the share of the real sector is very high, higher than the average for Russia as a whole and, as a rule, somewhat higher than the average for all northern regions.

- The high share of value added is due to the development of raw material industries, in particular oil and gas production. This is a competitive advantage of this territory, the realisation of which becomes especially important in the conditions of economic and financial crisis. The industries of the real sector do not allow a deep decline in production. This was confirmed during the pandemic and is being confirmed now against the backdrop of large-scale sanctions imposed by Western countries against the economic and financial sectors.

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DOI 10.34660/INF.2023.55.51.075

公司总资本的战略管理

STRATEGIC MANAGEMENT OF THE TOTAL CAPITAL OF A CORPORATION

Lanskaya Daria Vladimirovna
PhD in Economics, Associate Professor, Head of Department
Kuban State University

Melikhova Sofia Gennadievna
Lecturer, Head of Department
Kuban State University

El Hellani Hassan Ali
Postgraduate Student
Kuban State University

注解。 本文提出了管理公司总资本的新问题。 无形资产开始在企业总资本结构中占据主导地位。 作者开发了一种与构建公司资本和谐配置相关的方法——资本图。 现代知识企业资本理论发展了 G.B. 克莱纳。 修改后的生产函数包括许多以前在公司发展过程中未考虑到的新参数（资产）。 研究结果提出了资本图模型

关键词：无形资本、资本图、资本配置、修正生产函数、战略、战略资本管理。

Annotation. *The article poses a new problem of managing the total capital of a corporation. Intangible assets begin to play a dominant role in the structure of the total capital of a corporation. The authors develop an approach related to the construction of a harmonious configuration of the corporation's capital - capitalograms. The modern theory of capital of an intellectual corporation develops the theory of capital by G.B. Kleiner. The modified production function includes a number of new arguments (assets) that were not previously taken into account during the development of the corporation. As a result of the study, a capitalogram model was proposed*

Keywords: *intangible capitals, capitalogram, capital configurations, modified production function, strategy, strategic capital management.*

Introduction

In the course of the transformation process, the semantic capacity of the concept of "capital" expanded, there was a noticeable increase in the role of intangible

assets, which predetermined the systemic evolution of the essence and structure of total capital [2].

Considerable time has passed since the justification of capital by K. Marx, and not only the content, but also its structure has changed. The involvement of real and intangible capitals in the reproduction process is proclaimed as new sources of a new quality of economic growth. The concept of "capital structure" has so far been ambiguous and is debatable. Numerous studies by Russian and foreign authors testify to an expanded understanding of capital.

The process of strategic capital management is associated with the assessment and selection of strategic alternatives, which, in addition to specific factors, require taking into account the peculiarities of the use by the enterprise of both tangible and intangible capitals and the formation of their optimal configuration - capitalograms that are adequate not only to the corporate development strategy, but to the entire system of corporation strategies, as well as tactical tools for their implementation [3]. Important is the visualization of the total capital of the corporation. The choice and method of its graphical representation, as well as set-theoretic operations on them, will make it possible to synthesize various configurations of total capital - capitalograms. The research problem is to create procedures for the synthesis of capitalograms and strategic management of resource provision - configurations of real and intangible capitals. The hypothesis of the study is that, depending on the chosen development strategy, a corporation can synthesize an adequate configuration of capital. Research objectives:

1. Propose mechanisms for the transition from a modified production function to a set of capital configurations - capitalograms and explore their features.
2. To adapt the way of measuring capitals and their elements.
3. Suggest a mechanism for visualizing capitalograms using various methods of their graphical representation.

1. Literary review of the main studies on the theory of capital. The degree of scientific development of the problem.

Considering capital as an economic resource, it is customary to subdivide this category into real and financial. There are a lot of classification signs of the division of capital in modern scientific economics, given the fact that the desire to explain the essence and significance of capital was shown by representatives of all major schools and areas of economic science.

Within the framework of the neoclassical direction of economic theory, it originated in the works of J.B. Clark, J. Dewey extended treatment of capital. J.B. Clark recognized the possibility of isolating such a factor (capital) that would dominate in the formation of a harmonious (effective) capital combination. IN AND. Ivanus considered the nature of the emergence of capital harmonization

mechanisms and their application in the innovation development management system from the position of cognitive technology [1]. I. Fischer defined capital as a stock of wealth at the moment, including in this concept both natural and value aspects. In addition, Fisher defined "capital" as any stock (land and other natural resources, buildings, machinery, skills) that generates a flow of services over time, and "income" as the excess of this flow of services over volume,

Based on the principle formulated by D. Norton and R. Kaplan that "one can manage only what can be measured", there was a conscious need to justify the methodology for the quantitative and qualitative assessment of real and intangible capital. Among the new tools for implementing the strategies of the organization with the determination of the optimal structure of capital should be the construction of capitalograms [3]. At the same time, the problem area becomes the determination of the optimal capital structure for specific conditions and opportunities of the company, which will allow for the effective management of all assets in their totality. The idea of measurement based on information theory is considered promising.

2. Analysis of the main models of intangible capitals and their elemental composition

It has been proven that a special role in knowledge management is played by the synergistic interaction of various capitals [2,3]. In general, the configuration of intangible capital, tangible assets should be formed for a specific strategic task [3]. It is important to create conditions for harmonizing the interaction of all capitals with each other. The phenomenon of capital diffusion in the study of capitalograms is of the greatest interest. It should be noted that a certain configuration allows you to give properties that give rise to sustainable competitive advantages of the corporation. "The creation of a configuration of natural resource, physical, financial, human, entrepreneurial, social, consumer and client, organizational and information capital is the most important element in the development of a corporation in a post-industrial society…" [2,3]. Wherein, It is customary to divide the category of human capital from the standpoint of mobility and properties of the ability to learn innovations. Recently, the importance of digital capital in the digital economy has also increased.

Thus, the corporation of the knowledge economy and the digital economy represents a certain set of capitals (resources) that today underlie its competitive advantages. Analyzing the system of relations of a corporation, J. Galbraith singled out in it a special "intellectual core", the functioning of which allows solving the problem of adaptation to external conditions and self-development, as well as ensuring the efficient production of corporate capital [3].

It is important that, according to the concept of Norton and Kaplan, intangible capitals are studied using cognitive analysis, which allows structuring not only

quantitative, but also qualitative knowledge about various capitals and their elements. E.V. Lutsenko developed a system of automated system-cognitive analysis that allows searching for golden sections using cognitive-target structuring, formalization of the subject area, synthesis with subsequent verification of the system of models. “Under conditions of uncertainty, the process of forming managerial decisions in the informational aspect is equivalent to the process of generating new knowledge” [4]. These possibilities are used in modeling the elemental composition of capitalograms.

3.Determination of the model range of capitalograms

Traditional production functions from the Cobb-Douglas equations to well-known modifications using information today required a fundamental rethinking. It is known that the basis of the modeling of intelligent systems is the cognitive structuring of knowledge about the object and its external environment [2,4]. Data and information are processed faster today with the development of digital technologies, and, consequently, knowledge is formed faster. The formation of the company’s development strategies also takes place along the trajectory of maximizing the use of information and digital technologies.

Various operations can be performed on capitals and their elements, for example: substitutions, additions, diffusions, etc. In addition, the property of complementarity is taken into account. The researchers note that the study of the forms of capital movement should lead to the determination of the shares of each capital in the capitalogram and the development of mechanisms for their synthesis, based on the implemented development strategy of the corporation [3].

According to the model of optimization problems of lean manufacturing, visual representation involves connecting the links of a five-pointed star (Figure 1), each of which presents specific tasks used today in lean manufacturing (BP).

When designing an optimal capital configuration model, this element of visualization of the implementation of the lean manufacturing methodology should also form the basis of the model, namely, the model for determining such a configuration. Offering the uniqueness of the process of interaction of capitals for each company, the structure of such a configuration may outwardly resemble a DNA helix, where there is a close relationship between the elements and if the species composition of one chain is violated, the overall structure is violated.

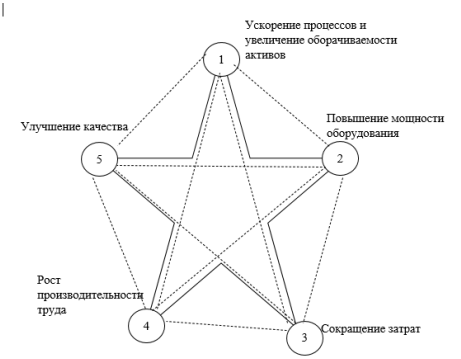

Figure 1. *Elements of BP optimization problems*

The result of the designed model for determining the optimal configuration of capitals (otherwise, the optimal algorithm with an elementary composition of structural elements) using the BP and management methodology is shown in Figure 2.

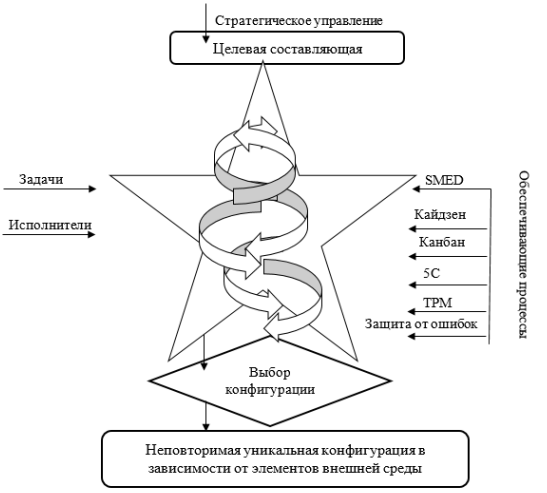

Figure 2. *Elements for determining the unique configuration of capitals*

Approaching the model of the optimal configuration of capital, it is possible to build a Fibonacci spiral, laying in the main characteristic of the properties of such a spiral that the polar radius changes when the position changes, just as the

optimal composition of capital changes when the company's strategy changes. In addition, when the external conditions for the development of society change, the structure of capital may change, as, for example, after separating digital capital into a separate type.

It is known that a spiral is a curve described by a point moving away from the center. Will the model of the optimal configuration of capitals be close to building an "Archimedean spiral" with two centers, a three-centered spiral or a golden spiral, also known as the Fibonacci spiral? The question can be considered from the standpoint of the perfection of the logarithmic spiral. This provision is close to the considered structure of capitalograms with the elemental composition of real and intangible capitals. Based on the fact that the golden proportions are actively used in the construction of geometric figures, it can be assumed that such proportions should be used in calculating the optimal capital structure. It is noteworthy that even the "golden spiral" is used in the model of the galaxy [1].

Scientific reasoning that the principle of the golden section is the highest manifestation of the perfection of the whole and its parts in various subject areas allows us to assume a criterion for the optimality of capitalograms and their configuration [1]. We can assume the approximate location of capital on the golden spiral (Figure 3). The representation of the configurations in the figure is represented schematically by the letters "K" with a numerical index. Structurally, and most correctly, configurations can be described as a similarity of fractals, that is, complex figures with the property of self-similarity [5].

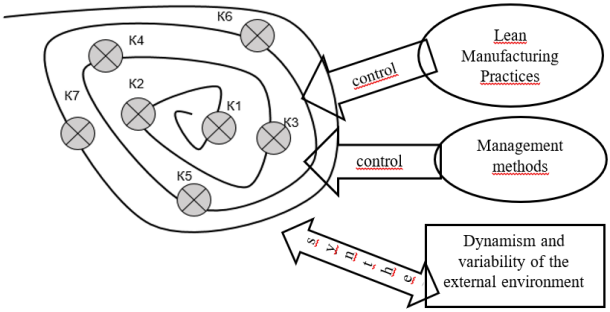

Figure 3. *Capital configuration model (enlarged)*

An approximate composition of the selected configuration structures is presented in Table 1.

Table 1

Composition of capitalogram configurations

No. p / p	Types	Elemental composition
1	Configuration 1 «elementary»	Tangible assets, social capital, corporate culture, knowledge
2	Configuration 2 «creative»	Tangible assets, intangible capital, incl. knowledge and creativity
3	Configuration 3 «typical»	Tangible assets, social, cultural, symbolic, political, administrative, communication, information and human capital
4	Configuration 4 «digital»	Tangible assets, intangible capital and digital capital
5	Configuration 5 «model using external services»	Tangible assets, intangible, digital capital, the use of outsourcing services as capital in the aggregate
6	Configuration 6 «spatio-temporal»	Tangible assets, intangible, digital capital, the use of outsourcing services and spatio-temporal resources of the system economy
7	Configuration 7 «managerial»	Real and intangible capital, including natural resource, financial, human, entrepreneurial, management capital

It is known that the higher the degree of formalization of the model, the more accurate mathematical methods can be applied, and "the display of real objects in formal scales is the measurement" [4]. Just as "...the Kotelnikov-Shannon theorem is a mathematical justification for the possibility of representing a signal consisting of an infinite number of points by using a finite number of sample numbers..." [4] one can talk about measuring signals, information and the optimal composition of real and intangible capitals in the company from the position of fractal sets. As a result, we get an ideal model, taking into account the savings in resources, both material, intangible, and temporary.

Conclusion

Modern ideas about the interaction of real and intangible capitals in a company are considered as the optimal configuration and selection of the capitalogram structure. Applying the method of lean production in the process of managing the capital of the company and choosing their sufficient structure, we lay down the methodology for calculating the optimal composition of capital, taking into account many of the unique characteristics of the corporation, including its strategy.

The ideal configuration model proposed by the authors is a spiral model built on the basis of the validity of the ideality of the golden section in space. The authors also proposed a graphical representation of the algorithm for determining the optimal capital configuration model and a calculation method.

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DOI 10.34660/INF.2023.28.43.076

制定纽伦堡法庭章程时的国际犯罪分类
CLASSIFICATION OF INTERNATIONAL CRIMES IN THE PREPARATION OF THE CHARTER OF THE NUREMBERG TRIBUNAL

Mironenko Sergey Yurievich
Candidate of Juridical Sciences, Associate Professor,
Head of Department
Donbas State University of Justice

注解。 文章分析了《纽伦堡法庭规约》在国际犯罪分类中的作用。 文章重点指出，在纽伦堡法庭规约的制定过程中，首次制定了“危害人类罪”的定义，其中包括谋杀、灭绝、奴役、流放或其他在发生之前对平民实施的罪行。或在战争期间，或出于政治、种族或宗教原因而实施危害和平罪或战争罪的迫害。

关键词：纽伦堡法庭规约、国际罪行、危害人类罪、战争罪。

Annotation. *The article analyses the role of the Statute of the Nuremberg Tribunal in the classification of international crimes. The article focuses on the fact that during the preparation of the Statute of the Nuremberg Tribunal for the first time the definition of “crimes against humanity” was formulated, which includes murder, extermination, enslavement, exile or other crimes committed against the civilian population before or during the war, or persecution on political, racial or religious grounds for the purpose of committing crimes against peace or war crimes.*

Keywords: *Statute of the Nuremberg Tribunal, international crimes, crimes against humanity, war crimes.*

Until the First World War of 1914-1918, there had been no successful attempts to subject the perpetrators of wars of aggression to the International Criminal Court. Napoleon I, declared the perpetrator of the wars of aggression of the early 19th century, was not tried by an international court, but only punished by a political act of the victorious powers. According to the peace treaty concluded in August 1815 between Russia, Great Britain, Austria and Prussia, Napoleon was declared a prisoner of these states and handed over to the British government, which subjected him to life imprisonment on St Helena.

The scale of the First World War, the large number of casualties and the terrorist methods of its conduct led to a public demand to punish those responsible for the war. The Versailles Peace Treaty included Part VII "Sanctions", which provided for such responsibility (Articles 227-230). A special court was to be established. But it never happened, and Wilhelm II Hohenzollern, the former German Emperor, accused of the greatest offence to international morality and the sacred power of treaties, was not brought to trial [2, p. 120].

More than half a century ago, the first international trial in the history of mankind over the main war criminals of Nazi Germany took place. For the first time in the dock were persons who were part of the government of an aggressive state. Before the court appeared 22 persons, on whose account there were 50 million deaths in almost all European countries.

In his speech the chief prosecutor from the USSR Rudenko R.A. noted: "For the first time in the history of mankind justice is faced with crimes of such scale, which caused such grave consequences. For the first time before the court were criminals who took possession of the entire state and the state itself made the instrument of their heinous crimes " [6, p. 324].

The preparation and conduct of the Nuremberg Trials was a vivid example of successful cooperation of the four allied states. The idea of prosecution and punishment of war criminals was expressed in the declarations and statements of the governments of these states, adopted in the period from 1941 to 1943. The agreement of 8 August 1945, signed during the London Conference between the governments of the USSR, the USA, Great Britain and France on the prosecution and punishment of the major war criminals of the European Axis countries, provided for the establishment of an international military tribunal to convict these criminals, whether they were charged individually or as members of organisations and groups or as both. An integral part of the agreement was the Statute of the International Military Tribunal (hereinafter - IMT), which defined its organisation, jurisdiction and functions [6, pp. 224-225].

The most difficult part of the London Conference's work was the development of the substantive law and, above all, the concept that formed the basis of the charges against the defendants - the concept of international crime. By 19 July, the conference had essentially completed its deliberations on the individual articles of the agreement and had begun to discuss the most difficult issue - the determination of the jurisdiction of the IMT. Two drafts of Article 6 were presented to the conference delegates - a draft prepared by a subcommittee on the basis of the American proposals and a French draft.

According to the subcommittee's 11 July draft, Article 6 states:

"The following acts are considered criminal violations of international law and should be subject to the jurisdiction of the tribunal:

a) Violations of the laws, rules and customs of war. Such violations include the killing and torture of prisoners of war, atrocities and violence against the civilian population, enslavement of the population, reckless destruction of towns and villages, looting and other violations of the laws and customs of war;

b) the outbreak of a war of aggression;

c) (invasion or threat of invasion), waging war against other nations in violation of treaties, agreements or assurances between nations or in violation of international law;

d) Engaging in a common plan or conspiracy to oppress other nations, if the plan or conspiracy used or intended to use unlawful means to carry it out, including any of the acts which are specified in paragraphs from "a", "b", "c", or a combination of such acts with other means.

(e) Atrocities, persecutions and exile based on political, racial or religious motives (in pursuance of a common plan or conspiracy referred to in paragraph (d) or in violation of the internal law of the State where it was committed)". The brackets indicate that the phrases contained therein were not agreed upon among the four representatives on the subcommittee [1, p. 122].

Along with valuable suggestions, there were also significant shortcomings in the draft. Attention was drawn to the ambiguity and some duplication in the division of certain types of offences into groups, and to some disorder in the construction of the whole article (first there are paragraphs "a-c", which include individual offences, then paragraph "d" concerning a common plan or conspiracy, and then again paragraph "e", which contains a third type of offence). The main flaw in the subcommittee's draft was that it did not take into account the personal responsibility of individuals for the offences in question.

The formula "criminal violation of international law" can be interpreted in two ways and does not give the tribunal clear authority to try individual persons for the commission of such "criminal violations" [1, p. 123]. Therefore, the formula proposed by the French delegation was better: firstly, it did not provide for the responsibility of states or social entities, but for the responsibility of specific individuals, and secondly, it dealt with the definition of the offence in such a way that it was directed only against those who had committed the offences.

The Soviet delegation did not submit its draft in order to reach agreement as soon as possible and supported the wording of draft article 6 submitted by the French side, which provided: "The Tribunal shall have the right to try any person who in one way or another prepared and directed such acts:

1. The policy of aggression against other nations and the policy of oppression of other nations pursued by the European Axis Powers, which were aimed at violating treaties and at violating international law.

2. The policies of oppression and persecution pursued against civilian populations.

3. The unleashing and waging of war by means contrary to the laws and customs of international law, and by those responsible for the violation of international law, the laws of humanity and laws dictated by public conscience, committed by the armed forces and civilian authorities in the service of these enemy powers." [1, p. 124].

The composition of the offences and the formula for individual liability were set out more clearly and concisely in the French draft. But it was not without its shortcomings. The main one was that it did not declare the outbreak and waging of a war of aggression an international offence, although it did provide for the right of a tribunal to try persons who prepared and carried out a policy of war and oppression of other peoples in violation of treaties. The French delegates explained that they did not consider waging a war of aggression a criminal offence. To declare war a criminal act by individuals would go beyond the scope of existing international law. Perhaps in the future, any state that starts a war of aggression will be held morally and politically responsible for the offences. Where a war of aggression was waged and not governed by the laws of international law, those responsible should be punished as criminals, but waging a war of aggression was not a crime.

The representative of Great Britain disagreed with this and, on the contrary, considered that aggression is an international crime and those who are responsible for its preparation and waging commit crimes. But he pointed out that there were really no sanctions against the offence at the time, which caused difficulties for the tribunal. The USSR and US delegations argued that in 1939 aggression was already considered a crime under international law because the source of law, along with treaty and agreement, was international custom, which recognised aggression as a crime. [4, pp. 69-118].

When discussing other paragraphs of Article 6, as well as its introductory and final parts, it was decided to combine the American and French drafts, taking into account the best of them, taking into account the comments and additions of the Soviet and British delegations.

Serious disagreements arose between the delegations when discussing the proposal of the representatives of Great Britain and the USSR to emphasise in the article that the jurisdiction of the tribunal extends only to crimes committed by persons in the service of the European Axis Powers. During the discussion, our delegation proposed the best formula: "The Tribunal established by the agreement referred to in Article 1 of the present Statute for the trial and punishment of the principal war criminals of the European Axis Powers shall have the right to try and punish persons acting for the European Axis Powers individually or as mem-

bers of organisations who have committed the following acts. Such acts or any of them are criminal, fall under the jurisdiction of the tribunal and entail individual responsibility...” [1, p. 129]. The formula of criminal offences in the final text of the statute basically corresponded to the American draft of Article 6, with some amendments:

a) Crimes against peace (referred to as crimes of war in the American draft), namely: planning, preparing, launching or waging a war of aggression or war in violation of international treaties, agreements or assurances, or participating in a common plan or conspiracy to carry out any of the foregoing;

b) war crimes, namely violations of the laws or customs of war. These violations include the killing, torture or enslavement, or for other purposes, of the civilian population of the occupied territory; the killing or torture of prisoners of war or persons at sea; the killing of hostages; the looting of public or private property; the wanton destruction of towns or villages; devastation not justified by military necessity, and other offences;

c) Crimes against humanity, namely, murder, extermination, enslavement, exile and other atrocities committed against the civilian population before or during the war, or persecution on political, racial or religious grounds for the purpose of carrying out or in connection with any offence subject to the jurisdiction of the Tribunal, whether or not these acts were in violation of the internal law of the country where they were committed.” [3, pp. 147-148].

This definition draws attention to the fact that the offences in the second and third groups are largely the same - murder, torture, enslavement, and theft of populations. Delegates found it appropriate to separate the three groups of offences because the laws and customs of war apply only to offences committed in time of war and against citizens of states attacked under the pretext of war. But the preparation for war and the execution of the Nazi plot required complete “pacification” in one’s own state. Even in peacetime the Nazi leadership committed grave crimes to destroy any opposition to its political course (Buchenwald concentration camp was established in 1933, Dachau - in 1933, operation “Kristallnacht” took place in 1938, “Programme T-4” /euthanasia/ was signed by Hitler in 1939). It was therefore decided that crimes committed against civilians on political, racial or religious grounds before or during the war were placed in a special section.

But crimes against humanity included not only the persecution of Axis nationals to prevent any attempt to thwart a fascist plot, but also crimes aimed at the physical and moral destruction of entire peoples. And although in practice the prosecution and the tribunal faced difficulties in the criminal legal qualification of these types of offences, the allocation of a special type of “crimes against humanity” in the statute was of great importance [5].

So where is the line between war crimes and crimes against humanity? It can be said that ordinary war crimes turn into crimes against humanity if they are committed under prearranged orders and, therefore, are of a state-organised nature, as well as have the purpose of mass destruction of people. The attribution of crimes against humanity to the jurisdiction of the International Military Tribunal finds sufficient grounds in the inseparability of the foreign and domestic policies of the German-Fascist government, which constituted a single whole, a single "total" policy of attack, suppression, oppression and destruction. In their scale, war crimes were crimes against humanity. Crimes against humanity were even more warlike in nature.

There was no difficulty in drafting rules of substantive law aimed at eliminating possible attempts by defendants to avoid punishment through pseudo-legal constructions. All delegates to the London Conference agreed that the official position of the defendants, the position of the head of state, or the position of responsibility in various government departments should not be considered as grounds for exemption from criminal responsibility or commutation of sentences.

Delegates unanimously endorsed the rules governing sentencing by the International Military Tribunal. All agreed that the court should have the power to sentence the perpetrator to the death penalty or other punishment that the tribunal has found just [1, p. 132].

Crimes against international law, war crimes were committed by human beings, not by abstract entities, and only by punishing the perpetrators of such crimes could the establishment of international law be respected.

The Nuremberg Trials were the first international trials without precedent in world history. It was established by international agreement and was composed of representatives of several states. It itself became a precedent. And all its shortcomings, which are identified by modern researchers, are due to this very fact. As for individual responsibility, the verdict clearly states that those who committed criminal acts could not cover themselves with their official position. Anyone who violated the laws of war would not go unpunished on the ground that he was acting at the behest of the State if the State, in giving its sanction to such acts, went beyond the competence conferred on it by international law. It was argued on behalf of the majority of the defendants that they were guided in their activities by Hitler's orders and therefore could not be held responsible for acts committed in accordance with those orders. But the State is composed of responsible individuals who formulate its policies and develop its plans, and the actions of the State can only be limited or prevented by influencing individuals acting as its organs or representatives. The Tribunal would show a complete misunderstanding of reality and true legal hypocrisy if it were to declare that only the State, that is, an abstract concept, is to blame for everything, and that its organs and individual represent-

atives who create and implement its policies cannot be blamed for everything. It was also unacceptable, in condemning a dictatorship, to use the dictator, however unlimited his power, as a scapegoat and to lay on him all the sins of his subjects in the government and the armed forces. The defendants who received criminal orders were in a difficult position, but the fact that they obediently obeyed clearly criminal orders for fear of punishment, which they were repeatedly openly threatened with, could not serve as an excuse for them. [7, p. 99].

Thus, the result of work on the Statute of the Nuremberg International Military Tribunal, in particular, was the first recognition of such a category as an international crime, or crime under international law. For the first time, a definition of "crimes against humanity" was formulated to include murder, extermination, enslavement, exile or other crimes committed against the civilian population before or during war, or persecution on political, racial or religious grounds for the purpose of committing crimes against peace or war crimes, whether or not these acts were in violation of the domestic law of the State where they were committed. The process established specific manifestations of crimes against humanity and war crimes.

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DOI 10.34660/INF.2023.78.89.077

中华人民共和国和俄罗斯联邦刑事立法下的犯罪收益合法化（洗钱）：比较法律方面

LEGALIZATION (LAUNDERING) OF CRIMINAL PROCEEDS UNDER THE CRIMINAL LEGISLATION OF THE PEOPLE'S REPUBLIC OF CHINA AND THE RUSSIAN FEDERATION: A COMPARATIVE LEGAL ASPECT

Solonenko Kristina Mikhailovna
Student
Donetsk State University

Karpenko Lyudmila Konstantinovna
Candidate of Law, Associate Professor
Donetsk State University

注解。 本文结合中华人民共和国和俄罗斯联邦的历史发展，对中华人民共和国和俄罗斯联邦刑事立法中非法收入合法化（洗钱）的比较法律分析。 两国在打击腐败和包括洗钱在内的经济犯罪方面都面临严峻挑战。 该研究旨在查明中华人民共和国和俄罗斯联邦在打击非法收入合法化（洗钱）领域刑事立法的共同特征，并确定在打击非法收入合法化（洗钱）领域借鉴邻国积极经验的可能性。 国内（俄罗斯）刑法领域。

关键词：犯罪收益合法化（洗钱）、腐败、经济犯罪、刑事立法、国际预防犯罪。

Annotation. *This article provides a comparative legal analysis of the legalization (laundering) of illegal income under the criminal legislation of the People's Republic of China and the Russian Federation, taking into account the historical development of these states. Both countries face serious challenges in the fight against corruption and economic crimes, including money laundering. The research is aimed at identifying common features of the criminal legislation of the People's Republic of China and the Russian Federation in the field of countering the legalization (laundering) of illegal income, and determining the possibilities of using the positive experience of a neighboring state in the field of domestic (Russian) criminal law.*

Keywords: *legalization (laundering) of criminal proceeds, corruption, economic crimes, criminal legislation, international crime prevention.*

1. Introduction.

The legalization of funds or other property obtained by criminal means is the process of the official transformation of these funds or property into legitimate funds or assets and is carried out in order to hide the source of these funds or property, to avoid prosecution for their illegal origin. This is a process closely related to the development of society and takes various forms in certain periods of time, allowing to reflect the peculiarities of the socio-economic context of each time period. Consideration of this phenomenon in the historical aspect seems appropriate due to the fact that:

1) it allows law enforcement agencies to identify schemes, methods and methods of committing crimes in the field of economic activity, helping to fight organized crime more effectively;

2) creates a precedent and reminds that responsibility follows for every crime;

3) analysis of the history of money laundering and other property acquired by criminal means helps to identify vulnerabilities in the system of prevention and suppression of money laundering and the fight against corruption.

The historical aspect of the legalization of money or other property acquired by criminal means in the Russian Federation and the People's Republic of China is both an interesting and problematic topic for study. After all, both states have their own unique history of development, peculiarities of legislative acts and approaches to the suppression of this type of crime.

2. Legalization of illegal income in China: a path of 2.5 thousand years.

One of the earliest evidence of the practice of money laundering abroad is given in the Chinese chronicle of the IV century BC. The legalization of illegal income in ancient China was primitive, but systematic. Officials seized surplus food or goods from peasants and merchants, which partially went to the treasury or remained at the disposal of the ruling caste.

In the era of the Tang Dynasty (VII-X centuries AD), the legalization of property acquired illegally, A.S. Poliychuk notes, was actively carried out following the results of conquests [1, p.71]. Up to 30-40% of luxury goods and money received during the conquests were hidden in this way, which is comparable in terms of the scale of statehood of this period with the annual income of one prosperous imperial province. However, with the attraction of a large amount of money and the prosperity of trade, it became necessary to control these flows and ensure the legality of their origin.

In the capitalist era, the legalization of income occurred in various ways, one of which was the withholding of wages from workers, the exploitation of child and slave labor. Thus, Liu Xin Yu notes that the mechanisms of money legalization under Mao Zedong were not progressive [2].

The establishment of the China Anti-Money Laundering Monitoring and Analysis Center (CAMLMAC) in 1997 marked a significant step in China's anti-money laundering efforts. CAMLMAC is responsible for coordinating anti-money laundering activities, analyzing suspicious transactions and providing recommendations to financial institutions.

Early 2000s: The country has taken steps to improve legislation, regulatory framework and financial transparency. Cooperation with international organizations, such as the Financial Action Task Force (FATF), has played a crucial role in this process [3].

In 2007, the Anti-Money Laundering Law of the People's Republic of China came into force [4]. One of the key provisions was the obligation of banks and other financial institutions to apply verification measures when performing transactions with any amounts that could be associated with money laundering. In addition, within the framework of the Law, a special anti-corruption agency was created to investigate financial crimes.

Thus, the adoption of the Anti-Money Laundering Law played a key role in increasing the transparency of China's financial system and preventing money laundering.

China is currently continuing its efforts to combat money laundering by bringing its regulations in line with international standards. The country actively participates in international initiatives to combat money laundering and is working to strengthen its cooperation with other jurisdictions in the investigation of money laundering cases.

3. A retrospective of the domestic legalization (laundering) of funds and other property obtained by criminal means, from ancient times to the present day.

The legalization of criminally acquired income was also widespread in Ancient Russia and included several ways to deviate from the law.

One of these methods was the fictitious sale of property or land plots. For example, in the XII century, the Grand Duke Vladimir Vsevolodovich gave his son Mstislav a yard in Novgorod in order to avoid taxation.

Also, to hide property, there were cases when landowners alienated their property in favor of the church. Thus, Prince Vladimir Vasilkovich (Volynsky) transferred ownership of the Pechersk Monastery lands and villages.

In the Middle Ages, the most popular way of legalization was the acquisition of land and real estate.

Until the beginning of the twentieth century, complex financial schemes were common in Russia, allowing criminals to hide their income.

In the period from 1922 to 1991, the legalization of criminal proceeds was carried out through illegal trade. As V.A.Karleba notes, the main places of sale of items obtained by criminal means were markets [5, p.1016].

In the early 1990s, some States adopted laws aimed at combating money laundering (Belgium, Italy, Germany and others).

Thus, the creation of anti-legalization legislation began with the ratification of the United Nations Convention against Illicit Trafficking in Narcotic Drugs and Psychotropic Substances of December 20, 1988 [6], as well as the Council of Europe Convention on Laundering, Identification, Seizure and Confiscation of Proceeds from Crime and on the Financing of Terrorism of May 16, 2005 [7] which, in turn, is connected with the adoption of appropriate special criminal law norms establishing responsibility for the legalization of proceeds from crime.

Thus, it can be argued that the legalization of criminal proceeds and property arose long before the first regulations aimed at combating it.

4. The criminal-legal aspect of the legalization (laundering) of illegal income in the legislation of the Russian Federation and the People's Republic of China.

Laundering of criminal proceeds is a phenomenon that is becoming one of the most common in modern society. This is a process in which illegally obtained money is converted into legal money, thereby hiding their origin. Despite the adoption of many laws and measures to combat this problem, cases of laundering of criminal proceeds continue to increase.

The Criminal Code of the Russian Federation provides for responsibility for the legalization of criminal proceeds under two articles: article 174 - for the legalization (laundering) of funds or other property acquired by other persons by criminal means, and Article 174.1 - for the legalization (laundering) of funds or other property acquired by a person as a result of committing a crime [8].

In the People's Republic of China, responsibility for the legalization (laundering) of proceeds from crime is established by article 191 "Money laundering" of the Criminal Code [9, p.106].

Throughout the existence of the Criminal Code of the People's Republic of China, the disposition of legalization (laundering) of criminally acquired funds has undergone changes. This is manifested in an increase in the number of predicate crimes preceding money laundering, such as: 1) smuggling, sale, transportation and manufacture of drugs (Article 347); 2) smuggling of weapons, ammunition, nuclear materials or counterfeit currency (Article 151); 3) smuggling of cultural values, gold, silver and other precious metals prohibited by the state for export from the country, as well as valuable animals and products made from them prohibited by the state for import into the country; 4) "black market" and others.

This feature, firstly, indicates that the Chinese legislator seeks to take into account environmental changes and take appropriate measures to combat socially dangerous manifestations of human activity. Secondly, it demonstrates that, although formally there is no direct reference to the concept of "predicate crime" in the norm under consideration, its essence and inextricable connection with the

construction of “money laundering” are enshrined in the Criminal Code of the People’s Republic of China.

Despite the fact that there is no category of “predicate crime” in Russian criminal law, legal theorists note a similar connection between the legalization of proceeds from crime and other acts, which include the above-mentioned elements of crimes by the Chinese legislator. In turn, P.A. Gusev emphasizes that the purpose of the legalization (laundering) of income is to conceal the criminal nature of the origin of money and other property obtained as a result of a predicate crime. The perception of legalization (laundering) of criminal assets as an economic crime makes it difficult to fully assess the nature of the public danger of the considered corpus delicti, which is directly related to the object of criminal encroachment [10, p.15]. At the same time, predicate crime as an independent criminogenic phenomenon, in relation to articles 174 and 174.1 of the Criminal Code of the Russian Federation, is not given due attention either in the domestic criminal law doctrine or in law enforcement practice.

The following feature relates to Chinese legislation, which provides a clear list of specific actions that make up the legalization process. One of the notable aspects is the inclusion of the phrase “use of other payment and settlement means” as an indication of the adaptability of the Chinese legislator to modern circumstances. Thus, with the development of the Internet and electronic payment systems, new ways of transferring and storing money, as well as opportunities for their illegal use, have become available. Cybercriminals use sophisticated algorithms and anonymous networks to transfer and exchange financial assets without leaving traces. However, the digital yuan, a currency issued by the People’s Bank of China, provides anonymity while maintaining the ability to centralize user information and transaction data in the background, which, in turn, helps to identify and track illegal activities [11].

Thus, the legislative consolidation of various methods of transferring illegally obtained funds provided for in article 191 of the Criminal Code of the People’s Republic of China serves two purposes. Firstly, it allows you to cover a wide range of criminal acts, and secondly, it gives law enforcement officers the opportunity to use mechanisms, tools and methods that correspond to the current state of society, legal and economic systems and technological advances.

A comparison of the studied norms of Chinese legislation with Russian legislation allows us to conclude that there are two articles in the Criminal Code of the Russian Federation on the legalization (laundering) of funds and other property acquired by criminal means, which differ only by subject, is not appropriate.

Taking into account the positive experience of the Chinese legislator in this area and sharing the opinion of M.V. Talan [12, p. 56], we believe that the elements of crimes (Articles 174 and 174.1) should be combined into one – provided for in Article 174 of the Criminal Code of the Russian Federation.

Thus, adapted to the conditions of the Russian Federation, the borrowing of Chinese experience in the criminal law fight against the legalization (laundering) of criminal proceeds will increase the effectiveness of domestic means of countering this crime.

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DOI 10.34660/INF.2023.62.17.078

属地管理项目的发展策略与跨学科壁垒
STRATEGIES OF THE DEVELOPMENT OF TERRITORIAL MANAGEMENT PROJECTS AND INTERDISCIPLINARY BARRIERS

Kavtaradze Dmitry Nikolaevich
Doctor of Biological Sciences, Leading Research Officer
M.V. Lomonosov Moscow State University,
Moscow, Russian Federation

Yamova Ekaterina Andreevna
Candidate of Economic Sciences, Lecturer
M.V. Lomonosov Moscow State University,
Moscow, Russian Federation

Risnik Dmitry Vladimirovich
Doctor of Biological Sciences, Leading Research Officer
M.V. Lomonosov Moscow State University,
Moscow, Russian Federation

抽象的。 发展趋势的不确定性需要定义基本概念及其层次结构，从概念到战略和项目，以制定长期战略。 复杂过程的技术、工具和动态模型被考虑用于高级检测和考虑潜在错误、规划和实施策略的障碍。

关键词：概念、策略、管理、效率、风险、建模、跨学科、模拟模型、城市生态。

Abstract. *The uncertainty of development trends requires the definition of basic concepts, their hierarchy, from concept to strategy and project to develop long-term strategies. Techniques, tools and dynamic models of complex processes are considered for advanced detection and consideration of potential errors, barriers to planning and implementing strategies.*

Keywords: *concept, strategy, management, efficiency, risk, modeling, interdisciplinarity, simulation models, urban ecology.*

In modern conditions of uncertainty of many tendencies and processes of the external environment, the growing complexity of the world around us, the increase in natural and man-made disasters, the high risk of erroneous decisions, it is necessary to streamline the basic concepts in management, such as “strategy” and “concept”, “dynamic model”, “ competence” and others. Explanatory dictionaries,

Internet sources reveal a variety of definitions and a variety of concepts, often their incompatibility, confusion.

Let us consider the success of the implementation of strategies and the verification of development concepts at different levels of management[1].

Over the past twenty to thirty years, such strategic developments have been adopted as the Development Strategy of the Russian Federation until 2010 (the Gref program), developed at the Center for Strategic Research in 1999-2000, the Concept for the Long-Term Socio-Economic Development of the Russian Federation for the period up to 2020 year [11], the Strategy for Innovative Development of the Russian Federation until 2020. [12].

The measures envisaged by the "Strategy-2010" were implemented by 36%, according to individual expert estimates - no more than 10-15%. [2].

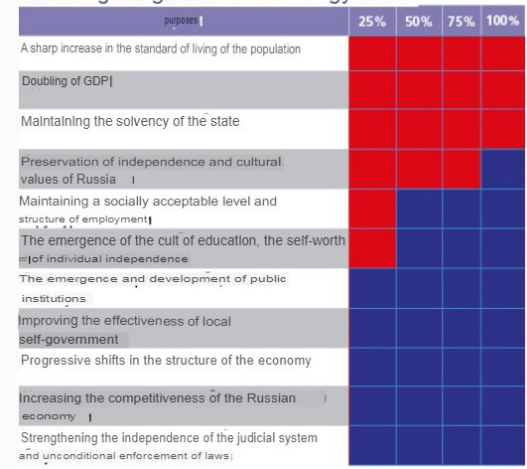
Table I

Implementation of the Strategy measures-2010

Sections	Implementation level, %
The average level of implementation of the measures of the Strategy-2010, including by sections:	36
Modernization of the economy	39
Government reform	39
Reform in the social sphere	31

Figure I.

Achieving the goals of the Strategy-2010.



[1] [When analyzing failures, the authors avoid assessing the intellectual complexity of the tasks set.].

The degree of achievement of the set goals is highlighted in red, the unachieved goals are highlighted in blue.

According to experts, the concept of long-term socio-economic development of the Russian Federation for the period up to 2020 has not been fully implemented, the implementation of some of the goals was extended until 2024 in accordance with Decree of the President of the Russian Federation No. 204 "On the national goals and strategic objectives of the development of the Russian Federation for the period up to 2024 of the year". Many indicators of the strategy of innovative development of the Russian Federation also remained unfulfilled [10].

Deviations in the behavior of the subjects of innovation process	Possible mechanisms of state decision
Underestimation the scale and speed of environmental change	Setting priorities in the concept of innovative development
The problem of choosing a "breakthrough idea"	The placement of the priorities in the concept of innovative development
Overestimation of internal and underestimation of external innovations	Creating conditions for partnership in the field of innovative development with TNCs, attracting their laboratories to the territory of the country
Innovative failures due to underestimation of sociocultural customs	Design of relevant institutions
The difficulty of creating an "innovative culture"	Transformation of the education system in order to form an "innovative and entrepreneurial consciousness"
The complexity of forming an "innovation portfolio"	Combination of priorities and determination of the number of innovative development final goals, taking into account the possibilities of their resource provision
Inability to learn from innovative failures and use feedback	Support for the organization of continuous monitoring of situation by the expert community

Figure 2. *Application of institutional and behavioral economics to the conceptual justification of the state's innovation policy [13].*

If we consider the development strategies of the federal districts of the Russian Federation, we can also note the inconsistency of regional strategies, the imbalance of development, as well as autonomy [8].

Let us pay attention to errors in the use of strategic planning at the level of organizations: the autonomy of each level of management, the inability to convey to employees the adopted strategy, its goals and objectives, a formal approach to planning, in the absence of a concept and mission, the transition to formulating a strategy [1].

The low effectiveness of the implementation of development strategies as a management tool is due to a number of reasons: the inconsistency of a number of concepts and definitions of “strategy” and “concept”, the lack of comprehensive planning at each stage and level, taking into account possible errors and barriers to the implementation of management goals and objectives, misunderstanding of the managed systems [4,5,6].

The verbosity of definitions in each production sector, the discontinuity of information links along the management vertical - at each level, there is a reduction in meaning, a narrowing of the evaluation criteria determined by formal signs (points, conditional definitions of quality, etc.), technically gives rise to a scatter in the interpretation of the tasks of each management link. The definition of N.N. Moiseev “management is the disposal of available means to achieve the goal”[2].

The metaphor “perestroika” opened up the possibility of arbitrary interpretation of the content of concepts, led to the displacement of commonly used, historically rooted concepts: “progress”, “schedule”, “efficiency”, “management”. “organizer”, “foreman”, “cleaning the premises”, etc. by replacing them with embedded ones: “effective management”, “cleaning”, “timing”, “road map”, requiring explanation and examples that are often outside personal, production, social experience. Under these conditions, the Shchedrovitsky-Brudny effect manifests itself: copying management structures and filling them with their own, new content [14], while maintaining external compliance with accepted standards, which creates confusion in management at the content, semantic levels. In the context of rapid changes in the social, technological, educational spheres, this semantic inconsistency gives rise to massive misunderstandings, conflicts and failures in production, social systems, i.e., disorganizes the life of society.

A number of authors strongly recommend tools for designing, testing complex systems - simulation models or business games that have become widespread in the military sphere - staff exercises. Modern game models of complex systems began to be developed in Leningrad (Inzhekon) M.M. Birshtein, P.T. Timofeevsky and colleagues in the late 30s. of the last century and continued the training of specialists and teachers of the country’s universities in the 70s. [3].

We note the high level of system modeling and development of educational, educational games in other countries - the management of the development of the country “Strategem” [developed by prof. D. Meadows and adapted at Moscow State University. M.V. Lomonosov], climate game Climate Action Simulation, industrial city management model (Ecolopoly - Ecolopoli [16], at the level of the production chain of organizations (Beer Game - “Beer Game”, FishBanks Ltd. - “World Fisheries”, created by Prof. D. Meadows et al. [15]), which is explained

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by the reliance on fundamental patterns: the evolution of the biosphere, ecology, the development of urbanization, ecological and social metabolism. The top of the world achievements in modeling global processes are the MIR3 and Nuclear Winter models [9].

To teach the management of complex systems, we have developed a sequence of stages of acquaintance of a human operator with himself, colleagues in situations of small duration and complexity that require attention, observation, correlation of personal and social experience, mobilization of the senses, quick wits [7].

Simulation modeling of the management of complex systems (logistics in an organization, a fishing company, management of a city, a coastal territory, etc.) gives each participant a clear idea of the complexity and non-linear behavior of the system in practice and allows you to verify the correctness, and / or, conversely, incompleteness ideas about the processes occurring in the environment under study. The modeling process teaches you to plan activities for many years [decades].

Simulation models are a tool for mastering systemic thinking and management, aimed at understanding the chain of consequences of decisions made, based primarily on academic, basic laws of psychology, sociology, economics, biology and many other sciences, their interaction and transformation at the time of decision making. The transition from simulation models to the development of interdisciplinary projects allows you to approach problem solving from the point of view of different disciplines, leading to a deeper understanding of the problem, to offer its overcoming, taking into account different aspects of management, which will be combined within one project.

This approach was used by us in the online course “Urban Ecology” Dr. of Biological Sciences. Kavtaradze D.N. with the participation of teachers from a number of disciplines to provide an interdisciplinary course in English for environmental students of MSU-BJP in Shenzhen for three years. The community of scientists and Universities of the two countries (Russia and China) has a solid foundation, the creation of the University of Moscow State University-PPI has led to the development of projects and the defense of master’s theses using an interdisciplinary approach.

Students developed projects such as Calculator of risk and coherent urban development in certain China’s province, Ecopolis cities and goals of eco-cities design up to 2030 in China 2030 in China), Public participation in Ecopolis planning and implementation, Artificial Intelligence Meets Citizen Science to Supercharge Ecological Monitoring, Biodiversity Management in Functional Areas of the City, Sponge city concept and biodiversity management, Principles and Projects of Ecocity in Semidesert Area, Urban terrestrial ecosystems monitoring (Monitoring of urban terrestrial ecosystems), Ecological Problems in Beijing (Ecological problems of Beijing), etc. The following master’s theses were defended:

- He Jun - Exploration of ecological urban and rural planning in the mode of soft urbanization, master's thesis under the supervision of Kavtaradze D.N., co-supervisor Kudryavtsev F.S. planning in soft urbanization mode, Master's thesis, Supervisor Prof. Dmitry Kavtaradze, Co-Supervisor: Arch. Fedor Kudryavtsev, MSU-BIT University Shenzhen, CHINA)
- He Yan Management of the city's green areas. Graduate work. 2022. Head prof. Dmitry Kavtaradze, master's thesis (HIE YAN Management of Urban Green Area, Master thesis, Superviser Prof. Dmitry Kavtaradze, Shenzhen, 2022)
- Xie Yan "Eco-city and Ecological Civilization" Degree work, 2022. Supervisor prof. Dmitry Kavtaradze, master's thesis.

The metaphors "green economy", "sustainable development", etc., attract attention, inspire trust, hope, unite at first, then internal contradictions arise, initial concepts, strategies, organizational design of scientific principles are needed. Such order is not observed now. The strategies are known, the concepts on which they are based are unknown. Even ingenious tactics lose their meaning if there is no strategy.

From our point of view, the development of a management strategy initially requires the definition of a basic concept, the recognition of axioms. Achieving systemic integrity, understanding the interdisciplinarity of problems, the developers' idea moves on to its transformation into a strategy, its description, then highlighting relationships, including hypothetical ones, saturating the model with numerical values, the dynamics of individual processes and testing the entire system model.

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DOI 10.34660/INF.2023.41.16.079

教师对学龄前儿童认知沟通的看法
TEACHERS' IDEAS ABOUT COGNITIVE COMMUNICATION WITH OLDER PRESCHOOL CHILDREN

Berezina Yulia Yurievna
Candidate of Pedagogical Sciences, Associate Professor
Moscow Pedagogical State University, Moscow, Russia

Dong Yao
Master
Moscow Pedagogical State University, Moscow, Russia

注解。 文章探讨了学前教育机构教师对学前大龄儿童认知沟通的看法。 所呈现的经历反映了与孩子进行认知交流的具体情况和困难。 研究结果表明，教师在管理与儿童的认知沟通过程时，是以了解儿童年龄发展特征、课程要求为指导的，但却错过了在沟通中运用儿童个体认知表现的机会。 。 阐述了教师与学龄前儿童认知沟通发展的难点和前景。

关键词：认知沟通、学龄前儿童认知沟通的内容和形式、认知沟通的困难。

Annotation. *The article discusses the ideas of teachers of preschool educational organisations about cognitive communication with elder preschool children. The presented experience reflects the specifics and difficulties in cognitive communication with a child. The results of the study show that teachers, managing the process of cognitive communication with children, are guided by the knowledge of the features of children's age development, the requirements of the programme, but missing the opportunities to use individual cognitive manifestations of children in communication. The difficulties and prospects in the development of cognitive communication of teachers with preschool children are described.*

Keywords: *cognitive communication, content and forms of cognitive communication with a preschool child, difficulties of cognitive communication.*

Communication between a child and an adult is important in the first seven years of life. It is communication that contributes to the formation of the child's holistic picture of the world, a positive attitude to others, the formation of the child's worldview, and the formation of his or her personality.

The process of communication is an indicator of adaptation in modern society, because daily involvement in communication and its implementation contribute to the mastering and reproduction of social experience, comprehension of social ties and relationships and the formation of cognitive abilities of preschool children.

At different times in the studies of N.M. Aksarina, T.M. Zemlyanukhina, M.Y. Kistiakovskaya, G.M. Lyamina, S.Y. Mescheryakova, G.L. Rosengrat-Pupko, A.G. Ruzskaya, N.M. Schelovanov and others it is noted that the absence or lack of communication with an adult causes specific features in the development of children at the stages of early childhood. As a result of lack of communication, the child forms a low level of cognitive activity, limited outlook on the world around him, as well as a general underdevelopment of speech. [3]

M. I. Lisina in her research considering the child's communication with an adult, developed a concept of the genesis of this process, in which communication is considered as a special kind of activity, which includes various structural components, such as motives, means, needs. She considers extra-situational-cognitive communication as one of the forms of communication between a child and an adult. This form allows expanding ideas about the world, revealing cause-and-effect connections and other relations between objects and phenomena. Among the various motives of a preschooler, a special place here is occupied by the cognitive motive, which is one of the key and most specific for the older preschool age. It is accepted to believe that this age is characterised by intensive formation and expression of this motive in the child's cognitive interests. [2;3;4]

A clear evidence of the emergence of extra-situative-cognitive communication, according to M.I. Lisina, E.O. Smirnova are the child's questions addressed to the adult. The motives of children's questions can be divided into two groups: communicative and cognitive. Communicative questions the child tries to attract the adult's attention to his experiences or joys, to establish a connection with them. Cognitive ones begin to appear during direct familiarisation with phenomena and objects of the surrounding world, in communication with adults and peers, or the child's own reasoning. [2;3;4]

In the Federal educational programme of preschool education in the field of cognitive development of children of different age periods are presented tasks aimed at the development of cognitive actions and ways of cognitive communication of the child with an adult. [5] Here the involvement of teachers in the process of cognitive communication with pupils in different types and forms of organisation of children's activities is of particular importance.

The analysis of teachers' perceptions during the survey showed their opinion about the content, forms, cognitive communication with children and allowed us to identify the range of problems in the organisation of this kind of communication with older preschoolers in the preschool educational organisation. The survey in-

volved 50 teachers from different preschool educational organisations in Moscow with 10 and more years of work experience.

More than half of the surveyed teachers (41 teachers) are happy to answer children's questions in all details, allocating special time for this in the course of joint activities, which is a very good strategy. This certainly shows that children enjoy communicating with educators, trust them and show openness in communication with them. This encourages children to think and talk actively and helps them to develop and builds trust in the adult as a carrier of information. When answering children's questions, carers choose either to answer questions fully or to pay attention and highlight connections and dependencies.

The quality of answers to children's questions by teachers varies by degree, for example, most teachers consider it necessary to provide children with only the most basic information in order not to leave children's questions unattended or often advise them to think for themselves (40 teachers). Generally, educators do not express concern that children's questions take a lot of time. It is rather one of the ways for modern educators to understand in which direction the interests of their pupils are developing. [1] Moreover, educators note that there is often a need to stimulate children's questions, to encourage them to reason. This is due to a number of difficulties that some of the surveyed educators have faced recently.

The overwhelming majority of teachers (33 teachers) believe that the main problem in the development of cognitive communication with children is related to the inability or unwillingness to ask an adult a question. For example, 16 interviewed teachers stated that children are so influenced by a large number of electronic devices that they are not interested in anything and, in particular, in communication with adults. There are cases of family ignoring this problem in communication with children, which also affects the quality of cognitive communication with children in the educational process of kindergarten. According to teachers, many parents believe that children's development is spontaneous and do not believe that their personal influence on cognitive communication with their child can play an important role in their child's development.

In terms of content, the overwhelming majority of teachers note that the child actively seeks to acquire new knowledge and shows interest in learning only at the initiative of an adult (45 teachers). Children of the older preschool age are able to take the initiative in cognition when an adult creates all conditions for obtaining new information. Without exception, all children are interested in receiving new information from an adult and in this respect the adult is a primary source for the child. However, when a child asks an adult about who runs faster, a wolf or a hare, the question arises, why is he or she interested in this very thing? Do teachers select topics for cognitive dialogue in accordance with the child's interest or do they strictly follow a thematic plan?

Half of the respondents (25 teachers) are attentive to the choice of the content of conversations with children and are based on their interests. This important condition contributes not only to the development of a trusting relationship between an adult and a child, but also demonstrates an example of co-operation between communication partners, provides an opportunity to discuss mutually interesting information and further translate it into practical activities. At the same time, teachers do their best to ensure that this choice is in line with their intended plan. However, the other half of the surveyed teachers do not see an opportunity to deviate from the planned topics and use children's questions formally, taking them away from the topic of interest to the planned one. This raises the question of what is relevant in the content of communication for the adult and for the child - the child's interest or the adult's plan?

To summarise, it should be noted that children are very happy to communicate with teachers and ask them questions of different nature, including cognitive questions. This is a very good phenomenon that requires the support of teachers and parents in the way of creating conditions. However, it is important to note that teachers often do not see ways to integrate the child's own activity and interest into a predetermined programme of activities. This leads to the search for methods of guiding cognitive communication with preschool children.

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DOI 10.34660/INF.2023.79.25.080
UDC 165.9

数字和数字的实际意义
THE PRACTICAL MEANING OF A DIGIT AND OF A NUMBER

Kryukov Victor Vasilyevch
Doctor of Philosophical Sciences, Full Professor
Siberian State University of Geosystems and Technologies,
Novosibirsk, Russia

抽象的。 文章的主题是数字和数字的起源、账户出现的原因以及计算的需要。 考虑词源，即原型，人物的原型。 下面是数字作为符号的功能，是数字的人工表示。 数字的本质被分析为一种抽象概念，将任何现实的数量方面理想化，无论其物质如何。 数是数学的基本范畴，是表达任何事物或现象的数量方面的最初概念。 当我们分心于账户的内容、我们到底计算了什么以及考虑数量本身时，数字是最古老的抽象概念之一。 最后，讨论了一些值得注意的数字，即毕达哥拉斯的神奇七数和斐波那契数，它们对于理解自然和社会结构特别重要。 毕达哥拉斯将自然理解为秩序和美，而“宇宙”和“混沌”这两个词的本义被比喻为战士和集市广场上人群的形成，因此毕达哥拉斯和斐波那契逻辑和数学能够渗透到宇宙中。 事物的本质，并用数字和数字来表达这种本质。

关键词：数字、词源、符号、表示、数字、计数、显着数字。

Abstract. *The topic of the article is the origin of digits and numbers, the reasons for the appearance of the account and the need for calculations. The etymon, that is, the archetype, the prototype of the figure, is considered. The following is the function of a digit as a sign, an artificial representative of a number. The essence of number is analyzed as an abstraction idealizing the quantitative side of any reality regardless of its matter. Number is the basic category of mathematics, the initial concept expressing the quantitative side of any things or phenomena. The number is one of the oldest abstractions when we are distracted from the content of the account, what exactly we count, and take into account the quantity as such. Finally, remarkable numbers are discussed, namely the magic seven of Pythagoras and the Fibonacci numbers, which are of particular importance in understanding natural and social structures. Pythagoras understood nature as order and beauty, and the original meaning of the words “cosmos” and “chaos” was likened to the formation of warriors and the crowd in the market square, so Pythagoras and Fibonacci logic and mathematics were able to penetrate into the essence of things and express this essence in digits and numbers.*

Keywords: *digit, etymon, sign, representation, number, count, remarkable numbers.*

Introduction. In the life of a modern person in the information society, the figure is of exceptional importance. It can be stated that digitalization of all aspects of human communication and adaptation to this new form of information coding in various fields of human activity has happened and is intensively expanding its range. The invention of the digital form of coding is attributed to the author of the general information theory, the American engineer at Bell, Claude Shannon, who used the binary number system invented by the great German philosopher and mathematician Gottfried Leibniz. However, Shannon found a way of digital expression not only in mathematical calculation, but also in the display of verbal and visual information. This has led to a revolution in the application of information technology and its implementation in technology. Humanity has reached a qualitatively new level: the information society.

Etymon figures. Etimon is the original meaning, revealing the origin of the word. This is the science of etymology. The word "number" came to modern European languages from Arabic and was borrowed from the Moors and Saracens. This word is رف [ṣifr] meaning "empty, zero". From here, cifra appeared in Latin, which in the same form fell into the German Ziffer, and then into the Russian "figure" and "tsyfir" as the use of numbers, like counting and arithmetic. [6, p. 21; 1, p. 93]

In ancient times, quantities were not differentiated, but expressed in words: a couple, a triple, a dozen, a handful, a bunch, an armful. However, with the formation of civilization, an economy appears, property that needs accounting, which means an accurate account. "The society of people, society is separated from nature there and then, when the consumption of finished products of nature is replaced by the production of everything necessary for life. Cities were a sign of this level of cultural development, since the beginning of production marked a rejection of the nomadic lifestyle and the transition to settled life. [2, p. 73]

"The economy (from the Greek οἶκος - around and νόμος - house) is an economy, a sphere of social production in which utilitarian values are created, distributed, exchanged and consumed as life's blessings. Let's imagine, for example, a peasant estate. What's around the house? Animal farm: cowshed, pigsty, stable. Lands: kitchen garden, garden, greenhouses, arable land. Buildings: shed, barn, cellar. In a word, everything necessary for the production of products in order to satisfy the material needs of man. [2, p. 107] And all this must be considered. List and take into account the harvest, the exact number of goods for exchange, calculate the terms of work and trade, the length of the day, season and year.

To count, you need observable quantities: pebbles like in an ancient abacus, notches on chips, wedge impressions on clay tablets. But the easiest way is with our own fingers. Just as the larynx and tongue are always with us to reproduce sounds, so are the hands and fingers always "at hand" for presenting numbers. For example, Roman numerals are clearly III fingers, V is a spread palm, and X is crossed arms. Hence the expression of the ancient European "I know your fingers", and "fingers in Latin dididi and hence in modern English digits - numbers and digital - digital. [4, p. 51] The decimal number system in Europe, and now everywhere is derived from the number of fingers on the hands, especially since it is convenient to use it with digits, decomposing it into lines like in the Greek abacus and counting separately ten units, ten tens, ten hundreds, etc. d.

In ancient Sumer, they came up with a sexagesimal counting system, which was based on the number 12. And these are also fingers! Extend the index, middle, ring and little fingers forward, leaving the big one aside. Each finger has three phalanges, for a total of twelve knuckles. Like our dozen. And she is everywhere. There are 12 digits on the watch face. One circle - day (half of the thumb), another circle - night (thumb to bend). Between the numbers, dividing by five minutes, and one turn of the minute hand gives us an hour, 60 minutes. Likewise 60 seconds in a minute. The celestial circle includes 12 constellations of the Zodiac, and from here 12 months make up a year lasting 360 days (the rest of 5 days the Sumerians celebrated the interannual period, i.e. spent them idly, did not work).

Interestingly, dividing the circle into 12 parts also had a practical meaning. If a rope tied with a ring with 12 marked equal shares is stretched between three pegs in a ratio of 3-4-5, then we get a right angle, which is important in geodesy and geometry for marking land, laying irrigation canals, or when deriving even angles in construction . And the ratio in question is the simplest integer solution of the Pythagorean theorem, which was known to the Sumerians and captured in the drawings on clay cuneiform tablets of the era of King Hammurabi. This knowledge was adopted by the ancient Egyptians and inscribed on the paintings inside the pyramids one and a half thousand years before the birth of Pythagoras. Another thing is that Pythagoras, in addition to integer solutions, built a rigorous proof of the validity of integer ratios for any length of legs, discovering the fact of incommensurability of segments and irrational numbers.

In addition, "Pythagoras made sacred, hermetic knowledge open and accessible to any person, not only in the Union of Pythagoreans, but also to a curious subject of mathematics. That is why the proportion of the right angle, which in particular sets the ratio of the circumference of a circle to its radius, we denote by the letter π - the first letter in the name of Pythagoras, and we call the famous theorem after him. [6, p. 64; 5]

Number function. The essence of a figure is that it expresses a number, is the sign of a number. Signs are the representatives of things. If the word "presentation" is translated as presentation, demonstration, then the prefix "re" means "again", "once again". When we show someone not the thing itself, but something that replaces and represents it, we use a sign. In the science of signs, semiotics (from the Greek sema - sign, pointer) has a basic definition: a sign is a thing that replaces another thing.

The word "sign" comes from the Proto-Slavic *znakъ. "Signs are invented when the presentation is difficult or even impossible to implement. Then people create new things, the only purpose of which is to represent, to represent things of the first kind, which we cannot "have", i.e. have as such, but about which we get the opportunity to "know", i.e. have about them performance. Correlating the first with the second, we can "understand" what is at stake.

Anything can be used as signs: sounds, images, smells, gestures, but the most commonly used as signs are specially created and well adapted for solving communication problems, i.e. communication, exchanging signs - symbols. [2, p. 96]. A symbol is not a "portrait" of a thing, like signs-images: drawings, paintings, photographs, roles performed by actors, objects depicted by gestures of pantomime artists. A symbol is something exclusively conditional, the relation of which to an object, to a primary thing, is established purely conventionally (from Latin conventia - agreement). We just agreed - and everyone agreed with this - that the $ sign means a dollar, the & sign replaces the union "and", and the% sign expresses a percentage or a hundredth of a certain value. [Ibid.] From the same root "nobility" in the church lexicon there is the word "sign" as a harbinger of future events or in army usage "banner" as an object around which soldiers gather on the battlefield. Or in civil use, "noble people" are well-known personalities "in sight and on hearing."

Essence of number. In turn, the number is the basic category of mathematics, the original concept that expresses the quantitative side of any things or phenomena. Number is one of the oldest abstractions, when we abstract from the content of the count, what exactly we count, and take into account the quantity as such. Thus, the number is an ideal object that does not have its own embodiment, but is present invariantly in a multitude of bodily things and organizes and streamlines their existence. Twelve phalanges in the fingers, twelve hours on the dial, twelve signs of the Zodiac, twelve apostles in Jesus Christ - in all cases, the number expresses not only the number of elements, but expresses the completeness, roundness and internal harmony of the structure, the harmony of a certain set. It is in the circle (twelve) that the Pythagorean proportion is realized: 3 - 4 - 5.

Remarkable numbers. As examples of the most amazing numbers, we give the magic seven of Pythagoras and the Fibonacci number.

The number 7 is present in many realities. Seven wonders of the world, seven great sages, seven colors of the rainbow, seven notes in the musical scale, etc. The simplest explanation is the seven days of the week: a number tied to the lunar calendar. Seven is a quarter of the lunar cycle: from the new moon to half the disk of the moon, then to the full moon and vice versa. This is a natural account of time, since the measure is literally before everyone's eyes. But there are also more complex versions.

Pythagoras taught that the position of any body is determined by seven points: in front, behind, left, right, above, below and in the center, and this is the archetype of the Cartesian coordinate system in a three-dimensional continuum! There are seven celestial bodies in Pythagorean cosmology: Moon, Sun, Mercury, Venus, Mars, Jupiter and Saturn. The structure of the Cosmos is determined by the seven: the Earth is in the center, and the rest of the planets are located on spheres in accordance with ideal bodies. A tetrahedron is built around the sphere of the Moon, along the vertices of which the sphere of the Sun is described. An octahedron is built around this sphere, along the vertices of which a sphere is built and the next ideal polyhedron is a pentahedron, and then an icosahedron, a dodecahedron, etc. It is surprising that if you implement the Pythagorean proportion to the radii of the orbits of the planets around the Sun, everything will almost coincide. The reason is the three-dimensionality of the physical space.

In 1979, at the Problem Council on Dialectics at the Leningrad University, the outstanding methodologist of science Yu.A. Urmantsev, who was called the Einstein of biology, made a report "On the Magical Seven", in which he showed that the seven determines the possibilities of combining options for modifying systems. You can change the number of elements, the quality of the elements and the order of their arrangement. For example, in the word "hum" we add a letter and get "google" (quantity); change the letter and get "goal" (quality); without changing the letters, we change the order and get "meadow". Then you can simultaneously carry out permutations 1 and 2, 1 and 3, 2 and 3, and finally 1, 2, 3 together. Thus, we exhaust the combinatorial capacity of seven possible permutations. Using unused options, Urmantsev's students defended dozens of dissertations, many of which were drawn to discoveries.

There are sevens in other areas as well. In social psychology, seven plus or minus two is the upper limit on the number of people in a small group. In demography, seven is the lag of the change of generations, since seven years determine the change in the phases of a person's age: seven years of childhood, seven years of adolescence, seven years of youth, etc.

The Fibonacci number is a proportion, which is also called the "golden section", this is when a straight line segment is divided into parts in the ratio: the larger part is related to the smaller one in the same way as the entire segment is

related to the larger part. Or else: to build the golden ratio, you need to have a "doubled square", i.e. a rectangle with sides 1 and 2. The diagonal of the rectangle is equal to the square root of 5. Subtracting the smaller side from the diagonal and putting the remainder on the larger side, we get the "golden section". [3, p. 59] The Fibonacci number has a value of 1.618 and is denoted by the letter φ (phi), and it refers to the name of the sculptor Phidias, who used the golden ratio discovered by Pythagoras in his work. The harmonious figure of a person should be as follows: the navel point divides the height in a ratio of 1 to 2; the knee divides the leg and the elbow divides the arm in a ratio of 1 to 2; the line of the eyebrows and the line of the nose divide the face in a ratio of 1 to 2; the pupil of the eye divides the face 1 to 2. It is in the proportions that harmony, symmetry are expressed, which means beauty and perfection!

The Fibonacci number is of great importance in the theory of fractals, or self-similar structures in which the Fibonacci proportion is realized, when the order is realized in a certain sequence: each next number is the sum of the two previous ones. These are 1, 1, 2, 3, 5, 8, 13, 21, 34, etc. Well, we find fractal structures everywhere: in the proportions of the Egyptian pyramids and in the structure of crystals, in the arrangement of flowers and leaves of plants and in colonies of ants and bees, in urban infrastructures and in the structure of social networks.

Conclusion. Pythagoras and Fibonacci solely by the power of thought and conviction in the correctness of the structure of the Cosmos, and the cosmos is order and beauty in the ancient Greek language, as opposed to chaos and disorder. The original meaning of the words "cosmos" and "chaos" was likened to the formation of warriors and the crowd in the market square, and so Pythagoras and Fibonacci, by logic and mathematics, managed to penetrate into the essence of things and express this essence in number and figure.

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DOI 10.34660/INF.2023.65.62.081

西西伯利亚油气省发现研究史
ON THE HISTORY OF STUDYING THE DISCOVERY OF THE WEST SIBERIAN OIL AND GAS PROVINCE

Prishchepa Alexander Ivanovich
Doctor of Historical Sciences, Professor
Surgut State University, Khanty-Mansiysk Autonomous Okrug-Yugra

注解。 文章试图分析西西伯利亚俄罗斯最大油气田发现的一些史学问题。作者关注对 20 世纪 30 年代石油勘探这一此前鲜为人知的时期及其在战后恢复活跃进程的历史认识状况的评估，特别注意到早期地质发现的重要性。 20世纪60年代为西西伯利亚油气联合体的形成和开发。

在描述历史学家对地质勘探主题发展的个人贡献的过程中，本文重点关注秋明大学历史学派代表对出版物的高度评价。

关键词：史学、专着、分期、历史来源、方法论、地质勘探、探险、田野。

Annotation. *The article attempts to analyse some problems of historiography of the discovery of the largest Russian oil and gas fields in Western Siberia. The author pays attention to the assessment of the state of historical knowledge about the previously little-studied period of oil exploration in the 1930s and the resumption of its active process in the post-war years, especially noting the importance of geological discoveries of the early 1960s for the formation and development of the West Siberian oil and gas complex.*

In the process of characterising the personal contribution of historians to the development of geological exploration topics, the article focuses on the high evaluation of publications by representatives of the historical school of Tyumen universities.

Keywords: *historiography, monograph, periodisation, historical source, methodology, geological exploration, expedition, field.*

The West Siberian oil and gas bearing province is located on the West Siberian Plain. The bulk of hydrocarbon fuel deposits are concentrated within the Tyumen Region - in the Khanty-Mansiysk and Yamalo-Nenets Autonomous Districts and the Uvat District, and there are also reserves in the Omsk, Tomsk, Novosibirsk Regions and Krasnoyarsk Territory. The West Siberian Oil and Gas Complex

(WSOGC) created on this territory is the basis of the country's economic stability and its reliable geopolitical position

The history of formation and development of the WSOGC is the subject of a large number of scientific publications. Among them there are a number of valuable monographic works[1] and substantial scientific articles[2], which laid the foundations for the study of this fruitful topic and basically outlined the range of issues constituting its problem field and proposed interesting solutions to them

At the same time, in the last, more than twenty-year period, in the domestic science there was the identification of new source material and there were serious methodological changes that expanded the possibilities of addressing to the study of the previously not sufficiently covered subjects of this historical epic. To them, in our opinion, we should include the history of geological exploration for oil in the 1930s, the creation of the construction industry in the north of the Tyumen region in the 1960s and the improvement of oil production technology in relation to the geographical and climatic conditions of this region during the entire period of industrial development of Siberian fields.

This is all the more necessary because the modern history of Western Siberia in the second half of the twentieth century is organically connected with the discovery of the country's largest oil fields in the Middle Priobie at the turn of the 1950s-1960s, carried out by a geological exploration expedition led by the outstanding geologist of our time Hero of Socialist Labour, Lenin Prize Laureate F.K.Salmanov.

On the arrival of his expedition, which became, as it turns out, a decisive event for further economic and social development of the north of Western Siberia, expressing the public sentiments of its inhabitants, the famous local historian I.P.Zakharov later wrote: "In our opinion, it is September 1957 that is the main event of the twentieth century. Then, the autumn day of 13 September in the drenched from frequent rains Surgut landed the first group of geologists led by a young specialist Farman Salmanov"[3]. It should be noted that this was by no means the first geological exploration party that attempted to find hydrocarbons in the Ob-Irtysh interfluve. We believe it would be correct to say that the work of the newly arrived expedition was a natural continuation of thirty years of oil prospecting in Western Siberia.

If we talk about the origins of scientific interest in the Siberian oil subject, it arose quite a long time ago. Even in 1896 in the work of the famous geologist N.K. Vysotsky "Sketch of Tertiary and Post-Tertiary Organisations of Western Siberia" was presented the first scheme of stratigraphy of their sediments[4].

In the further study of the oil prospect of West Siberian oil can be traced several stages. The authors of the book "Prometheans of Siberian oil" academician V.V.Alekseev and V.A.Lamin figuratively called 1930-ser.1940-ies "intellectual

period" of development of Tyumen oil and gas[5]. With this we can agree, if we take into account the fact that the discussion of supporters and opponents of the presence of oil in Western Siberia at that time was accompanied by a practical search for hydrocarbons in this region.

Interrupted by the war, in the mid-1940s, the search for hydrocarbons in this region was followed, as in the 1940s. 1940s followed, as it seems to us, another period of geological exploration of oil fields. From 1945 the reconstruction of the industry began[6], and from the mid-1960s came the time of industrial and social development of the West Siberian oil and gas province, which continues today[7].

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DOI 10.34660/INF.2023.51.93.082

俄罗斯犹太人的传统价值观：保存的问题和特点
TRADITIONAL VALUES OF THE JEWS OF RUSSIA: PROBLEMS AND FEATURES OF PRESERVATION

Kashtanyuk Valeriya Aleksandrovna
Candidate of Historical Sciences, Head of Department
Sholem Aleichem Amur State University

Sheludko Alexander Sergeevich
Student
Sholem Aleichem Amur State University

抽象的。 本文考察了俄罗斯国家犹太人民历史的主要阶段。 在每个历史时期，都会考虑传统价值观的发展和保存。 作品关注各个历史时期犹太人传统价值观的特殊性。 结论是保护犹太民族的传统价值观的重要性，从而保护犹太人的自我认同及其作为现代俄罗斯联邦领土上的一个民族的进一步发展。

关键词：传统价值观、犹太人、历史、保存、发展。

Abstract. *The paper examines the main stages of the history of the jewish people in the Russian state. In each historical period, the development and preservation of traditional values are considered. Attention is paid to the peculiarities of the traditional values of jews in each historical period indicated in the work. The conclusion is made about the importance of preserving the traditional values of the jewish ethnic group, as a consequence, preserving the self-identification of jews and their further development as an ethnic group on the territory of the modern Russian Federation.*

Keywords: *Traditional values, jews, history, preservation, development.*

Relevance of the study. In the Russian Federation, against the backdrop of global interethnic conflicts taking place in the countries of Western Europe, it has become relevant to study and further develop traditional relations in the territories of the constituent entities of the Russian Federation. Many representatives of nationalities live on the territory of Russia, which makes Russia a multinational state. In this regard, the need to study traditional values as the basis of any ethnic group is an integral part of the study of a certain nationality living in the territory of the subject. In historical development, the traditional values of an ethnic group show what the nation inhabiting the area from which its historical development

originates has lived and lives. In this study, using the example of the jewish people living in Russia, we will consider the development of traditional values in the historical process.

The purpose of our study is to identify the features of the traditional (spiritual, material) values of the jewish people and analyze Jewish culture at various stages of the historical development of the Russian state.

In the course of the study, comparative-historical and historical-chronological methods were used. So A. Alekseev in his work explores the traditional values of the jews, their customs, customs [1]. I.G. Orshansky in his scientific work examines the life of Jews in the Russian Empire, explores the traditional values of the jewish people in Russia [2]. Y.I. Gessen gives a description of the Russian legislation in relation to the Jewish population throughout the entire stay of Jews on the territory of the Russian Empire [3]. A. Oksman in his work "The History of Jews in the Russian Empire and the Soviet Union" examines the development of the historical path of the jewish people, the development of national jewish culture [4]. In his scientific work, Johanan Petrovsky-Stern explores the attitude of the Russian army to the traditional values of Jews in military service during this period of time [5]. A. Engels (ed.) "The Line 1791-1917" in this monograph, examines the creation and development of the territory on which the ewish popujlation lived from 1791 to 1917. Attention is paid to the daily and religious life of Jews [6].In the work of V.A. Kashtanyuk, the stages of the ethnocultural history of the jews of the Jewish Autonomous Region are considered. Particular attention is paid to the process of their re-emigration at the present stage[7].

The traditions of the jewish people originate from the distant past. In the course of its long historical development, the jewish ethnos formed certain rules of behavior in the family and society, which were passed down from generation to generation. Thus, due to historical processes, family values were constantly transformed, modified, new ones came to replace the old ones. As a result, the Jews formed established traditional values, according to which the jewish people still live in our time. The beginning of Jewish immigration to Russia falls on the second half of the XVII - beginning of the XVIII century [6; c.5]. After the death of Emperor Peter I and the introduction of the policies of subsequent rulers who came to power as a result of "palace coups", the Jews were expelled from Russia. By 1750, there were practically no jews in the Russian Empire.

With the beginning of the reign of Empress Catherine II, the jews received a significant indulgence. In 1772, a kahal organization of communities was introduced in Russia, which was engaged in the management of the jewish population in terms of controlling the collection of taxes, performing religious rites as an integral part of the traditional values of jews, and also supervised jews. In 1780, the jews were assigned and assigned to the urban estates of burghers and merchants.

Since 1782, with the goal of creating trading cities, the Empress by her decree [1] ordered jewish merchants and burghers living in villages to move to the cities. Due to the fact that, coming to the city, the jews could not settle there due to lack of means of subsistence, soon the forced eviction of the jewish people from the village to the city ceased. The main part of the jewish people remained to live in the villages on the leased lands of the landlords, while being assigned to the urban estates. As for the inner life of the jewish community, mainly in Lithuania and Belarus, since the bulk of the Jewish people lived there before the process of partitioning the Polish-Lithuanian Commonwealth in 1772, and after its completion in 1785. The situation in these regions between rabbis and Hasidim was tense. As a result, in view of the law-abiding Hassids, the government made concessions and allowed them to erect synagogues [6; c.10]. This fact emphasized the peacekeeping policy of the government of Catherine II in relation to the jewish people and consolidated the fact that already in the second half of the XVIII century, jews mastered their traditional values on the territory of Russia, but within the Pale of Settlement - the border of the territory of the Russian Empire, for leaving which persons of the jewish religion were forbidden to permanently reside in the country.

At the beginning of the XIX century, in 1804, the "Regulations" were issued, the first legislative act in the Russian Empire regarding the jewish people and their stay on the territory of tsarist Russia. This document did not give Jews equality, but did not infringe on their former rights as an ethnic group. The "Regulation" did not disturb the religious life of the jewish people, on the contrary, it made it possible for jewish children to study in state general education schools. In addition to public schools, jewish children could also be educated in separate jewish schools maintained at the expense of the jewish community. As for education as one of the spiritual components, according to jewish traditional values, children mainly studied in cheders. Chedera is a jewish elementary school, these institutions belonged to the traditional jewish religious education system. In the cheders, they were mainly engaged in religious education, consisting in the study of the Talmud - the teaching of the life of the jewish people written by the rabbis [3; p.22]. In the first half most jewish children studied in the XIX century chederach, very few received a Russian education [6; p.18]. As for the general jewish schools for jews, the first of them opened in 1822. The peculiarity of these schools was that in their curriculum, in addition to general subjects, special attention was paid to the Russian language. Despite such a serious step on the part of the authorities, aimed at educating the masses in jewish communities, conservative-minded Jews were against visiting such institutions, giving preference to cheders. Nevertheless, despite the opening of state jewish schools in the 20s and 30s of the XIX century, most children continued their education in cheders, which emphasized the tradition in education.

With the coming to power of Nicholas I and the signing of several decrees by him in 1827 concerning the jews and their conscription [7; c.42]. Being in a barracks position, the jews did not cease to pay attention to the traditional values of the jewish people. So, during the Passover period, the Jews were given matzo and kosher Passover wine, of course, the jewish soldiers were not given matzo, matzo, they were allowed to use it as a delicacy. As for wine, it was forbidden to use it in everything. No matter how the jewish communities wrote a lot of complaints to the commanders of the military garrisons where the members of their communities served, basically they were denied everywhere in favor of military regulations. This fact demonstrated that, despite the rather strict situation in which the jews called up for recruits found themselves, traditional values were not forgotten by them in any way, but rather fulfilled, which indicates the preservation of their identity among this people.

It is worth paying attention to the traditional values of the Jews in the matter of housing in the XIX century, then everything was as follows. jews, honoring the traditions of their ancestors, according to which each person should live exclusively with a person of his faith. Jewish families mostly did not live in the same house with Christians, as they did not recognize anyone's faith except their own. Another reason was that the lews, living under the same roof, together, performed the same traditions, for example, after dinner they occupied themselves with prayer [3; p.28]. Another attribute of the traditional values of the jewish people was family values. Particular attention was paid to the upbringing of children, they tried to educate them in the spirit of traditions. The wife was the keeper of the hearth in the house, faithful and devoted to her husband. In addition, the wife was engaged in the family budget and introduced savings of everything in the house, constantly counting money. The prudence of parents and their savings in everything was passed on to children. Those from an early age already began to save money.

At the beginning of the XX century, or to be more precise, after the events of February 1917 and with the coming to power of the Provisional Government, a number of decrees were issued that had a democratic character for the public masses. Thus, according to the Decree of the Provisional Government "On the Abolition of Religious and National Restrictions" [2], Jews were given the opportunity to settle beyond the Pale of Settlement, thereby leaving their jewish shtetls. Here the jews decided for themselves how they wanted to equip their lives in the future. Many remained within the boundaries, not that the majority, but still some part of the Jewish population moved to the cities. Thanks to their education, jews quickly found work in both the private sector and the public service. Soon after the October Revolution and as a consequence of the outbreak of the Civil War in Russia, a crisis caused by unemployment occurred in the socio-economic situation of the population. This crisis also affected the jewish population living in the cities.

After the establishment of Soviet power in the country, the anti-religious policy of the authorities towards the jews began. At this time, in the 1930s - 1940s, the district was first formed on the territory of the Far East as an administrative-territorial unit, and in 1934, by transforming the Birobidzhan district, the Autonomous Jewish National Region was formed with the administrative center of the working village of Birobidzhan. In 1937, the working village of Birobidzhan received the status of a city. The newly formed region began to arrive jews from Europe, America and other parts of the world. Due to the anti-Semitic policy of the Soviet government, there was no official religious center in the Jewish Autonomous Region, and traditional values also continued to be passed on to jewish families. So, the Jews spoke in their circle in the Yiddish language, celebrated their traditional holidays.

Until 1941, jews lived in small towns, in their Jewish neighborhoods, constituting the general mass. There were also jewish quarters in large cities of the USSR. Traditional values continued to be continued thanks to the development of the Yiddish language, which became spoken in most jewish families living in the territory of the union. Many jewish families continued to observe the traditions and culture of the jewish people. There were jewish schools in the towns and villages where jews lived. But not all jews could accept the traditional values of their people. Thus, many jews who moved to the big cities assimilated and their descendants in the first generation did not accept the culture and language spoken by their ancestors a couple of generations ago. In connection with the Nazi attack on the USSR and the genocide of the Jewish people, the condition of the jews changed greatly. living in the USSR. Jewish schools were not opened both during the war and after it. As for the population of the jewish people, the mass executions of the jews the destruction of their townships in a place with a population in those areas that were occupied by the Nazis and their supporters, all these factors affected the decline of the Jewish population. After the war, the jews, who wanted to preserve their traditional values, did not want to be subsequently subject to assimilation and gradual extinction as a nation, it was necessary to gain a foothold in a certain territory where jewish schools, houses of culture could exist, where the language of the people they spoke would be. Thus, the JAC made a proposal to give the jews one of their national districts in the Crimea. Soon, instead, the members of the JAC were subjected to mass repression [6; p.121].

In 1948, another campaign was launched to discriminate against the Jewish population. Thus, restrictions on admission to universities were imposed on the children of Jews, and many Jewish specialists were not hired to work at heavy and light industry enterprises. Jewish national culture was also suppressed. For example, the jewish theater in the Jewish Autonomous Region was closed. Thus, by 1950, there were no legal centers for the development of Jewish national cul-

ture and the maintenance of traditional values in the USSR. In the 1950s, the Jews became a time of repression until the death of I.V. Stalin (March 1953).

After N.S. Khrushchev came to power for the first time, there were no changes related to the weakening of discrimination against jews in the USSR. In the period 1956-1960 began to be carried out indulgences associated with the revival of jewish culture. Thus, books by jewish writers in Yiddish began to be published. In the 1960s, the weakening of jewish culture increased even more, which contributed to the development of traditional Jewish relations in the union. In 1961, the newspaper "Birobidzhan Star" began to be published in Yiddish in Birobidzhan. At the same time, not many jews living at that time could freely read and translate literature written in Hebrew. In connection with historical processes for the period 1941-1961, that is, for 20 years, no jewish schools or textbooks were opened, so the younger generation of jews perceived newspapers and magazines as souvenirs.

The aggravation of the development of the traditional culture of the jewish people in the 1960s was influenced by the deprivation of Jews to familiarize themselves with their national culture. This process was expressed in the prohibition of the Soviet authorities to publish textbooks and primers in the national language to Jewish cultural and educational organizations. The situation of synagogues continued to deteriorate, which was reflected in the development of traditional values. As a result of this process, the younger generation of Jews was overtaken by the process of assimilation and caused a sense of national inferiority.

After the resignation of N.S. Khrushchev, the position of the jews as an ethnic group and its cultural national development did not change in any way. There was also a ban on the publication of jewish textbooks, and the publishing of small newspapers and magazines in Yiddish continued. Even so, the number of Jews who could read a language other than Hebrew was small. In the 1960s, the policy of assimilation of jews was already being consolidated at the official level [6; p.135].

In the late 1960s and early 1970s, actions were again taken to weaken the national jewish culture, which contributed to the restriction of traditional values. In the period 1975-1980 the policy of restricting the national culture of the jewish people continued. Jews as an ethnic group were almost never mentioned anywhere. A striking example of this is the failure to mention the existence of jewish literature in the USSR at official party meetings. The only mention of jewish literature came with the release of a Hebrew primer in 1984. This event became possible for the 50th anniversary of the formation of the Jewish Autonomous Region. With the emergence of the period of "perestroika", which significantly changed the situation in the country, it also affected the lives of jews. Thus begins the revival of jewish national culture. It is worth noting that the Jews were not the only ethnic group against the background of the rest of the peoples of the country. In the

late 1980s, there was an opportunity to emigrate to Israel. In general, in connection with the collapse of the USSR and the formation of the 15 independent states had a significant impact on the lives of the jewish population. In the 90s of the XX century, opportunities began to appear for the revival of the Jewish national culture, and with it the continuation of the traditional values of the jewish ethnic group.

Since the appearance of the jewish people on the territory of Russia and for many centuries, experiencing historical processes, at the same time going through their historical development, the jews have preserved and developed their traditional values. Thus, in the last quarter of the XVIII century, the final territory of residence of jews was formed - the Pale of Settlement, in which jewish traditional values began to form. The XIX century was with varying success for the jewish people, the policy of the rulers of that period of time had a significant impact on the traditional values of the ethnic group.

The beginning of the XX century contributed to the possibility of jewish culture reaching a new level, recognizing it as equal among other national cultures. With the coming to power of the Soviets, this attempt was accompanied by constant discrimination and repression of the jewish people, who did not want their traditions to succumb to oblivion. As a consequence of this process, most of the jews were assimilated, which had an extremely serious impact on the traditional values of the jewish people. Since the 90s of the XX century, the rise of jewish traditional relations associated with the opening of educational institutions and the creation, and somewhere the resumption of national jewish culture, has been renewed.

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DOI 10.34660/INF.2023.27.63.083

乌兹别克斯坦钢琴音乐的东方浪漫主义
ROMANTICISM FROM AN ORIENTAL PERSPECTIVE IN PIANO MUSIC OF UZBEKISTAN

Osetrova Vlada Anatolevna
Candidate of Sciences degree seeking applicant
State Conservatory of Republic of Uzbekistan

抽象的。 本文致力于乌兹别克斯坦作曲家钢琴音乐中欧洲浪漫主义的体现，考虑了乌兹别克浪漫主义领域最流行的流派，并考虑了该领域最杰出的作品。

关键词：音乐浪漫主义、乌兹别克斯坦作曲家、钢琴音乐、细密画、练习曲、诗歌、钢琴套曲。

Abstract. *This article is devoted to the reflection of European romanticism in the piano music of Uzbek composers, the genres that are most popular in the field of Uzbek romanticism are considered, and the most outstanding works in this area are considered.*

Keywords: *romanticism in music, composers of Uzbekistan, piano music, miniatures, etudes, poems, piano cycles.*

"*An intense interest in strong and vivid feelings, in the secret movements of the soul, in its "night" side, a craving for the intuitive and unconscious are the essential features of the romantic worldview" [1].*

The most important feature of romantic music is the direct expression of the world of human feelings, confession, freedom of expression, unlimited by conventions. Uzbek composers in this direction are especially attracted by the richness of the musical language and overcoming classical standards. The confessional and lyrical nature characteristic of oriental music echoes the romantic intimacy of self-expression. Hence the compression of the scale of selected genres and forms. Eastern instrumental music, which was not distinguished by its extensive scale, combined with romantic miniature. This may explain the special popularity of piano miniatures in the works of Uzbek composers.

Romanticism put forward a bright national background as one of its main principles. It was the national intonations that determined the Polish origin in the work of F. Chopin, the Hungarian background in the work of F. Liszt, the Norwegian melodies in the work of E. Grieg, etc. Maintaining connections with classi-

cal forms (two-three movements, sonatas, etc.), composers enriched piano music with original national intonations. These principles were especially close to Uzbek composers.

The founders of the formation of Uzbek piano miniatures were V. Uspensky and B. Nadezhdin. The miniature genre, specific of European romanticism, turned out to be very relevant and in demand in the 20-30s of the XX century in Uzbekistan. Whet at one time F. Chopin brought new genres of national music to the professional stage (polonaise, mazurka, krakowiak, ballad and others), then V. Uspensky and B. Nadezhdin added folk Uzbek intonations to the romantic genres.[1].

In the XX century among the composers of the older generation, the genre of piano miniatures was distinguished by: M. Ashrafi, B. Gienko, G. Mushel[2]. The works created by these composers in the genre of miniatures are distinguished by their simplicity, conciseness, and democratic musical language. For this reason, they are often used in teaching practice[3]. It is also impossible not to mention H. F. Azimov, the creator of the "School of Piano Playing" based on Uzbek material, similar to the "School of Piano Playing" by L. Nikolaev.

H.F. Azimov is also the author of piano opuses that are included in the repertoire of Uzbek pianists. The favorite genre of romantics "Poem" was not ignored by composer H. F. Asimov. His "The Poem" and other works in this direction are often performed and are very pianistic. Он был He was an excellent pianist from the school of N. M. Yablonovsky[4] and an extraordinary piano teacher.

The genre of piano miniatures has not lost its relevance even in the XXI century. Among the modern composers, the composer M. Atadzhanov is closest in his work to the romantic direction, whose works are distinguished by their emotional richness and colorful depiction of especially folk life. The composer subtly feels the nature of the piano and deeply knows its specifics. A striking example of his romantic nature of creativity are his piano miniatures. For example, the play

[1] B. Nadezhdin: Sonata, Prelude, Fugue, Waltz, Fantasia, Impromptu, Little Suite; V. Uspensky: Prelude-1909, Sonata-1911, Etude, Theme with variations, "Prayers to the fire", "On the ruins of an ancient temple" from the music for the drama "Mukanna"-1943, "Song under the water" from the music for the drama "Yoriltosh" "-1945; collection of Uzbek piano pieces for 2 hands, 1 notebook T., 1936; collection of Uzbek piano pieces for 4 hands, 2 notebooks T., 1936, "Novella" - 1947, T., 1951 [2].

[2] M. Ashrafi "Album for violin and piano' – 1948; B. Gienko: 24 preludes: 1 notebook-six preludes - 1959, 2 notebook-12 preludes. T., 1962, 3 notebooks - 6 preludes. T., 1964. "Rubai" - 12 concert miniatures – 1974, Concertino "Maskharabozy" for two pianos – 1979. Piano score. T., 1981, "Children's album for piano", "Album of piano pieces" - 1978. "Triptych" for piano - 1985; G. Mushel: 24 preludes and fugues, "Musical Kaleidoscope" - 1942-1963, "Children's album". T., 1947. Sonata, "Pink Sonatina" - 1965, several notebooks of pieces, 9 easy pieces. M., 1950, 8 sketches. T., 1951, "Dance Suite" and "Samarkand Suite" for two pianos.

[3] Both at the initial stage and at all levels of the training stage.

[4] Yablonovsky's students preferred romantic works to other trends [3].

"Cockfighting" is very original in its style and means of expression. As musicologist L. M. Azimova especially emphasized: "...It is based primarily on fine piano technique and is useful for the development of musical-imaginative thinking. Its content is based on the demonstration, through the piano, of the oldest picture of a rooster competition in the Eastern culture of many nations..." [4, page 72]. It is known that the depiction of the sounds of nature is often found among romantics[5]. For example, in this play M. Atadzhanov, like other romantics, almost illustratively conveys the warlike crow of the rooster that opens the play.

Toccata has become one of the popular romantic genres among Uzbek composers. As we know, the toccata, which historically arose in the Baroque era, was revived by the romantics. In this genre, Uzbek composers are attracted by the romantic approach, since: a toccata in the Baroque era is an independent concert work for organ and harpsichord, and in addition, the first section of a two-part instrumental cycle, for example, "Toccata and Fugue" by I.S. Bach. Toccata in the era of Romanticism is a virtuoso work, similar to a concert etude. It also has a homophonic texture and is intended to demonstrate the technical capabilities of the performer [5]. In the creativity of composers in Uzbekistan, there is a diverse approach to this genre in piano music. If the toccatas of G. Mushel, B. Gienko, Kh. Izamov, D. Amanullaeva, A. Khashimov, O. Abdullaeva retain specific to this genre concerto performance and dynamism, then the toccatas of D. Saidaminova[6], R. Abdullaev, D. Yanov-Yanovsky are more complex in terms of dramaturgy in solving figurative content. Along with the interpretation of the toccata as a self-sufficient and independent genre, the inclusion of this genre in various micro-cycles is observed in the works of these composers. Moreover, even as part of these cycles, the toccata retains its romantic particularity.

Among the miniature genres, especially often used by composers of Uzbekistan, the etude genre stands out. Etude is a genre that at one time belonged only to pedagogical practice and was limited by a problem of performing technique; it was later reformed by F. Liszt, F. Chopin and other romantics. It was they who enriched the etude genre with artistry and content. High performing technique, combined with the ability to display deep content, attracts Uzbek composers to this genre. In the 50s of the XX century, G. Mushel[7] often turned to the genre of piano etude. Despite the fact that his etudes do not require special virtuosity, they are distinguished by their dynamism and outburst of emotions. Among modern composers, Kh. Azimov and M. Atadzhanov[8] often turn to the etude genre. In these etudes, Uzbek composers pay tribute to the great romantics of past centuries. The virtuosity and orchestral solutions characteristic of F. Liszt, the pronounced

[5] In Weber's opera "The Magic Shooter" used the imitation owl's night cries.

[6] D. Saidaminova "Toccatina".

[7] 8 etudes. T.,1951.

[8] Etude for piano - 2005.

national origin and dynamism characteristic of F. Chopin found their continuation in the piano music of Uzbek composers. Kh. Azimov, M. Atadzhanov, turning to the etude genre, each in their own way achieved a spectacular and at the same time technically complex sound of national intonations, which is especially noted in performing practice.

One of the most indicative genres for romanticism, the nocturne genre, was also reflected in Uzbek composers' creativity. Staying true to the traditions of the romantics, Kh. Azimov retained all the main distinctive features of the romantic night song. "Nocturne" (c-moll) by Kh. Asimov is very interesting. It is written in a three-part form with a developmental middle, very bright and dynamically rich. The general character of "Nocturne" is lyrical, contemplative in the extreme parts and emotionally elevated, lyrical-dramatic in the middle part of the play.

Preludes occupy a separate niche in the miniature genre. Many composers of Uzbekistan turned to the prelude genre as an independent piece outside the cycle. Composers of the older generation such as S. Jalil, S. Khaitbaev, A. Malakhov, T. Kurbanov, N. Giyasov, N. Narkhodzhaev, D. Yanov-Yanovsky sacredly preserved the traditions of romanticism in this genre. Young composers who are attracted to the piano prelude - D. Zakirova, V. Khandamyan, Sh. Sobirov, Z. Khodieva, N. Erkaev, A. Safarov, K. Gulomjonov - have a new interpretation of this genre. While generally maintaining the lyrical beginning in the prelude genre, young composers are trying to introduce something new into its formation and performance decisions.

One of the features of romanticism is the cyclical nature of miniatures. This is due to the disclosure of the plot of the work. Miniatures were often combined into cycles (forest scenes, Schumann's carnival). Often cycles grew to very large sizes (for example, Liszt's "Years of Wanderings" is a macrocycle consisting of several cycles of plays). The specific attraction of romantics to the synthesis of arts (music, poetry, theater) also attracts Uzbek composers. Traditional subjects related to events of national history, images of architecture, folk legends that inspire composers to interesting ideas are introduced into the scope of miniature themes: "Walls of Ancient Bukhara", "Frescoes of Afrasiab" by D. Saidaminova.

A. Mansurov "Everyone to the holiday". In this colorful work, the composer uses intonational lexis adopted from the folklore of our region. This is an alternation of episodes of different nature on a single intonation grain, united by the principle of monothematic. The national flavor is conveyed through unique timbres and rhythms that imitate playing Uzbek folk instruments (nagora, doira, karnai and surnai).

"Rhapsody" by R. Abdullayev is an extensive concert virtuoso composition. It is based on a temperamental, impulsive Khorezm folk dance (maskharabozlar raksi). R. Abdullaev boldly uses the richest capabilities of the instrument, its vari-

ous registers, elements of "large" technique - chords, octave presentation, basses in accompaniment. The composer also emphasizes the national character. The rhythmic principle dominates here, the gradation of dynamic shades and colorful timbral colors are subtly felt.

"Variations on a theme of Paganini" (2012) by N. Erkaev, in which the famous theme of Paganini is presented with original harmonies in the left hand. The concept of the cycle is united by a single idea - this is a retelling of the famous legend of Paganini. In his work, N. Erkaev is busy searching for a new intonation, synthesizing elements of European and Uzbek music.

One of the striking signs of romanticism is the appeal to fairy tales and mythology. R. Abdullayev turned to fairy-tale images and musical paintings inspired by the natural world in his cycles, "Five Children's Miniatures." In his "Fairy Tales" cycles, R. Abdullaev colorfully and figuratively shows fairy tale plots. The musical language of his fairy tales is fundamentally different from his works written in other directions since R. Abdullaev in this cycle appears as a bright artist - a romantic. Each of his tales from the cycle is a small miniature, or rather, a small miniature theatrical scene. And in each of these fairy tales, the composer, using meager means (detailing the elements of musical expressiveness) achieves the conciseness of the depicted images.

Another cycle by R. Abdullaev, called "Five Children's Miniatures" and addressed to a children's audience, is also filled with fairy-tale plots. Based on the intended audience, the composer fills each miniature with bright, memorable fairy-tale images. The plays, small in scale, are built on the principle of contrasting comparison, while maintaining the romantic kaleidoscopic nature of diverse images.

A brief excursion into the works of Uzbek composers written in the romantic style makes it possible to draw the following conclusions:

- the works of Uzbek composers are characterized by:

- programmability,
- appeal to the popular genres of piano miniatures in romantic music (preludes, etudes, musical moments, romances, elegies, nocturnes, humoresques, songs without words, fairy tales, musical paintings, etc.),
- the images of these works are clearly national,
- there is an appeal to fairy tales,
- romantic interpretation of the content of the work (prevalence of the emotional principle),
- reliance on everyday genres,
- simplicity and accessibility of musical presentation.

- composers of Uzbekistan have created a significant section of compositions in this direction, including arrangements of folk melodies, songs, and dances.

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DOI 10.34660/INF.2023.89.10.084

塔吉克斯坦在全球层面解决水问题的重要政治作用
THE IMPORTANT POLITICAL ROLE OF TAJIKISTAN ON THE GLOBAL LEVEL IN ADDRESSING WATER ISSUES

Madimarova Gulhayo Madimarovna
Scientific worker
Institute for Studies Asian and European countries under the National Academy of Sciences of Tajikistan

抽象的。 本文分析了世界水问题以及塔吉克斯坦作为解决区域水问题的重要参与者的作用。 水提供生命、经济繁荣、环境安全和人类文明。 全球范围内，水资源和气候变化的压力日益增大。 因此，塔吉克斯坦也非常关注这个问题，并与全世界合作，为减少这个问题做出贡献。

关键词：水问题、塔吉克斯坦、全球、水外交、政治作用、中亚、倡议。

Abstract. *This article analyzes water issues in the world and the role of Tajikistan as an important player in solving water problems at the regional level. Water provides life, economic prosperity, environmental security and human civilization. Globally, pressure on water resources and climate change is increasing. Therefore, Tajikistan also pays a lot of attention to this problem and contributes to the reduction of this problem in cooperation with the whole world.*

Keywords: *water issues, Tajikistan, global, water diplomacy, political role, Central Asia, initiatives.*

Although, the 21st century has created decent living conditions for humanity with the development of technological advances, on the other hand, humanity has faced problems in this century that it cannot solve alone. Such a problem is not specific to one country or one people, but covers the entire planet. Therefore, such issues, which have acquired a global character, are always under the special attention of governments of states and international organizations, and specific measures are taken to address them. The development of industry and the increase in the population in the field of ecology have led to the emergence of new problems. On this occasion, in the preface to the Russian edition of the book "The Ecology of Public Understanding" by the famous scientist Peter Farb, it is emphasized that: "The importance of ecology is increasing year by year, since lately it has been dealing with great questions of practical importance." It can be seen that in the

last decade, humanity has been “threatened” by the problems of climate change, an increase in natural disasters, avalanches, outbreaks of any infectious diseases, water shortages, population growth, melting glaciers, etc. Unfortunately, the risk of water crises may increase due to an increase in the world’s population and a decrease in water resources. Scientists estimate that by the end of this decade, about two billion people will face the problem of absolute water shortage. Therefore, in the context of the growing global demand for water, cooperation and constructive partnership of countries in this direction is the imperative of the times. It is worth noting that in modern times, climate change in the world has affected the environment and the activities of man and nature to such an extent that it has seriously affected the stability of the biosphere. As a result of research and scientific processes, researchers and experts in the field recognize global warming and climate change in the rapid growth of the population, the depletion of renewable natural resources, the release of volcanic gases, the destruction of forests (cutting trees) and environmental pollution. environment from various wastes.[1, 35] Today, the issues of efficient use of water resources, reduction of water losses, improvement of water quality and prevention of pollution of its sources are always in the focus of attention of the Government of Tajikistan. On this basis, the Water Sector Reform Program of Tajikistan for the period 2016-2025 provides for a comprehensive position on water issues, which can become the basis for achieving new achievements. This program was developed on the basis of two main methods: the separation of political tasks from the regulation of production and economic activity and the transition to a regional management system. Achieving integrated water resources management and other water-related targets included in the Sustainable Development Goals have also been included in the National Development Strategy of Tajikistan for the period up to 2030. It is equally worth noting the efforts of the Government of the Republic of Tajikistan towards cooperation in the field of water resources, especially at the border level. It is obvious that today’s water problems cannot be solved without comprehensive cooperation, especially at the transboundary level. As World Water Bank mentioned “Action is needed at the national and regional level to combat climate change, while building resilience and strengthening water security. The government of Tajikistan is playing an important leadership role in addressing these priorities and in the water sector internationally. The Dushanbe Water Process works to create partnerships at the global level, to ensure that people can thrive in a water-secure world”. [2] Head of State Emomali Rahmon has repeatedly stated Tajikistan’s firm position on the complex water and energy problems of the region and stressed that only cooperation is the only reasonable way to solve them. Therefore, the Foreign Policy Concept of Tajikistan pays special attention to the issues of water diplomacy.

It's no secret that the Central Asian region is already experiencing the negative effects of climate change. Heavy rains and droughts, high temperatures in summer and prolonged cold in winter are increasingly observed. As a result of such anomalous phenomena in nature, the countries of the region suffer huge economic losses, and it is obvious that this trend will continue in the future. In addition, it is unlikely that the region's population will increase significantly in the coming years. For this reason, this factor necessitates the adoption of additional measures to develop the economy, including in order to increase the production of food and electricity.

Tajikistan's vast water resources and its many mountain ranges offer great opportunities for clean energy production. When it comes to water, Tajikistan is a land of lavishness, despite its small surface. Water is the crown jewel, but as all that is precious, everyone wants a piece of it. Tajikistan is the wettest country of the region, with 691mm of average annual precipitation, from 100mm in the southeast to 2,400mm at the Fedchenko glacier, in the middle of the country, according to FAO. About 947 rivers longer than 10 kilometers cover the country with a total length of more than 28.500 kilometers, representing 60% of all hydro-resources of central Asia.[3]

Through them, our country can contribute to the implementation of this concept. Beneficial cooperation and concerted action towards the rational use of hydropower resources can undoubtedly make a significant contribution to the achievement of development goals not only related to water, but also the implementation of other goals and objectives. It should be noted that the Republic of Tajikistan has been actively promoting water issues within the framework of the Global Agenda over the past two decades. At the initiative of Tajikistan and a number of other countries, the UN General Assembly declared the International Year of Drinking Water (2003), the International Decade for Action "Water for Life" (2005-2015) and the International Year of Cooperation in the Water Sector (2013). These global events have made a significant contribution to strengthening the understanding of the importance of water for socio-economic development, environmental protection, peace, stability and development. Thanks to this, Tajikistan is recognized in the world as an innovator and a key initiator of the water issue.

As we mentioned, the Government of the Republic of Tajikistan, taking into account the importance of the topic in question and active participation in promoting the global water agenda and providing a platform for political dialogue, organizes and hosts high-level international conferences in cooperation with the United Nations. These meetings were recognized by the international community as the "Dushanbe Process on Water-related Issues". Dushanbe's high-level events, which are held once in two years, provide a timely opportunity to expand partnerships, find reasonable solutions to related problems, and most importantly, strengthen the trust between the countries of the world. Tajikistan initiated six ma-

jor initiatives: “International Year of Clean Water” (2003), International Decade of Action “Water for Life” (2005-2015), “International Year of Cooperation in the Water Sector” (2013), International Decade of Action “Water for Sustainable Development” ” (2018 – 2028), the Year of Glacier Conservation (2025) and the declaration of March 21 as World Glacier Day are implemented at the global level, each of which is vital to humanity. It is worth noting that in 2021, a high-level panel on water and climate issues under the title “Water and Climate Leaders” was established by the World Meteorological Organization and the “UN-Water” mechanism. The purpose of the establishment of the Panel is the integrated promotion of water and climate issues in the global development agenda. The President of Tajikistan was one of the first to be invited to become a member of this Panel, considering his valuable contribution to promoting water and climate issues on the world agenda. As Rahmanov said “I am pleased and proud that my country, the Republic of Tajikistan, has made and continues to make a substantial contribution to this process. From 2000 to 2016, at the initiative of Tajikistan, the United Nations General Assembly adopted seven resolutions on water. Among them are International Year of Freshwater (2003);1 International Decade for Action, “Water for Life”, 2005-2015;2 International Year of Water Cooperation, 2013;3 and International Decade for Action, “Water for Sustainable Development”, 2018-2028;4 which deserve special attention. Throughout this period, Tajikistan has repeatedly provided a platform for discussing global water issues”. [4]

This year, from March 22 to 24 at the UN headquarters in New York, the Republic of Tajikistan and the Kingdom of the Netherlands co-chaired the UN Conference on the comprehensive mid-term review of the process of implementing the goals of the International Decade of Action “Water for Sustainable Development 2018-2028”. This is the second world-level conference that will be held after the first UN Water Conference in 1977 (Argentina). In this regard, as early as April 2021, a working group was formed at the expense of experts from Tajikistan, the Netherlands, UNDESA and UN-Water, and it regularly holds its meetings. In this process, several relevant documents, including the Conference Concept, Road Map, Media Strategy, theoretical statements, etc., were developed, which help to prepare for the Conference and work with various interested parties. In addition, within the framework of the activities of the Tajik working group, together with the relevant ministries and agencies of the country, as well as the Executive Committee of the International Fund to Save the Aral Sea, the project of interactive topics of the Conference, the Plan for the involvement of interested parties, voluntary commitments in the field of water, the project of the Mid-term Report on the implementation of the goals of the International Water Decade and other documents related to the content of the Conference were prepared. To date, the Tajik side, together with the Netherlands, has held several special meetings on the sidelines

of international events for the purpose of presenting and promoting this Conference. In particular, the World Water Week (August 2021 in Stockholm), the 26th Conference of the Parties to the UN Convention on Climate Change (November 2021, Glasgow), the meeting of the Friends of Water Group (October 2021, New York), the meeting of the UN- Water (October 2021, Geneva), 9th World Water Forum (March 2022, Senegal), 4th Asia-Pacific Water Summit (April 2022, Japan), Second Dushanbe Conference on the Decade of Water (June 2022), the 27th Conference of the Parties to the UN Convention on Climate Change (November 2022, Egypt). By the way, on December 14, 2022, on the initiative of Tajikistan, the adoption of the Resolution of the General Assembly of the United Nations on declaring 2025 as the "International Year of Glacier Protection" is very important. Through this Resolution, the United Nations announced both the International Year of Glacier Protection and the World Glacier Day, which is one of the most important achievements of Tajikistan's foreign policy these days. Also, in 2025, a high-level international conference on the protection of glaciers is planned to be held in Dushanbe, which is a reflection of Tajikistan's unique and leading position in the field of water and climate. One of famous Magazine Trends has been write about all water initiative of Tajikistan also: "Since 2000, the Republic of Tajikistan has initiated the adoption of 6 UN General Assembly resolutions aimed at addressing water related issues. These initiatives have made a worthy contribution to a better understanding of the importance of water at a global level and given a high priority to addressing it for socio-economic development, environmental sustainability, peace and stability, and overall viable development". [5]

In the adopted document, governments, international organizations and donors are invited to contribute with the Trust Fund for the protection of glaciers under the management of the UN Secretary General and the relevant institutions of this organization. The main objective of the Fund is to attract the support of countries to respond quickly to the rapid melting of glaciers and its consequences. The Republic of Tajikistan has taken one of the key positions in the axis of global policy in terms of protection of glaciers and water resources.

The next step was accepted by the Republic of Tajikistan with the support of 153 UN member states. Based on this resolution, the proposals submitted by the President of Tajikistan were supported by the UN member states, including:

- declaring March 21 as the International Glacier Protection Day;
- declaration of 2025 as the International Year of Glacier Protection;
- establishment of an International Trust Fund under the UN to contribute to the protection of glaciers;
- in 2025, holding an international conference on glacier protection in the city of Dushanbe.

The main goal of our state's initiative to protect glaciers is to draw the attention of the international community to the importance of this issue and to take decisive measures to reduce the negative impact of the global climate change process on glaciers. Based on the resolution of the United Nations, the Republic of Tajikistan will host the International Conference on Glacier Protection in 2025. During this conference, the Head of State expressed the full readiness of Tajikistan to hold an international conference at a high level, and called on the member states of the United Nations and other interested parties to cooperate in this direction. Thus, the Republic of Tajikistan is known as an initiative state for environmental peace, in order to eliminate the negative consequences for healthy nature and implement effective environmental policy.

The Republic of Tajikistan, on the basis of a proper understanding of the growing water problems, as well as the importance of water resources for sustainable development, actively and consistently promotes the importance of water on the global agenda. About 60 per cent of water resources of the rivers in Central Asia (the Aral Sea basin) are formed in Tajikistan, and our country generously shares this vital resource with our neighbours. Tajikistan is a co-founder of the International Fund for Saving the Aral Sea and its two commissions, the Interstate Commission for Water Coordination (ICWC) and the Interstate Commission on Sustainable Development (ICSD), which provide platforms for discussing urgent transboundary water issues in the region Tajikistan possesses significant reserves of water resources and is a supporter of equitable and sustainable use of water through regional and international cooperation and believes that consistent promotion of water cooperation diplomacy is the only tool to solve problems in this area.

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DOI 10.34660/INF.2023.74.28.085
UDC 574.64

使用大型植物评估石油生产中使用的腐蚀抑制剂的毒性

USE OF MACROPHYTES IN ASSESSING THE TOXICITY OF A CORROSION INHIBITOR USED IN OIL PRODUCTION

Akatieva Tatyana Grigorievna
Candidate of Biological Sciences, Associate Professor
Northern Trans-Urals State Agrarian University, Russia

注解。 石油生产设备的运行涉及使用各种技术混合物，包括腐蚀抑制剂。 当进入水生环境时，这些物质会对所有营养级的水生生物产生负面影响。 本文介绍了利用大型植物伊乐藻（Elodea canadensis）对含有含氮物质的缓蚀剂的毒性进行的研究结果。 已确定高浓度的该物质（5 mg/dm3 及以上）会导致植物急性和慢性死亡。

关键词。 缓蚀剂、毒性、加拿大伊乐藻、植物死亡、主枝和侧枝生长、光合作用活性、致死浓度和非活性浓度。

Annotation. *Operation of equipment in oil production involves the use of various technical mixtures, including corrosion inhibitors. When getting into the aquatic environment these substances have a negative impact on hydrobionts of all trophic levels. This article presents the results of studies of toxicity of corrosion inhibitor containing nitrogen-containing substances with the use of macrophyte Elodea canadensis. It is established that high concentrations of the substance (5 mg/dm3 and more) cause acute and chronic death of plants.*

Keywords: *Corrosion inhibitor, toxicity, Elodea canadensis, plant death, growth of main and lateral shoots, photosynthesis activity, lethal and inactive concentrations.*

Introduction. The development of the oil and gas extraction industry has always been accompanied by a negative impact on natural landscapes and, in general, on ecosystems. At present, despite the measures taken, the problem of environmental pollution by oil and its refined products is still unsolved [1]. As a result, almost all natural components are disturbed in the process of production and transportation, as a result of various accidents, the causes of which are often corrosion of oilfield equipment and oil pipelines [2]. The solution of the issue is the use of corrosion inhibitors - multicomponent mixtures, which include highly toxic substances. When entering water bodies in natural waters, the amount of dis-

solved oxygen decreases, the conditions of decomposition of organic substances that intensively accumulate deteriorate, the concentrations of nitrogen, phosphorus, various metals, organochlorine and other harmful compounds increase [3]. The most optimal method for determining the toxicity of various substances on organisms is considered to be the method of biotesting, in particular, phytotesting. It is used not only as a method of toxicological assessment of media, for example, soils and waters, but also as a very common method of assessing the toxicity or bioactivity of various materials, chemicals, and industrial wastes [4].

The aim of this research was to study the toxicity of a corrosion inhibitor on a representative of higher aquatic vegetation *Elodea canadensis*. For this purpose the following *tasks were set:*

- to evaluate the effect of the substance on morphophysiological parameters of plants;
- to determine the range of lethal and non-lethal concentrations for this test subject.
- каротиноидов, кислорода в воде).

Material and research methods. The studied corrosion inhibitor is an aminoamide of fatty acid of tall oil and polyethylene polyamine (N-acyltriethylene triamine) - 50%, ethyl alcohol - 50%, having good solubility in water and oil products [5]. For studies by dilution method, solutions in the concentration range of 6.25 - 100 mg/dm^3 (acute experiments) and 0.01 - 10.0 mg/dm^3 (chronic experiments) were prepared. *Elodea canadensis*, a representative of submerged plants widely distributed in standing water bodies of the temperate zone, was used as a test object [6]. The study was carried out in laboratory conditions. The upper part of Elodea shoot 4 cm long without lateral shoots and roots was used for experiments and 5 specimens were placed in crystallisers with solutions of the investigated substance and with water without toxicant (control) in the volume of 1 dm^3 in three repetitions [7]. In acute and chronic (6 and 30 days, respectively) experiments, the state of elodea in toxicant solutions was tested by the general condition of plants (colour change, damage and death of growth points, loss of turgor), survival rate, main shoot growth, number of lateral shoots, photosynthesis intensity (chlorophyll, carotenoids, and oxygen content in water).

Research results and their discussion. In short-term experiments, the plants were observed to have growth point die-off, loss of turgor, disintegration of plants into separate whorls, browning, lysis and death of shoots at concentrations of 100 and 50 mg/dm^3 on the 2nd and 4th day of the experiment, respectively. In solutions with lower amount of toxicant, a 40% decrease in survival rate (25 mg/dm^3), yellowing of leaves (12.5 mg/dm^3) was observed. Plant growth was either significantly stopped (maximum concentrations) or retarded (12.5 - 25, 0 mg/dm^3) compared to controls.

Despite the absence of visual differences, a decrease in physiological functions of plants was observed, manifested by a decrease in total chlorophyll and dissolved oxygen content at all concentrations by 4 - 33 % and 26 - 72 %, respectively (Fig. 1).

Fig. 1 Photosynthesis activity of *Elodea canadensis* on the 6th day of the experiment (% to control)

In chronic experiments (30 days) the range of ICB-6-2 concentrations with lower amount of the substance was investigated: from 0.01 to 10.0 mg/dm3. It was found that in the maximum of the investigated concentrations 100% of elodea shoots died by 26 days. The survival rate of plants in solutions containing less than 1.0 mg/dm^3 of inhibitor was at the level of control. However, after 20 days of the experiment, inhibition of the main shoot growth was observed in all solutions (Fig.2).

Fig. 2 Length (cm) of the main shoot of *Elodea canadensis* in the chronic experiment

Delayed growth of the main shoot of elodea was compensated by stimulation of growth of lateral shoots (Fig. 3). At the same time, the total plant growth was 8 - 12 % less than in the control in all experiments.

Fig. 3 Length of lateral shoots (% to control) of *Elodea canadensis* in the chronic experiment

In all investigated concentrations of the substance depressing of photosynthesis process of elodea was observed. Thus, the total chlorophyll content by 30 days was lower than in the control by 34-84 %. The lowest amount of photosynthesis pigments was registered at maximum concentrations. Oxygen content in solutions with relatively low concentrations (below 1.0 mg/l) was determined at the level of control.

Growth suppression of elodea plants was also noted by other authors. Thus, Taran D.O. [8] studied the effect of nitrobenzene on higher aquatic vegetation and found that aromatic hydrocarbons affect the shoot length of elodea. The most sensitive indicators - total growth of Elodea, growth of main and lateral shoots - were established under the influence of fungicide on *Elodea canadensis* [9].

Conclusion. Thus, in the course of acute experiments it was established that the corrosion inhibitor is a rather toxic composition of organic compounds, which in a short time causes death of higher aquatic plants at concentrations above 50.0 mg/dm^3, depresses their photosynthetic activity and main shoot growth at concen-

trations above 6.25 mg/dm^3. The substance content of 5.0 mg/dm^3 is chronically lethal: death of a part of plants is observed within 30 days. The lethal outcome was preceded by depressed growth and functional activity of plants, dying off of growth points, loss of turgor, browning of shoots, then disintegration of plants into separate whorls and lysis. As a threshold concentration for corrosion inhibitor 0, 1 mg/dm3 can be taken.

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DOI 10.34660/INF.2023.93.76.086

神经嵴细胞在髋关节发育不良发病机制中的作用
THE ROLE OF NEURAL CREST CELLS IN THE PATHOGENESIS OF HIP DYSPLASIA

Pahomova Nataliya Yurievna
Candidate of Medical Sciences, Associate Professor, Leading Research Officer
Ya.L. Tsiv'yan Novosibirsk Research Institute of Traumatology and Orthopedics, Novosibirsk, Russia

Strokova Elena Leonidovna
Candidate of Biological Sciences, Senior Research Officer
Ya.L. Tsiv'yan Novosibirsk Research Institute of Traumatology and Orthopedics, Novosibirsk, Russia

Zaydman Alla Mikhailovna
Doctor of Medical Sciences, Full Professor, Chief Scientific Officer
Ya.L. Tsiv'yan Novosibirsk Research Institute of Traumatology and Orthopedics, Novosibirsk, Russia

抽象的。 髋关节发育不良被认为是一种多基因起源的病理状况。 目前的文献数据是通过候选基因与产后髋关节发育不良关联的研究结果来呈现的。 胚胎期髋关节正常发育受到破坏，会加剧髋关节结构早期畸变的形成，从而导致形态异常和功能障碍。 近年来，神经嵴细胞的迁移过程及其作用得到了深入研究。神经嵴细胞是一种多能胚胎细胞群，在神经板边缘形成，随后在整个胚胎中迁移。 神经嵴细胞迁移过程的变化可能引发正常胚胎发生的结构紊乱，从而导致发育中的生物体结构发生形态反转。 目的：神经嵴细胞在髋关节发育不良发病机制中的作用。 结论。 在胚胎发育早期，即下肢肾脏形成期间，神经嵴细胞迁移失调（PAX3基因表达的变化）可以使发育中的髋关节的形态结构发生显着变化。

关键词：髋关节发育不良，胚胎发育，神经嵴细胞迁移，下肢发育。

Abstract. *Hip dysplasia is considered a pathological condition with a polygenic origin. The literature data of the present time are presented by the results of studies of the association of candidate genes with hip dysplasia in the postnatal period. Violations of the normal development of the hip joint in the embryonic period potentiate the formation of early aberrations in the structures of the hip joint, which leads to morphological abnormalities and functional disorders caused by them. In recent years, the process of migration of neural crest cells and their role*

have been intensively studied. Neural crest cells are a multipotent embryonic cell population that form at the border of the neural plate and subsequently migrate throughout the embryo. Changes in the process of neural crest cell migration can initiate structural disturbances in normal embryogenesis, thereby contributing to the development of morphological inversions in the structures of a developing organism. Objective: The role of neural crest cells in the pathogenesis of hip dysplasia. Conclusion. Dysregulation of neural crest cell migration (changes in PAX3 gene expression) during the period of early embryonic development, namely, during the formation of the kidneys of the lower extremities, can make significant changes in the morphological structure of the developing hip joint.

Keywords: *hip dysplasia, embryonic development, neural crest cell migration, lower limb development.*

For citation: Pakhomova N.Yu., Strokova E.L., Zaidman A.M. The role of neural crest cells in the pathogenesis of hip dysplasia.

Introduction

Hip dysplasia is one of the most common congenital malformations of the axial skeleton and is characterized by a wide range of anatomical anomalies of the hip joint - incomplete formation of the acetabulum, hyperextensibility of the joint capsule, dislocation and, subsequently, deformity of the proximal femur [1]. Violations of the normal development of the hip joint in the embryonic period potentiate the formation of early aberrations in the structures of the hip joint, which leads to morphological abnormalities and functional disorders caused by them.

In search of a starting point in the pathogenesis of hip dysplasia, various etiological and predisposing factors are being investigated [2]. Neural crest cells are a multipotent embryonic cell population that form at the border of the neural plate and subsequently migrate throughout the embryo. In recent years, the process of migration of neural crest cells and their role have been intensively studied. Changes in the process of neural crest cell migration can initiate structural disturbances in normal embryogenesis, thereby contributing to the development of morphological inversions in the structures of a developing organism. Objective: The role of neural crest cells in the pathogenesis of hip dysplasia.

The hip joint begins to develop physiologically from mesenchymal cells already at 5–6 gestational weeks of pregnancy. The caudal part of the embryo arises by secondary induction and transformation of epithelial cells into the mesenchymal tail bud [3]. Secondary neurulation is characteristic of all studied vertebrates - lampreys, fish, amphibians, birds, and mammals (including humans) - indicating that secondary neurulation is an ancient developmental process inherited from a common ancestor of vertebrates [4]. Many orthopedic fundamentalists assumed that the pathogenetic mechanisms of hip dysplasia begin to be determined even in the period of primary laying - during the period of gastrulation [5, 6, 7, 8].

According to Stephens et al. [9], the area of lower limb formation can be recognized already at the 11th stage (for consideration, the embryonic period of development of a chicken was taken as an experimental biological object. The stages are given in accordance with the classification according to Hamburger and Hamilton [10]). Potential limbal areas become visible from about 15 stages according to Hamburger and Hamilton (50-55 h) as slightly thickened ridges of the somatic mesoderm of the lateral plate [9]. The kidneys of the lower extremities are formed at the level of somites 26–32; these levels are apparently determined by the distribution of the expression of various Hox genes [11]. As the lateral folds of the body form, the limbs are located along the lateral walls of the body. The buds of the extremities consist of an ectoderm sheath that contains the core of the mesoderm. The ectoderm originates from the ectoderm of the lateral body wall, and the mesoderm is formed from the somatic lateral plate, although it is subsequently supplemented by cells migrating from the somites [12]. The somatic mesoderm gives rise to tendons, skeleton, dermis, and connective tissues of the limbs, while somite cells form muscles [12].

The first morphological step in the formation of the kidney of the limb is the proliferation of cells of the mesoderm of the lateral plate. This, apparently, occurs due to the production of the FGF10 factor by the mesoderm of the lateral plate itself [13]. Epithelial-mesenchymal interactions, which are secondary inductions, initiate or regulate the morphogenesis, differentiation, and growth of most organs in vertebrate embryos. Chondrogenesis and limb formation are controlled by epithelial-mesenchymal signaling involving the apical ectodermal ridge [14]. At the tip of the limb, the ectoderm thickens and becomes known as the apical ectodermal ridge. Important interactions occur between the apical ectodermal ridge and the underlying mesoderm. The apical ectodermal ridge is formed under the influence of mesenchymal cells, mainly due to the secretion of FGF10 and FGF8 [15]. The development of the apical ectodermal ridge and induced signaling pathways are reviewed by Fernandez-Teran [16]. The mesenchyme, located just below the apical ectodermal ridge, is an area of high mitotic activity, providing additional cells that are needed as the limb bud lengthens. This is known as the zone of progress and is made up entirely of cells that are not yet differentiated. Apparently, it is supported by FGF8 secreted by the apical ectodermal ridge [12]. Gradually, the most proximal cells in the progress zone leave it, being replaced by an increasing number of cells distally as mitosis continues. The first cells to leave the progress zone form the most proximal limb structures. Consistently, as more and more cells leave the progress zone, they become determined to form more and more distal structures [12]. The skeleton of the lower limb develops from the same mesoderm as the pelvic girdle. Chondrocyte precursors of the femur, tibia and fibula are formed by the fifth day of embryogenesis. Once the limb regions are established, the apical ectodermal ridge disappears [17].

During this period of time, the embryo is a set of numerous mutually dependent versatile processes that occur not sequentially, but in parallel, namely in parallel, but in the end everything is aimed only at achieving one goal - the formation of a new organism.

The development of the lower extremities, mesonephros, and other organs occurs by secondary induction, and not by primary development from the germ layer (which occurs before the onset of epithelial-mesenchymal interactions). Because the caudal bud is of mixed origin, the caudal neural crest may not be entirely ectodermal in origin [18]. Primary neurulation originates from the germ layers, while secondary neurulation originates from the tail bud blastema. There are fundamental differences between the origin of cranial and caudal neural crest cells [14]. Indeed, it can be considered that the primary and secondary cells of the neural crest have a dual origin: the cranial (primary) cells of the neural crest come from the neuroectoderm; caudal (secondary) neural crest cells from the caudal bud [14]. Additional evidence is the origin of the tail bud by embryonic induction, and not as a result of germ layer detachment [14].

The extraordinary migratory ability and multipotency of neural crest cells distinguish them from all other embryonic cells [19]. The events preceding this process are epithelial-mesenchymal transformation and delamination - loss of intercellular connections, basal translocation of cytoplasmic contents, movement of cells into the fenestrated basal lamina, penetration through the basal lamina - all this is summarized in terms and processes of transformation of the epithelium into mesenchyme, detachment and migration of neural crest cells along the epithelial basal plates or through extracellular matrices [14]. The mesoderm and neural crest exfoliate as mesenchymal cells after undergoing epithelial-mesenchymal transformation [19].

The kidneys of the lower extremities are formed at the level of 26-32 pairs of somites, which morphologically and in time corresponds to the formation of the sacral neural crest. Somites are paired blocks of mesoderm that form in a row on either side of the notochord. Migration of neural crest cells occurs in waves from the anterior to the posterior part of the body. An important aspect is that migration follows the wave of somite segmentation directly, and there is evidence that each pair of somites affects the release of neural crest cells in its vicinity, affecting the BMP4 and noggin relationship [20]. Neural crest cells of the embryonic neural tube at certain axial levels migrate along several pathways to reach target tissues and generate an appropriate repertoire of neural crest derivatives [21].

The migration process of neural crest cells is a complex, polycontrolled process, in which mutually intersecting signaling systems of the neural crest cells themselves, the extracellular matrix, through which the migration process is carried out, take part [14]. One of the main inducers of neural crest cell migration

are the *PAX3* and *CXCR4* genes [22]. *PAX3* is involved in neural plate boundary definition [23], involved in neural tube closure, neural crest development, and peripheral neuron differentiation [24]. These results suggested that *PAX3* is a key modulator of neural crest cell migration through the regulation of *CXCR4* expression - *CXCR4* expression responded to changes in *PAX3* levels. Ectopic expression of *PAX3* increased the level of *CXCR4*, while knockdown of *PAX3* reduced the expression of *CXCR4* [22].

The results of many years of research by the morphologist Zaidman A.M. [25, 26] and literature data allowed us to suggest that changes in the epigenetic mechanisms of regulation of the temporal parameters of neural crest cell migration (inhibition of *PAX3* expression) during the formation of the kidneys of the lower extremities can be considered as a pathogenetic mechanism for the formation of hip dysplasia [27]. The emerging embryo is a collection of cells that change their location during the formation of morphological structures [12]. Neural crest cells acquire an epithelial-mesenchymal phenotype during delamination [14]. Changes in the temporal parameters of neural crest cell migration - inhibition of *PAX3* expression - create conditions in which neural crest cells are not at the final place and time of their evolutionary finish. The modeled phenotypic structure of neural crest cells [14] and the process of formation of the apical ectodermal ridge [12] create the prerequisites for the "participation" of neural crest cells in the morphological structure of the kidneys of the lower extremities. The phenotype of neural crest cells, their presence during the formation of the kidneys of the lower extremities, and the cells of mesenchymal origin of the apical ectodermal crest [14] create conditions for the possible movement of a set of cells from the zone of progress to the distal parts of the developing lower extremities. Undoubtedly, changes introduced into the temporal parameters of neural crest cell migration do not cause a lethal outcome in the developing organism, but they introduce significant changes in the formation of morphological inversions in the structure of the developing lower extremities [27].

In the results of the Weston J.A. It has been established that the microenvironment in which neural crest cells are located is the main factor determining their differentiation and morphogenesis in normal embryos [28, 29, 30, 31]. The results of research by an international group of scientists present data that, when migrating, neural crest cells behave depending on the signal that comes to them, if the signal arrives, the cells acquire their final type, and if the signal does not arrive, they wait for a new one from other tissues [32]. The simulated changes in the migration of neural crest cells and their stop during the formation of the apical ectodermal crest create an environment for neural crest cells, the signals of which they are not determined to perceive. What creates the prerequisites for the development of pathological changes in the emerging hip joint.

Undoubtedly, the proposed theory requires further research and justification, but the data obtained [27] suggest that the involvement of neural crest cells in the formation of hip dysplasia can be considered as a possible pathogenetic mechanism.

Conclusion

The study of the processes of formation of morphological structures in the embryonic period, the time parameters of morphogenesis is an area that requires further research. Dysregulation of neural crest cell migration (changes in PAX3 gene expression) during the period of early embryonic development, namely, during the formation of the kidneys of the lower extremities, can make significant changes in the morphological structure of the developing hip joint. The involvement of neural crest cells in the pathogenetic mechanisms of the development of hip dysplasia is the subject of further research.

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儿童包虫病：临床、诊断、治疗
ECHINOCOCCOSIS IN CHILDREN: CLINIC, DIAGNOSTICS, TREATMENT

Miropolskaya Natalya Yurievna
Candidate of Medical Sciences, Associate Professor
Far Eastern State Medical University

抽象的。 本文介绍小儿不同部位包虫病的综合检查和治疗结果。 这种严重的寄生虫病仍然是世界许多国家（包括俄罗斯联邦许多地区）的医学和社会领域的紧迫问题。 哈巴罗夫斯克边疆区是俄罗斯联邦包虫病的流行疫区之一。 这项工作的目的是分析儿童包虫病联合化疗和手术治疗的必要性。

关键词：包虫病，儿童，手术和化疗。

Abstract. *This article presents the results of a comprehensive examination and treatment of children with echinococcosis with different localization. This severe parasitic disease remains an urgent problem of medicine and social sphere in many countries of the world, including in a number of regions of the Russian Federation. Khabarovsk Territory is one of the endemic foci of the Russian Federation for hydatid echinococcosis. The purpose of this work was to analyze the need for a combination of chemotherapy and surgical treatment of echinococcosis in children.*

Keywords: *echinocaccosis, children, surgical and chemotherapy.*

Echinococcosis is one of the most dangerous zooanthropohelminthiasis, and its diagnosis remains an urgent medical problem. This severe parasitic disease remains an urgent problem in medicine and the social sphere in many countries of the world, including in a number of regions of the Russian Federation [1,6]. In the Russian Federation, from 200 to 300 cases of primary echinococcosis of various localization (lungs, liver, kidneys, brain and spinal cord, etc.) are recorded annually, and there is a tendency to increase the incidence of this pathology.

The Khabarovsk Territory is one of the endemic foci of the Russian Federation for hydatidosis echinococcosis. Attention to this pathology is due to the consistently high incidence in endemic areas, as well as the registration of clinical cases in non-endemic areas due to population migration. Children are the most affected part of the population by parasitosis, while several types of helminths can para-

sitize at the same time, which indicates the absence of antagonistic relationships between them, on the contrary, they cohabitate, multiplying the damage caused to the child's body [7,8]. It is believed that most patients become infected with echinococcosis in childhood, and due to the slow growth of the parasite, the diagnosis is established many years later. The polymorphism of the clinical manifestations of echinococcosis creates difficulties for the timely detection of this category of patients. Due to the absence of pathognomonic symptoms, as well as a long asymptomatic course, echinococcosis is diagnosed in some cases by chance during examination for other diseases. Often, the disease is recognized when various complications are attached to it.

The main methods for diagnosing echinococcosis are traditional radiography and ultrasound (ultrasound). Widespread and introduction into practice of ultrasound of the abdominal cavity and retroperitoneal space as a screening diagnostic method for dispensary observation of children makes it possible to suspect echinococcosis of the parenchymal organs of the abdominal cavity and retroperitoneal space in the early stages of the disease.

However, in some cases there are difficulties in verifying the diagnosis, the need to conduct differential diagnosis between non-parasitic cystic diseases, postoperative residual cavities, recurrence of echinococcosis, reinvasion and primary echinococcosis forces the use in practice of such methods as computed tomography of the abdominal cavity and chest, enzyme immunoassay. The use of radiation studies at all stages of the treatment and diagnostic process improves the efficiency of surgical treatment of patients with echinococcosis [2,3,12].

Surgical treatment remains the main method of treating echinococcosis [4,5], although the effectiveness of conservative treatment with albendazole has been proven, and, on the recommendation of WHO, it can be used as an independent method. However, in 10–20% of cases, albendazole has a depressing effect on white and red blood cells and a pronounced hepatotoxic effect, manifested by an increase in the level of transaminases, which is a deterrent to conservative treatment. At the same time, many authors agree on the need for postoperative antiparasitic chemotherapy, especially in complicated forms [9,10,12,13].

Materials and methods.

Since 2018, we have examined 179 children for echinococcosis aged 3 to 15 years. Enzyme-linked immunosorbent assay (ELISA) of blood was performed using a set of reagents "Echinococcus-IgG-ELISA-BEST" JSC "Vector-Best". Serological diagnostics was performed for all children during hospitalization, as well as as a component of medical examination of children, 3,6,12,18 months after echinococcectomy.

From the anamnesis it is known that in 128 children predominant liver damage was noted (in 71.5% of cases isolated and in 28.5% in combination with invasion of the parasite into the lungs, spleen).

Relatively rarely, parasitic cysts were localized in the kidneys, pancreas, and central nervous system (neurioma). At the same time, 6 (22.3%) of the children hospitalized to the hospital were referred for further examination and treatment with a diagnosis of cystic formation, in 4 (14.8%) patients a lung tumor, but most often (17 (62.9%))) cystic formation of the abdominal cavity or chest was a finding during clinical examination: clinical examination, ultrasound of the abdominal organs, fluorography or plain chest x-ray in direct projection.

For 5 years, 27 children aged 3 to 15 years with echinococcosis of various localization were hospitalized in the children's surgical department of the A.K. Of these, isolated liver damage was detected in 17 children (62.9%), isolated lung damage in 6 people (22.3%), combined liver and lung damage in 4 (14.8%) patients.

In 62% of patients, the examination was carried out regarding complaints of pain in the chest, abdomen, changes in the configuration of the chest, a symptom of a palpable tumor in the abdomen, episodes of coughing with a large amount of sputum, dizziness, weakness, hyperergic reaction r. Mantoux, shortness of breath, subfebrile body temperature.

In 5 (18.5%) children, echinococcosis was diagnosed at the stage of complications: in 2 cases - suppuration with the development of a lung abscess, in 3 cases - the development of pneumonia. In 24 (88.9%) patients there were solitary echinococcal cysts (EC) of small and medium sizes: up to 53.3 mm, in 3 (11.1%) - large and giant sizes: 96.6x84.4 mm. Multiple ECs were observed in 2 (11.1%) children.

All hospitalized children were examined according to the protocol adopted in the clinic: physical examination, clinical laboratory examination (blood test, urine test, coprogram), biochemical blood test (total protein, total bilirubin and its fractions, urea, creatinine, transaminases, thymol and sublimate tests, ionic blood composition - K, Na, Ca, Cl),

survey radiography of the chest in frontal and lateral projections, ultrasound of the abdominal organs, retroperitoneal space, chest organs, CT scan of the chest organs, abdominal cavity. ELISA of blood with echinococcal antigen.Ultrasound of the abdominal organs was performed in all patients with any localization of cystic formation.

The studies were carried out in the anterior, lateral and posterior surfaces of the abdominal wall. When a focal formation (cyst) was detected, the topography, number, spatial arrangement of echinococcal cysts, their internal structure, relationships with vessels and bile ducts were determined. Control ultrasound was the main method for assessing the state of the residual cavity and a criterion for the effectiveness of surgical intervention and conservative treatment. Evaluated according to WHO criteria according to ultrasound data:

successful treatment (disappearance or significant reduction in the size of cysts); favorable effect (marked decrease in the size of cysts or disappearance of some cysts with multiple lesions); unsuccessful treatment (lack of visible changes in the size, shape and structure of the cyst).

Results and discussions:

Clinical manifestations of echinococcosis are characterized by polymorphism of symptoms, which are determined by the characteristics of the localization of the cyst, size, number, possible complications, and the degree of traumatic effect on the surrounding organs and tissues. According to our material, all children were admitted to the clinic during the height of the disease (stage II), which was characterized by signs of chronic toxicosis and various local symptoms. Children noted complaints of recurrent abdominal pain, especially during exercise. Half of the patients periodically had subfebrile temperature. Hepatomegaly was noted in 16 (59.2%) patients, in a third of the echinococcal cyst was palpated as a tumor-like formation of a tight elastic consistency. Local symptoms are more pronounced with large cysts, deformation of the anterolateral part of the chest, expansion of the lower thoracic aperture and intercostal spaces were observed. Leukocytosis was observed in 25% of children, eosinophilia in 74.1% of patients. The study of the protein-synthesizing function of the liver revealed hypoproteinemia in 5 (18.5%) patients. Hyperbilirubinemia was not observed in any of the patients. An increase in the level of enzymes was observed in 37.0% of patients. III stage of the disease (stage of complications) occurred in 5 (18.5%) patients. The first symptoms of this complication were severe abdominal pain, weakness, lethargy, febrile fever, shortness of breath, allergic rash of the “urticaria” type. An objective examination revealed soreness, tension in the muscles of the anterior abdominal wall, positive symptoms of peritoneal irritation. EC suppuration was observed in 2 children. The clinical picture in this complication was characterized by pronounced signs of toxicosis and sensitization of the body due to increased absorption of the parasitic fluid. Patients complained of abdominal pain, vomiting, skin itching, subfebrile and febrile temperature. In blood tests, leukocytosis was noted up to (17+3.5) x109/l, eosinophilia up to (21+6.0)%, an increase in ESR up to 36+4.0 mm/h.

Combined damage by echinococcosis of the liver and other organs, we observed in 4 (14.8%) children, all of them had damage to the liver and lung. A characteristic feature of combined echinococcosis of several organs was the diversity of local symptoms. It should be noted that in case of combined lesions of these organs, the clinical manifestations of the lungs were more pronounced.

The ultrasound method in the diagnosis of liver echinococcosis allows highly informative, non-invasively determining the number of cysts, their localization, size and complications. In the presence of an uncomplicated echinococcal cyst in the liver, a cystic formation was determined, often with a dense layered capsule, a

clear even contour, and anechoic homogeneous contents. Echinococcal cysts were localized mainly in the right lobe of the liver - in 12 children (70.5% of all detected cases of liver echinococcosis), segments 6,7,8 were more often affected.

ELISA performed before surgery in all children with hepatic echinococcosis and lung involvement revealed 15% false-negative responses, especially in lung lesions. The antibody titer was elevated in 15 people (88.2%) and ranged from 1:200 to 1:800 at the time of diagnosis. After surgical and antiparasitic specific treatment, over time, the level of antibodies decreased in all children and ranged from negative in 10 (37.0%) children to 1:100. ELISA during dispensary observation is a valuable method for detecting recurrence of echinococcosis, regardless of localization. A high antibody titer, detected 3 years after surgery, indicates the presence of a relapse of the disease.

The choice of treatment tactics was determined by us depending on the size of parasitic cysts and the stage of the disease, while sparing and low-traumatic methods were preferred. At the same time, with small single cysts and high surgical risk, the effectiveness of conservative treatment with albendazole has been proven, and drug treatment with albendazole is the main method of preventing relapse. Antiparasitic chemotherapy in the complex treatment of echinococcosis was successfully used in 27 cases: in 17 - with isolated, in 10 - with combined liver echinococcosis. The liver cysts were 18–25 mm in size. Echinococcal cyst was in the first phase of the life of the parasite.

A double contour due to chitinous and fibrous membranes, an echographic sign characteristic of EC, is not always determined in this phase, which often causes certain difficulties in differential diagnosis with non-parasitic cysts. In 6 patients, we conducted a dynamic observation for 1–2 months, during this period an increase in the size of the cyst was noted, which is typical for echinococcus. The dynamics of the echographic picture was quite characteristic: the shape of echinococcus changed, a double, uneven inner contour appeared due to detachment of the chitinous membrane, and a gradual decrease in the size of the cyst was noted.

4–5 months after treatment, an area of parenchymal heterogeneity was determined at the site of the former EC. Conservative treatment was carried out in 6 patients with combined echinococcosis of the lung and liver after echinococcectomy from the lung. Antiparasitic chemotherapy was effective in 4 patients with combined echinococcosis of the liver and lungs after echinococcectomy from the liver.

Thus, in 10 children with combined echinococcosis, chemotherapy made it possible to reduce the number of surgical interventions and at the same time prevented the recurrence of the disease. Conservative treatment of echinococcosis was complex, taking into account allergic manifestations and moderate hepatotoxicity. During the period of allergic manifestations, desensitizing drugs were prescribed, after the first course - hepatoprotectors, after the third course - enzyme therapy (creon, pancreatin) and probiotics.

The drug Nemozol (albendazole) was prescribed at the rate of 10 mg/kg per day for 28 days with a break of 14 days, 4-5 courses. After each course of therapy, a follow-up examination was carried out, with clinical and laboratory examination and ultrasound. In order to assess the functional state of the liver, markers of hepatocyte damage, cholestasis, and indicators of the synthetic function of the liver were studied. In the children we observed, there were no signs of hematological toxicity. For many decades, surgery has been the only and still remains the main method of treating echinococcosis, and a large number of combined forms require multi-stage operations.

Laparoscopic echinococcectomy (LE) was a priority for single parasitic cysts of small and medium sizes located superficially. The proportion of endoscopic surgeries was 62.9% of all operated children with echinococcal disease identified from the date of the method introduction. A comparative analysis of the results of treatment of children with EP showed the advantages of CLE compared to traditional interventions. Liver CLE compared with echinococcectomy performed by traditional abdominal surgery was characterized by low intraoperative blood loss: 30.0 ± 3.5 ml versus 120.0 ± 4.1 ml.

Less traumatic LE in comparison with the traditional one affected the general well-being of children, contributed to a smoother course of the postoperative period, a decrease in pain, restoration of motor activity and a reduction in the length of the patient's stay in the hospital. Surgical intervention in LE was carried out according to the same principles as traditional operations, that is, observance of aparasiticity (complete removal of germinal elements, preventing the parasitic fluid from entering the surrounding organs, tissues, surgical field), antiparasiticity (treatment of the residual cavity and instruments that were in contact with elements of the parasite) and suturing of biliary fistulas.

In EC with large multiple lesions of the organ and the localization of the parasitic cyst in the depths of the parenchyma, traditional echinococcectomy was performed. There is no lethality for echinococcosis in the clinic. Long-term results were studied in 16 (59.2%). With the introduction of prophylactic chemotherapy into clinical practice over the past 5 years, there has been no relapse.

Conclusions: Thus, cystic formations in the liver and lungs in areas endemic for echinococcosis most often have a parasitic nature. Echinococcosis in children is asymptomatic for a long time, which makes it difficult to diagnose and determines the detection of the disease in the complication stage. The widespread use of ultrasound screening in endemic foci is the main condition for the early diagnosis of echinococcal disease. The use of an integrated approach in the diagnosis and treatment of cystic formations allows not only to identify echinococcal cysts of various localization, but also to selectively choose the most rational treatment tactics.

Antiparasitic chemotherapy is a radical treatment for echinococcosis in children with small cysts. Laparoscopic echinococcectomy is the method of choice for single cysts of small and medium size, located superficially and in the anterior sections of the liver. This intervention, compared with the traditional one, is less traumatic and is characterized by a smoother course of the postoperative period.

For large and giant echinococcal cysts, traditional echinococcectomy should be performed with the elimination of the residual cavity. The complex use of early diagnosis, sparing methods of treatment and preventive chemotherapy can significantly increase the effectiveness of the treatment of children with echinococcal disease.

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Coordinates for contacting the author:

Miropolskaya Natalia Yurievna – Ph.D. honey. Sci., Associate Professor of the Department of Polyclinic Pediatrics with a Course in Pediatric Infectious Diseases, FESMU, 8-914-776-56-14, e-mail: miropolskayanatasha@mail.ru

DOI 10.34660/INF.2023.16.86.088

过量服用中枢性肌肉松弛剂对大脑结构的影响
THE EFFECT OF AN OVERDOSE OF MUSCLE RELAXANTS OF CENTRAL ORIGIN ON BRAIN STRUCTURES

Gubik Ekaterina Alekseevna
Candidate of Medical Sciences, Head of Department
Chita State Medical Academy

Kuzina Tatiana Vladimirovna
Candidate of Medical Sciences, Associate Professor
Chita State Medical Academy

抽象的。 该研究的目的是使用放射诊断方法研究中枢性肌肉松弛剂（巴氯芬）急性中毒时脑部物质的状态。 为了实现这一目标，我们利用计算机断层扫描（CT）和磁共振成像（MRI）评估了巴氯芬片急性中毒患者的中枢神经系统（CNS）神经组织状态。 CT 显示 50% 的病例有不同严重程度的脑水肿迹象。 MRI 显示所有患者基底神经节的变化和通路数量的减少。

关键词：计算机断层扫描、磁共振成像、中枢性肌松药、急性中毒。

Abstract*. The aim of the study was to study the state of the brain substance in acute poisoning with centrally acting muscle relaxants (baclofen) using radiation diagnostic methods. To achieve this goal, the state of the nervous tissue of the central nervous system (CNS) was assessed in patients with acute poisoning with baclofen tablets using computed tomography (CT) and magnetic resonance imaging (MRI). CT revealed signs of cerebral edema of varying severity in 50% of cases. MRI showed changes in the basal ganglia and depletion of the number of pathways in all patients.*

Keywords: *computed tomography, magnetic resonance imaging, muscle relaxants of central origin, acute poisoning.*

Introduction. Acute intoxication with various substances for any purpose, including medical ones, is considered a significant social problem [1]. According to the State Statistics Service, the number of acute poisonings, including those with fatal outcomes, is high in the Russian Federation and their frequency tends to increase over the past three years [2, 3]. According to statistics, drug poisoning (23% of the total) ranks second after alcohol poisoning and its surrogates [4]. One such drug is baclofen [3].

Baclofen is a muscle relaxant of central origin (from the Greek mios - muscle, relax - relaxation). The drug is an antagonist of gamma-aminobutyric acid, as a result of its binding to GABA receptors, nerve transmission to the muscle is inhibited, which relaxes, spasms are relieved, pain is relieved, etc. [5, 6]. Often there are situations of unintentional overdose of the drug, especially when combined with alcohol.

Thus, this problem is relevant and has wide practical significance.

Goal of the work. The aim of the study was to study the effect of centrally acting muscle relaxants on the substance of the brain after acute poisoning using radiation diagnostic methods.

Research methods. To study the questions posed, an observation group of 10 patients was formed. All of them were delivered by the SMP team to the Department of Toxicology of the Regional Clinical Hospital of Chita, Zabaikalsky Krai with acute poisoning with centrally acting muscle relaxants, in particular, baclofen tablets. The average age of the patients was 20.3±2.1 years, males predominated. The clinical comparison group included 10 healthy people without signs of poisoning, including those with a history, comparable in sex and age (the average age of which was 21.3±1.8 years).

All patients underwent computed tomography (CT) of the brain upon admission. After stabilization of the condition (on average, after 3-4 days), magnetic resonance imaging (MRI) of the brain was performed. CT was performed on a GE 128-slice tomograph; MRI was performed on a Toshiba device with a magnetic field strength of 1.5 Tesla. The study used standard sequences such as T2, FLAIR, T1, as well as additionally BB, DTI (diffusion tensor tractography), T2 *, venography, MR arteriography. All studies were performed with the informed consent of the patients.

In the course of the work, the following methods of statistical analysis were used: grouping method, arithmetic calculation, percentage detection, paired t test (Student).

Results and its discussion. Patients with signs of acute baclofen poisoning were admitted to the toxicology department with confused consciousness, most of the contacts were not available, three patients were in psychomotor agitation, one was in a coma. All of them had severe weakness, muscle hypotension, and respiratory depression. Of the somatovegetative disorders in patients, signs such as tachycardia, arterial hypotension, mydriasis, dry mouth, nausea, and sometimes vomiting were noted.

All patients underwent CT scan of the brain upon admission. CT showed signs of cerebral edema of varying severity in 5 patients (50% of cases). Most often, the changes were minimal, and manifested themselves in the form of a moderate narrowing of the ventricles and cisterns, smoothing of the furrows. In two patients

(20%), CT signs of cerebral edema were pronounced and manifested as narrowing of the ventricles and cisterns, smoothing of the sulci, a moderate decrease in the density of the brain substance, and a decrease in the degree of differentiation of white and gray matter (Fig. 1). It should be noted that clinical signs of cerebral edema were detected in 70% of cases.

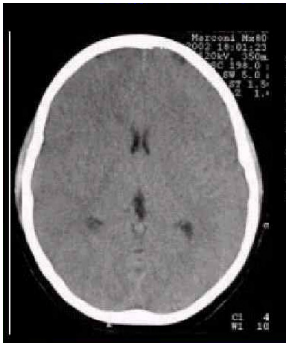


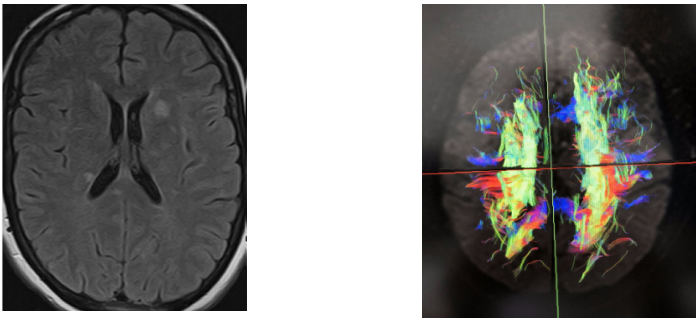
Figure 1. *Computed tomography of the brain. Diffuse edema of the substance of the brain.*

Due to the fact that at admission the patients were not available for contact, were in psychomotor agitation or with confused consciousness, MRI was not possible. This study was carried out 3-4 days (mean 6.2±2.4 days) after stabilization of the condition. Magnetic resonance imaging in 20% of cases (two patients) revealed changes in the basal ganglia in the form of a decrease in the intensity of the MR signal in the T2* sequence. In one case, foci of increased signal in T2 and FLAIR up to 5-7 mm were detected, which were interpreted as foci of acute toxic encephalopathy. When tractography in all patients (100%), depletion of the number of pathways of varying severity was noted. The greatest changes were registered in one case (young man, 17 years old, history of taking 9 tablets of baclofen together with alcohol), where the impoverishment of the tracts occurred twice as compared with the control group ($p \leq 0.01$).

It was not possible to judge the reversibility of the revealed organic changes in the brain, since the patients were discharged from the hospital 3-5 days after admission and control studies were not carried out.

It should be noted that the revealed changes in the brain during computed tomography and magnetic resonance imaging are nonspecific and are recorded in a large number of diseases. Differential diagnosis is possible with an integrated approach, subject to a careful study of clinical data and anamnesis, where there is the fact of using baclofen tablets.

The most severe clinical case of acute baclofen poisoning with the development of coma was recorded in one patient. A man R., born in 1988, was taken to the hospital by an ambulance in an unconscious state, the degree of loss of consciousness was coma, his breathing was shallow. According to the EMS doctors, it was found out that in the morning he took an unspecified amount of baclofen and cetrin for an unknown purpose. During laryngoscopy in the oral cavity, gastric contents were determined. After sanitation carried out simultaneous orotracheal intubation of the trachea. The patient was then transferred to a ventilator. In this state, MRI was technically impossible, and the patient was referred for a CT scan of the brain. CT revealed pronounced signs of diffuse cerebral edema. Improvement occurred five days later, when the patient regained consciousness. After the patient became available for questioning, it was further clarified that he had taken the pills with suicidal intent. The opportunity to conduct MRI examinations appeared 1.5 weeks after admission. MRI revealed foci of increased signal in T2 and FLAIR up to 5-7 mm, which were interpreted as foci of acute toxic encephalopathy (Fig. 2, A). At DTI, the diffuse depletion of the paths was determined by a factor of two. Changes were detected mainly in the subcortical regions (Fig. 2, B).



А *Б*

Figure 2. *Patient R., born in 1988 MRI of the brain. A. FLAIR sequence. The centers of the raised signal. B. Tractography. Diffuse impoverishment of the tracts, mainly in the subcortical regions.*

Conclusions. On the basis of the study, it was found that in acute poisoning with muscle relaxants of central origin, changes in the substance of the brain develop in the form of edema, toxic encephalopathy, and impoverishment of the tracts. The picture of damage to the nervous tissue during X-ray examination is nonspecific and should be assessed in conjunction with the data of the clinic and anamnesis.

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DOI 10.34660/INF.2023.91.77.089

用于治疗糖尿病背景下牙周炎的植物组合物
PHYTOCOMPOSITION FOR THE TREATMENT OF PERIODONTITIS ON THE BACKGROUND OF DIABETES MELLITUS

Zabrodnaya Victoria Konstantinovna
Head of Department, Lecturer
Donetsk Medical College

注解。 本文致力于探讨当前合并糖尿病患者的牙周炎治疗问题。 作者与药理学家一起开发了一种用于治疗糖尿病背景下的牙周炎的原创药用植物组合物（实用新型专利号129666“用于治疗糖尿病患者牙周病牙周袋的组合物”）。 总结了在糖尿病背景下使用药用植物组合物治疗牙周炎患者的实践经验。

关键词：植物成分、植物疗法、牙周炎、糖尿病、治疗。

Annotation. *The article is devoted to the current problem of treatment of periodontitis in patients with concomitant diagnosis of diabetes mellitus. The author together with pharmacologists has developed an original medicinal phytocomposition for treatment of periodontitis on the background of diabetes mellitus (utility model patent № 129666 “Composition for treatment of periodontal pockets in periodontal diseases in patients with diabetes mellitus”). The practical experience of using the medicinal phytocomposition in patients with periodontitis against the background of diabetes mellitus is summarised.*

Keywords: *phytocomposition, phytotherapy, periodontitis, diabetes mellitus, treatment.*

The problem of treatment of inflammatory periodontal diseases in patients suffering from diabetes mellitus, despite significant progress, remains relevant. Treatment of periodontitis against the background of diabetes mellitus (DM) is a complex problem that requires a comprehensive approach.

In the complex therapy of periodontitis against the background of diabetes mellitus, therapeutic, surgical, orthopaedic treatment is used, aimed at the elimination of inflammation in periodontal tissues, elimination of periodontal pocket, stimulation of osteogenesis [1,2]. Conservative treatment includes local and general treatment methods aimed at preventing the progression of dystrophic-inflammatory changes in periodontal tissues and the occurrence of complications [3]. One of

the possible treatment options is the use of phytopreparations and phytocompositions consisting of natural plant ingredients. Medicinal preparations of plant origin (phytopreparations and phytocompositions) are widely used in periodontology, have therapeutic (analgesic, anti-inflammatory, antimicrobial, regenerating, styptic, deodorising) and regulatory effects, affect metabolic processes and increase the body's defence properties. Phytocompositions and phytopreparations usually act milder than synthetic drugs, they have fewer undesirable side effects, including less frequent allergic reactions [4]. One of the effective stages in the complex treatment of generalised periodontitis against the background of diabetes mellitus is the use of an original medicinal phytocomposition consisting of natural plant ingredients.

The aim of this study is to investigate the effect of phytocomposition components on periodontal complex tissues in patients with diabetes mellitus and the effectiveness of treatment with this medicinal composition.

A phytocomposition is a mixture of medicinal plants that can be used for the prevention and treatment of various diseases. In case of periodontitis on the background of diabetes mellitus, the choice of phytocomposition components should take into account the specific needs of the patient, such as reducing inflammation, strengthening blood vessels and stimulating wound healing, normalising the composition of oral microflora, restoring the parameters of local immunity and interrelationships of its components. According to the data of literature sources, cases from clinical practice, the authors found out the main phytocomponents that have therapeutic effect on the state of periodontal complex tissues in patients with diabetes mellitus. After analysing the literature sources, the authors together with pharmacologists selected the ingredients, studied their properties, determined the dosage of the medicinal components included in the original medicinal phytocomposition. The main component of phytocomposition is *propolis* - it improves the condition of gums and periodontal tissues, has anti-inflammatory, immunomodulating, analgesic, antitumour and other properties. [5,6,7,8,9,10,11]. Randomised placebo controlled studies have shown that taking propolis for 6 months at 400 mg once a day improves the condition of oral mucosa, periodontium in patients with type 2 diabetes mellitus [12]. *Bee royal jelly* - in high concentrations inhibits the growth of a number of microorganisms (Escherichia coli, Staphylococcus aureus, Mycobacterium tuberculosis, salmonella, anthrax agent, etc.), stimulates tissue respiration and oxidative phosphorylation, breaks down sucrose, starch. When consumed internally, royal jelly leads to a decrease in blood glucose levels - thus, the bee product replaces the action of the hormone insulin. It is the lack of the latter that is the main cause of the danger of diabetes. In type II of the disease, the product contributes to the transition to the stage of stable compensation - regular intake will successfully maintain normal sugar levels. In

type I diabetes - the doctor may allow to reduce the daily dose of insulin [13]. *Tea tree essential oil* has a pronounced antiseptic, analgesic, prolonged deodorising effect on periodontal complex tissues. *Siberian fir essential oil* has antiseptic, analgesic, anti-inflammatory action and powerful immunomodulatory effect, increases blood flow in periodontal tissues, thus accelerating healing and shortening the recovery period.

Composition of phytocomposition, wt.%:
propolis - 35.54 (50 g.)
96% alcohol 30.43 (70 ml)
ether 13,64 (20 ml)
metronidazole 13,64 (20 ml)
Siberian fir essential oil 0.75 ml
tea tree essential oil 0.75 ml
bee royal jelly 5.25 ml.

Method of preparation of the original medicinal phytocomposition: 50 grams of propolis is finely rubbed and poured 70 ml of 96% alcohol. To the resulting mixture is added 20 ml of ether, the mixture is insisted for 5-7 days (until dissolved), shaking 2-3 times a day. It should be noted that all ingredients should be placed in a dark glass dish with a lapped lid (otherwise the solution quickly evaporates). The present mixture is filtered through 2-3 layers of gauze. Add 20 ml of metronidazole to the filtered liquid. Shelf life at a temperature of 4-10 °C 1-3 months. Indications: periodontitis (in the acute stage) against the background of diabetes mellitus. The developed original medicinal phytocomposition was tested on 30 volunteers with a history of periodontitis and diabetes mellitus. Each participant signed a voluntary consent to participate in the study after receiving information about the clinical trial and before the start of the clinical trial.

Treatment was carried out according to the scheme: at the first stage of the complex treatment local antimicrobial therapy was carried out at the appointment with a dentist: mouth rinses with 2% chlorhexidine biglucanate solution followed by application of the following composition to the gingival mucosa (20% hydrogel solution “Atoxil” was obtained from organosilicon sorbent and applied to the gingiva for 20 minutes). After sorbent therapy, cotton turundas impregnated with the original medicinal phytocomposition based on the alcohol-ether solution of propolis, metronidazole, tea tree essential oil, Siberian fir essential oil, bee royal jelly were instilled into periodontal pockets.

The second stage - local anti-inflammatory and antibacterial therapy: at home - “Metrogil-denta” gel rubbed into the gingiva 2 times a day, after brushing teeth rinse the oral cavity with “Fitodent” solution. Local anti-inflammatory and antibacterial therapy was carried out until improvement of clinical picture and disappearance of complaints, i.e. until elimination of inflammatory process in perio-

dontal tissues: absence of pain and swelling in gingiva, restoration of colour and relief of gingival margin, absence of bleeding gums.

The proposed phytocomposition for the treatment of periodontitis on the background of diabetes mellitus provides stimulation of regeneration in periodontal tissues, increases antimicrobial action, reduces the likelihood of allergic reactions. No side effects were observed during treatment. Normalisation of inflammatory processes was noted already on the 3-4 day after treatment, the duration of treatment was 7 days.

Thus, the use of phytocomposition for the treatment of periodontal pockets allows:

- enhance regeneration in periodontal tissues, simultaneously eliminate pain for a long period of time and eliminate the inflammatory process;
- to achieve persistent and rapid pain relief, reduce treatment time and the risk of allergic reactions;
- to simplify and make convenient the method of periodontal pockets treatment by one-time injection of medicinal phytocomposition into periodontal pockets;
- to provide, in the absence of toxicity and irritating effect, conditions under which wound cleansing is accelerated and tissue circulation and trophism are improved;
- use a medicinal product that eliminates the possibility of overdose, characteristic of dosage forms that are prepared immediately before use;
- use a medicinal product that does not require special storage conditions.

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DOI 10.34660/INF.2023.32.63.090

MMCC（意识集中的正念冥想）冥想作为发展情商的方法

MMCC (MINDFULNESS MEDITATION OF CONSCIOUS CONCENTRATION) MEDITATION AS A METHOD FOR DEVELOPING EMOTIONAL INTELLIGENCE

Tur Ekaterina Yurievna
physician, psychosomatologist
ORCID ID: 0009-0004-6901-2541

注解。 情商不仅在人类社会发展中发挥着重要作用，而且通过有意识的压力管理和心理自动调节技能的持续巩固，与身心健康直接相关。 MMCC（意识集中的正念冥想）冥想方法现在是一种开发人类情商的系统程序，以维持他们的身心健康并提高总体生活质量。

关键词：冥想、情商、心身学、压力、身体健康、心理健康。

Annotation. *Emotional intelligence plays an important role not only in human social development, but is also directly related to mental and physical health through both conscious stress management and the consistent consolidation of the skill of mental autoregulation. The MMCC (Mindfulness Meditation of Conscious Concentration) meditation method is now a systematic procedure for developing emotional intelligence in humans in order to maintain their mental and physical well-being and to improve the quality of life in general.*

Keywords: *meditation, emotional intelligence, psychosomatics, stress, physical health, mental health.*

Introduction

According to the World Health Organisation, psychological stress is one of the most widespread problems [1]. Modern man is subjected to colossal psycho-emotional overloads, daily faces various sources of stress impact. Stress negatively affects the psycho-emotional state, and with prolonged exposure and transition to the phase of distress is able to cause disruption of the autonomic nervous system, thereby triggering the process of bodily somatisation of emotional overstrain.

Development of emotional intelligence is a necessary part of psycho-hygiene of a modern person, and first of all it is directed on increase of level of stress resistance and self-awareness of the person. The skill of autoregulation is a multi-component procedure of self-awareness, self-observation, self-knowledge and

self-analysis, and as a result provides the ability to autoregulate one's own mental and emotional states through the development of introspection.

Meditation acts as a simple, applied method that allows the development of emotional intelligence, while positively influencing mental and physical reactions, stabilising the work of the body and psyche both through autoregulation and as a result of restoring balance in the autonomic nervous system. In the process of developing emotional intelligence a person gains the ability to independently correct the emotional sphere [2] of his own personality, to reduce the level of mental stress, which favourably affects his physical and mental health.

The peculiarity of meditation as a method of emotional intelligence development lies not only in its simplicity of application, but also in the possibility of consistent development of the most complex skill of interospection, which is a key link in human self-knowledge and provides the formation of personality integrity and attention management as a whole. In this article we will consider the MMCC (Mindfulness Meditation of Conscious Concentration) meditation method as part of an integrative approach to the development of emotional intelligence.

Emotional intelligence

Anyone can get angry - that's easy. But getting angry at the right person, to the right degree, at the right time, for the right purpose and in the right way is not easy.

- Aristotle, "Nicomachean Ethics".

Emotional intelligence (EI) is the ability to manage both one's own emotions and the ability to understand and recognise the emotions of others. The study of emotional intelligence using psychological tests and a comprehensive scientific approach began in 1990 by researchers P.Salovey and J.Mayer [3,4]. One of the first definitions of emotional intelligence labelled it as "the ability to monitor one's own and others' feelings and emotions, distinguish them and use this information to guide thinking and form subsequent actions".

The founders of the term distinguished four levels of emotional intelligence development: emotional perception, the ability to reason using emotions, the ability to understand (recognise) one's own emotions and the ability to manage emotions [5]. In a literature review of research and writings on emotional intelligence from 2019, the levels of development were expanded and specified: emotionality = perceiving emotions; self-control = regulating emotions in oneself; sociability = regulating emotions in others; well-being = strategic use of emotions [6].

It has also been suggested to revisit the 2018 term for emotional intelligence as "the ability to recognise, understand and use emotions positively to cope with anxiety, communicate well, empathise, overcome problems, solve problems and manage conflict" [7]. What makes this definition different is the emphasis on the fact that through the development of emotion management skills, anxiety and stress levels can be reduced using self-monitoring, self-reflection and autoregulation.

Such an approach to comprehensive anxiety reduction significantly increases the compliance of psychologist's clients and psychotherapist's patients, turning them into active participants in the process. The development of emotion management skills has a favourable effect on the psycho-emotional state, gradually allowing to expand the understanding of one's own mental and emotional processes. The ability to cope with anxiety, reduce stress levels with focused attention and cope with psycho-emotional overstrain is indispensable for modern man.

The results of frontal research have shown that methodical development of emotional intelligence in children and adults leads to improved social relations in children and an increase in their academic performance, improved social relations in adults, a more positive perception of people around them, increased stress resistance and improved learning in general [8].

Problems in the development of emotional intelligence are mainly related to low level of public education, high stress loads and low level of self-awareness. At present, there is no proper attention to the development of this type of intelligence neither in children nor in adults. At the same time, emotional intelligence plays an important role in human life, influencing relations with other people, the ability to communicate effectively and resolve conflicts. Lack of developed emotional intelligence can lead to problems in personal and professional life. Interest in how emotional intelligence can influence an individual's academic, professional, and social developmental success has grown significantly in recent years

In addition, the modern world is becoming increasingly complex and requires individuals to be adaptable and able to manage their emotions. Stress, conflicts, continuous changes - all these provoke negative emotions, and the ability to control them becomes an important skill. In general, the development of emotional intelligence is relevant and important in the modern world to preserve mental and physical health of a person [9].

Meditations: from autoregulation to emotion management

Self-regulation or autoregulation is the ability to monitor and manage one's emotional behaviour and mental processes both during rest and during stressful situations [10]. Autoregulation is one of the stages of developing emotional intelligence through the method of meditation.

Meditation today is a tool for increasing awareness and conscious control of focus of attention used in psychological, psychotherapeutic and psychosomatic practice. Meditation is a systematic procedure for becoming aware of one's own mental experience and perception of ongoing mental processes. Mindfulness is a skill developed through regular meditation practice that allows a person to focus on their inner experiences and states such as bodily sensations, thoughts and emotions. Increased mindfulness provides an opportunity to master the skill of self-management, self-reflection, reduces the impact of negative stress affect and increases a person's resilience and ability to cope with stressful situations [11].

MMCC - stages in the development of emotional intelligence

The MMCC (Mindfulness Meditation of Conscious Concentration) meditation method is based on the step-by-step development of autosurveillance, autoregulation and autoprogramming skills [12] through conscious management of emotional intelligence, improvement of emotion mastery and increase of stress tolerance. At the first stage, the skill of autosurveillance is formed while listening to the sound accompaniment of meditation, when a person shifts the focus of attention to the awareness and perception of his/her own thoughts, emotions and feelings.

One recognises, analyse and interospection of mental and emotional states directly in the moment of listening to the meditation. Gradually relaxing and monitoring one's own mental and emotional reactions, one learns the skill of autono-observation of both mental and later physical processes (controlling spontaneous movements, beginning to feel one's body, to take a more comfortable position, to focus attention on bodily relaxation of body parts that are under prolonged tension, to control the process of breathing, etc.).

At the second stage, the process of autoregulation itself begins, when, with the help of awareness of mental, emotional and bodily reactions, a person learns to switch attention from irritating negative impulses to positive ones. The phenomenon of autoregulation is still being studied by the medical and psychological communities, and we can already say that regular listening to meditations increases the level of self-awareness in general, stimulating an increase in the quality of human life through the subsequent transition of awareness into cognition [13,14] and conscious management of life spheres.

Increased interoceptive sensitivity [15] makes one more receptive to the reactions of one's own mind and body. Interoception refers to the conscious perception of body signals, and its development opens the medical community to the potential of meditation as a neuro-cognitive model of autoregulation with positive effects on the mental and physical health of modern humans.

Mental health is another aspect affected by meditation. As the positive emotions evoked by meditation help in resolving various mental health problems such as social anxiety disorder, post-traumatic stress disorder (PTSD), anxiety and depression. In general, mastering the skills of autoregulation and autogenic relaxation shows certain positive effects on all areas of human life. However, the extent of the effect is currently not fully known.

After development of introspection and interoception there is a transition to the next level of development of emotional intelligence by means of meditation - it is autoprogramming. A person with regular listening masters the skill of creating certain positive programmes that influence not only the living of one particular day or the solution of one particular task, but in general has a favourable effect on his psycho-emotional stability. The ability to create mental and emotional pro-

grammes is the fourth level of emotional intelligence and allows a person to fully manage his/her mental state and even physical processes, providing self-recovery of the organism in functional psychosomatic disorders.

Conclusion

MMSS is a method of emotional intelligence development, which complements a complex approach to work with psychological and psychosomatic problems. The effectiveness of the method is due to the development of the autoregulation skill, with the help of which it becomes possible to autoregulate psycho-emotional processes, increase the level of awareness and master emotional intelligence in general.

Positive results are also achieved by learning autogenic relaxation skills as a result of regular listening to meditations. The work of the nervous system and digestive system improves, metabolic processes are restored and the body's work is stabilised, including through the restoration of the activity of the parasympathetic nervous system. The development of emotional intelligence has a favourable effect on the mental health of modern man, increasing the quality of life and improving his psycho-emotional state of health and the organism as a whole.

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DOI 10.34660/INF.2023.12.22.091

益生菌苏巴林联合疫苗对肉食动物疾病、肉毒杆菌中毒、假单胞菌病和水貂病毒性肠炎的免疫刺激作用

IMMUNOSTIMULATORY EFFECT OF THE PROBIOTIC SUBALIN IN IMMUNIZATION WITH THE ASSOCIATED VACCINE AGAINST CARNIVORE DISEASE, BOTULISM, PSEUDOMONOSIS, AND MINK VIRAL ENTERITIS

Okulova Iraida Ivanovna
Candidate of Veterinary Sciences, Associate Professor
All-Russian Scientific Research Institute of Hunting and Animal Husbandry named after Professor B. M. Zhitkov

Berezina Yulia Anatolievna
Candidate of Veterinary Sciences, Senior Research Officer
All-Russian Scientific Research Institute of Hunting and Animal Husbandry named after Professor B. M. Zhitkov

Domsky Igor Alexandrovich
Doctor of Veterinary Sciences, Full Professor, Corresponding Member of the Russian Academy of Sciences
All-Russian Scientific Research Institute of Hunting and Animal Husbandry named after Professor B. M. Zhitkov

Relevance. The drug used in the work was subalin, which is based on the Bacillus subtilis strain 2335/105, containing a recombinant plasmid with the human interferon a-2 gene, producing alpha 2-interferon (RF Patent No. 1839459). (Belyavskaya V.A., 1992). The biological product, along with an immunomodulatory effect and high antibacterial activity, has antiviral properties [1]. Subalin differs from antibiotics in having a zero waiting period, i.e. sales of commercial products can be carried out immediately after a course of treatment or prevention; lack of addiction, because the drug does not cause the formation of resistant strains; harmlessness in concentrations thousand times higher than recommended. This cytokine is one of the key factors in the body's nonspecific resistance in viral diseases. The use of bacteria of the genus Bacillus, due to their high adaptive capabilities, is widespread in nature and, in particular, in those objects with which animals come into most close contact (food, water, air, etc.) [2]. That is why bacilli constantly

and in significant quantities enter the body of animals and, since they are resistant to lytic and digestive enzymes, remain viable throughout the gastrointestinal tract. Consequently, aerobic spore-forming bacteria of the genus Bacillus are one of the important components of exogenous microflora.

Materials and methods. Research on minks was carried out on the basis of the veterinary laboratory of the SRI All-Russian Research Institute of Hunting and Fur Farming (SRI ARIHFF) named after. prof. B.M. Zhitkov Rosselkhozakademii, LLC fur breeding plant "Vyatka" Kirov region. Used in this work: Vaccines. Experimental series of associated vaccine: Bionor - RAV (manufacturer Biocenter) against parvovirus enteritis, botulism and pseudomonosis (solvent for Bionor-D), series No. 0133 PVR -1-2.3/01288. Bionor-D vaccine against canine distemper (200 doses), series No. 0134, PVR-1-2.3/01288.

Probiotic. Biological product subalin, which is an immobolized dried spore biomass of the bacteria Bacillus subtilis (bacillus subtilis), strain 2335/105 VKPM B4759, containing a recombinant plasmid with the human interferon α-2 gene (RF Patent No. 1839459).

The experiment involved 160 commercial young minks of 60 days of age, immunized with the above-mentioned associated vaccine, from which experimental and control groups were formed according to the principle of analogues. Animals of the experimental group (80 animals), in addition to the traditional feeding ration, received the drug subalin at a dose of 0.5 x 109 CFU per animal once a day in 5-day courses with 10-day breaks. A control group of minks (80 heads) - with the traditional feeding method without the addition of a probiotic.

The work used various methods for studying the immunomorphological parameters of blood serum: protein fractions were determined using the nephelometric method, LASK - in accordance with the method of V. G. Dorofeychuk, concentrations of cholesterol, alkaline phosphatase (ALP), alanine aminotransferase (ALAT), aspartate aminotransferase (AST) - using a semi-automatic biochemical analyzer "Biochim SA" (USA, 2019). For this purpose, reagents from High Technology (USA, 2019) were used. BASK was studied according to the method of T.A. Kuzmina. Indicators of phagocytic activity of neutrophils were determined using the method of Labinskaya A.S. with the calculation of the Strieter numerical index. The resulting digital materials were processed on an IBM personal computer using the Statgraphics and HG statistical software package. Considering the small sample size in each group, the nonparametric Wilcoxon–Mann–Whitney test (U) was used to compare the studied parameters between different groups; differences were considered statistically significant at $p \leq 0.05$.

Experiments on animals were carried out in accordance with the basics of experimental work in animal husbandry [3], and methodological guidelines for conducting scientific and economic experiments on feeding on fur-bearing animals

[4]. The work was carried out in compliance with the international principles of the Declaration of Helsinki on the humane treatment of animals, the principles of humanity set out in the European Community Directive (86/609/EC). “Rules for carrying out work using experimental animals” [5].

Research results. When immunizing minks, the body’s reaction to the introduced antigens was noted. After vaccination on the 7th day, the experimental group of animals showed an increase in leukocytes by 24%, lymphocytes by 10% and monocytes by 36% against the background of a decrease in granulocytes by 12% compared with the corresponding indicators of the control group of animals. On days 14 and 21 after immunization, pronounced leukocytosis and lymphocytosis were noted in minks that received subalin. On the 28th day of the experiment, there was a tendency towards a decrease in the level of leukocytes and lymphocytes, but the studied indicators were higher than in the control group of animals by 61% and 60%, respectively (Table 1).

Table 1

Dynamics of hematological parameters of minks vaccinated with an associated vaccine against canine distemper, botulism, pseudomonosis and viral enteritis

Indicators	7 days	14 days	21 days	28 days
Control group				
Leukocytes, 109/l	3,3±0,13	7,0±1,2	9,5±0,5	6,0±0,05
Lymphocytes,%	41,5±0,43	55,0±3,8	54,25±3,19	42,6±4,13
Monocytes,%	6,7±0,363	6,2±0,02	6,8±0,04	6,38±0,02
Granulocytes,%	49,7±1,2	37,8±3,7	38,35±3,2	45,4±2,4
Red blood cells, 1012/l	2,9±0,03	3,0±0,02	3,7±0,27	3,6±0,06
Hemoglobin, g/l	115±2,37	119±10,3	118±0,8	116±2,17
Control group				
Leukocytes, 109/l	7,4±0,41**	11,3±0,6**	11,2±0,3**	9,7±0,16**
Lymphocytes,%	46,12±1,5**	65,1±3,0**	70,2±2,1**	68,3±6,8**
Monocytes,%	4,9±0,51**	7,0±0,34**	7,3±0,02**	7,0+0,2**
Granulocytes,%	55,76±1,6**	28,1±3,0**	22,1 ±1,9**	24,3±1,4**
Red blood cells, 1012/l	4,0±0,1**	5,6±0,3**	4,9±0,1**	5,0±0,3**
Hemoglobin, g/l	137±5,2**	148±5,5**	142±1,4**	144±3,16**

Note: $p<0,05$ - **

When analyzing the results of biochemical studies of blood serum starting from the 7th day after immunization and throughout the experiment, in the animals of the experimental group there was a tendency to increase the level of total protein, the fraction of γ-globulins and β-globulins with a simultaneous decrease in the concentration of albumins compared with analogues from the control . The

maximum values of protein metabolism indicators were noted on the 14th and 21st days after vaccination in minks of the experimental group. The content of γ-globulins was higher by 78% and 84%, β-globulins by 26% and 32%, respectively, compared to the group of immunized animals receiving a standard diet. On the 28th day after vaccination, the use of subalin contributed to maintaining a fairly high level of the above globulin fractions that are part of the antibodies (Table 2).

Table 2

Dynamics of biochemical parameters of blood serum of minks vaccinated with an associated vaccine against canine distemper, botulism, pseudomonosis and viral enteritis

Indicators	7 days	14 days	21 days	28 days
Control group				
Total protein, g\l	76,2±0,2	84,76±1,1	70,61±1,4	72,3±1,6
Albumin,%	59,3±1,1	58,8±1,4	55,9±0,1	58,6±0,2
α-globulins,%	23,3±0,07	20,7±1,3	24,3±0,5	24,4±0,07
β-globulins,%	7,8±0,02	8,1±0,05	7,9±0,06	7,2±0,08
γ-globulins,%	9,6±0,7	12,4±0,7	11,9±0,09	9,8±0,03
A/G	1,45	1,42	1,26	1,41
Experiment group				
Total protein, g\l	79,0±0,6**	87,21±1,2**	81,24±4,3**	80,8±1,8**
Albumin,%	52,9±0,07**	50,3±0,8**	51,0±0,05**	52,6±0,02**
α-globulins,%	22,1±0,03**	17,4±0,04**	16,7±0,7**	23,4±0,03**
β-globulins,%	9,7±0,3**	10,2±0,02**	10,4±0,6**	9,8±0,2**
γ-globulins,%	15,3±1,1**	22,1±1,1**	21,9±0,4**	17,3±0,6**
A/G	1,12	1,01	1,04	1,04

Note: $p<0,05$ - **

On the 7th day of the experiment, in the minks of the experimental group, the lysozyme activity of the blood serum exceeded the control values by 9%, and the bactericidal activity by 39%. At later stages of the study, these natural resistance factors in minks receiving subalin remained at a fairly high level and were higher compared to animals kept on a standard diet on the 14th day by 10% and 46%; on the 21st day by 8% and 27%, on the 28th day by 11% and 50%, respectively (Table 3).

Table 3

Dynamics of immunological parameters of blood serum of minks vaccinated with an associated vaccine against canine distemper, botulism, pseudomonosis and viral enteritis

Indicators	**7 days**	**14 days**	**21 days**	**28 days**
Control group				
Lysozyme act.	49,6±0,2	51,5±0,3	51,0±0,6	49,2±0,7
Bactericidal act.	38,9±1,6	50,7±1,2	59,3±1,1	45,6±0,9
Experiment group				
Lysozyme act.	54,1±1,7**	56,7±0,8**	55,2±1,4**	54,6±1,5**
Bactericidal act.	54,2±3,8**	74,5±2,9**	75,6±3,1**	68,6±4,3**

Note:p<0,05 - **

When performing an HIT, an increase in the antibody titer in the blood serum of animals of both groups was found to occur throughout the entire experiment, but they reached their maximum value on day 21 after vaccination. At a later date, they gradually decrease. It was noted that the antibody titer in animals whose diet was introduced with subalin was 14% higher on the 7th day after immunization, 37% higher on the 14th day, 30% higher on the 21st day, 30% higher on the 28th day. 33% compared to similar indicators in animals of the control group (Table 4).

Table 4

Dynamics of antibody titers in minks vaccinated with an associated vaccine against canine distemper, botulism, pseudomonosis and viral enteritis

Study period after vaccination	**Antibody titers in vaccinated animals in lg_2 to parvovirus enteritis**	
	without introducing subalin into the diet	**with the introduction of subalin into the diet**
7 days	1,4	1,6**
14 days	1,6	2,2**
21 day	2,0	2,6**
28 days	1,8	2,4**

Note: p<0,05 - **

Studies have shown that the introduction of subalin into the diet of minks according to the specified scheme provides more intense antibody formation due to the immunostimulating effect of the probiotic. Subalin is an effective adjuvant for immunization of minks with an associated vaccine against canine distemper, botulism, pseudomonosis and mink viral enteritis. An increase in the level and duration of a specific immune response to the diphtheria and tetanus components of the DTP vaccine was established with oral administration of a probiotic before

vaccination [6]. In all cases, subalin contributed to increasing the immunogenicity of the vaccines used.

Conclusions:

1. Subalin has a positive effect on the immune status of minks: it increases the bactericidal and lysozyme activity of blood serum, the level of total protein, the content of γ- and β-globulin fractions;
2. An increase in the titer of specific antibodies during experimental oral immunization with live vaccine against salmonellosis was established by 2 times, as well as an increase in the number of antibodies during vaccination against canine distemper by 27%;

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DOI 10.34660/INF.2023.68.42.092

动态条件下钴铜镍矿细菌化学浸出产品溶液中金属吸附的研究
STUDY OF METAL SORPTION FROM PRODUCT SOLUTIONS FOR BACTERIO-CHEMICAL LEACHING OF COBALT-COPPER-NICKEL ORES UNDER DYNAMIC CONDITIONS

Belova Tatiana Pavlovna
Candidate of Technical Sciences, Leading Researcher
Research Geotechnological Center
Far Eastern Branch of Russian Academy of Sciences (RGC FEB RAS),
Petropavlovsk-Kamchatsky, Russia

抽象的。 在本文中，数据显示了阳离子阳离子 KU-2-8 对细菌化学浸出的实际硫酸盐溶液中共同存在的铁、钴、镍、铜和镁的吸附能力，通过使用下降的溶液流进行研究 具有阳离子聚合物KU-2-8固定床的柱。 洗脱曲线用于计算每种混合物组分的实际最大吸附容量和突破前的容量。 氢型阳离子阳离子的实际总动态交换容量估计为 2.328 meq/g。 铁、镍和镁阳离子砂吸附柱填充量为 50%，钴和铜阳离子吸附柱填充量为 74% 时出现突破。 Thomas 模型和 Adams-Bohart 模型是最常用于计算吸附过程技术参数的数学模型。 总托马斯系数 kTh 为 0.465 ml/meq min。 Adams-Bohart 模型可用于描述高达 90% 柱填充的复杂细菌化学浸出溶液的吸附。 总动力学 Adams-Bohart 系数 KAB 为 0.549 ml/meq min。 获得的数据可用于预测操作过程中洗脱曲线的形状以及工业吸附柱的成功设计和操作。

关键词：吸附，吸附容量，铜，镍，钴，铁，磺基阳离子。

Abstract. *In this article, data is presented the sorption ability of the cationite KU-2-8 for iron, cobalt, nickel, copper and magnesium that are jointly present in real sulfate solutions of bacterio-chemical leaching are investigated by using a descending solution flow through a column with a fixed bed of the cationite KU-2-8. The elution curves are used to calculate the practical maximum sorption capacity and the capacity before breakthrough for each mixture component. The practical total dynamic exchange capacity of the hydrogen form of cationite is estimated at 2.328 meq/g. A breakthrough occurs at 50% of sorption column filling for iron, nickel and magnesium cation sand at 74% of sorption column filling for cobalt and copper cations. The Thomas and Adams–Bohart models are the mathematical models that are most frequently used to calculate the technological parameters of the sorption process. The total Thomas coefficient* k_{Th} *is 0.465 ml/meq·min. The*

Adams–Bohart model can be applied to describe sorption from complex bacteriochemical leaching solutions up to 90% column filling. The total kinetic Adams–Bohart coefficient K_{AB} is 0.549 ml/meq·min. The obtained data can be used to predict the shape of elution curves during operation and for the successful design and operation of industrial sorption columns.

Keywords: *sorption, sorption capacity, copper, nickel, cobalt, iron, sulfocationite.*

Introduction

Currently, there is an urgent need to develop efficient and environmentally friendly technologies for the extraction of nickel from sulfide ores to obtain a highly profitable product. Profitability can be increased by applying an integrated approach regarding the use of natural resources, the development of closed technological schemes and a decrease in environmental risks in the areas where mining and mineral processing plants are located. Geotechnological techniques, such as heap, dump and underground leaching, are widely used in industry to extract metals from mineral raw materials. Promising are the studies on the development of the bacterium technology of chemical leaching of sulfide cobalt-copper-nickel ores. The disadvantages of the proposed schemes are the process duration, which can reach 20–30 days, and the high content of by-products – iron and magnesium – in the product leaching solutions. Sorption and extraction are used to process sulfate solutions. Sorption of heavy metal ions is performed using synthetics sorbents, minerals and biosorbents [1, 2]. Many researchers have studied the sorption of heavy metal ions by sulfo-cationites. Alyüz and Veli [3] investigated the kinetics and equilibrium of ion exchange for the removal of nickel and zinc from an aqueous solution using a Dowex HCR S/S resin. Dowex M4195 ion exchange resin is used to separate nickel and cobalt from lithium-ion battery recycling solutions [4]. Makovskaya et al. [5] studied the issues of using sorption for the processing of sulfate solutions and galvanic sludge. Second-order reaction kinetics can effectively describe the removal of Ni^{2+} and Zn^{2+} cations [6]. El-Naggar et al. carried out sorption removal of caesium and cobalt ions from aqueous solutions in a fixed-bed column filled with a Lewatit S100 cation exchange resin, which is an analogue of KU-2-8. A packed column of Amberlite IR-120 [7] was used in periodic recirculation mode as an effective technology to reduce the nickel content in galvanic production wash waters to less than 1 mg/l. Other researchers have studied the sorption of heavy metal ions by mineral sorbents [8–10]. Sorption of copper, nickel, cobalt and iron by natural zeolite in dynamic conditions [8] and modified zeolite in batch conditions [9] from aqueous solutions have been investigated. The potential of a low-cost Nigerian montmorillonite for the adsorption of Ni(II) and Mn(II) ions from an aqueous solution was investigated by batch mode

[10]. The zeolite was modified [11] by the introduction of TiO_2 which resulted in an increase of zeolitic sorbent effectiveness in relation to Mn(II) and Fe(III).

We have previously shown [9, 11, 13] that one of the ways to increase the leaching rate and thereby reduce the leaching time is to remove the product solution from the reaction zone and use sorption to extract valuable components, such as nickel, copper, cobalt and iron, from the solution. Studies on the sorption processing of sulphate leaching solutions are urgently required because of the complexity of the solution composition.

According to the adsorption method, scientists distinguish between static [3, 9, 12] and dynamic sorption [11, 15, 16]. In production, adsorption is usually carried out using sorption columns under dynamic conditions. Consequently, there is a need to study the sorption process in columns under dynamic conditions. The sorption efficiency of a solution being filtered through a column depends on the solution composition and concentration, the presence of competing ions in the solution, the filtration rate, the height of the sorption layer, etc.

The aim of this research is to determine the sorption characteristics of sulfo-cationite for copper, nickel, cobalt and iron under dynamic conditions.

Research materials and methodology

The cationite KU-2-8 was prepared using a well-known standard technique that we have used previously [8, 11]. Initially, the resin was passed through a cascade of laboratory sieves, and 0.5–1.0 mm fractions were isolated. Dilute hydrochloric was poured onto the resin (in a 1:4 resin: acid volume ratio), and the resin was left for 24 hours During this settling period, the resin swelled and became saturated with hydrogen ions, and the dissolution of impurities, mainly iron, was observed. A day later, the resin was washed with hydrochloric acid for 5–10 min, and this procedure was repeated until a negative ammonium thiocyanate test for the presence of iron was obtained. The resin was then thoroughly washed with distilled water and placed in a column. The sorption column was a 10-mm-diameter glass tube, the height of the sorbent layer was 140 mm, elution was carried out by the descending flow method, and the volumetric flow rate was maintained at 1 ml/min. The solutions leaving the column were subjected to chemical analysis. The contents of copper, nickel, cobalt, and iron were determined by the atomic absorption method, where atomization was performed in an air-acetylene flame using an AA-6300 Shimadzu (Japan) according to standard methods.

A real solution for use in the experiments was obtained from primary processing of a product solution for the bacterio-chemical leaching of cobalt-copper-nickel-ores [12]. The composition of the solution was as follows, mg/l (meq/l): iron – 5300 (190), nickel – 1860 (63.4), magnesium – 376 (30.9), copper – 130 (4.09), and cobalt – 53.1 (1.80).

Research results and discussion

Various models are used to describe the dynamics of sorption in columns with a fixed bed of sorbent. It is convenient to describe the operating characteristics of a column with a fixed bed using breakthrough curves [3–5], which are plots that shows how C_t/C_o (where C_t and C_o are the concentrations of metal ions at the outlet and inlet of the column, respectively) depends on the volume or outflow time. The adsorption capacity of a column depends on the flow rate and the height of the adsorbing layer. The sorbent capacity is higher in dynamic mode than in static mode, because a large constant concentration gradient at the interface is maintained under dynamic conditions, whereas the concentration constantly decreases in static mode until equilibrium is reached.

The Thomas model is one of the most general and widely used models in the theory of column productivity [1-3, 7]. The Thomas model is based on the assumption that the sorption process follows Langmuir adsorption-desorption kinetics without axial dispersion The main advantages of this model are ease of use and adequate consistency in predicting breakthrough curves under various operating conditions. The model equation is as follows:

$$\frac{C_t}{C_0} = \frac{1}{1+\exp\left(\frac{K_{Th}}{Q}(q_0 M - C_0 V)\right)}, \quad (1)$$

where C_0 is the concentration of sorbate at the column inlet, mg/ml; C_t is the sorbate concentration at the column outlet, mg/ml; K_{Th} is the Thomas rate constant, ml/min·mg; q_0 is the adsorbent equilibrium capacity (mg/g); M is the mass of the column loading, g; Q is the volumetric flow rate (ml/min); and V is the volume of the solution that has passed through the column, ml.

Equation (1) can be written in a form that shows the linear dependence of the coordinate $ln\left(\frac{C_0}{C_t}-1\right)$ on V:

$$ln\left(\frac{C_0}{C_t}-1\right) = \frac{K_{Th} q_0 M}{Q} - \frac{K_{Th} C_0}{Q} V \cdot \quad (2)$$

Taking into account that $V = Q \cdot t$, the logarithmic form of the Thomas equation (Equation (2)) is represented by Equation (3), in which the coordinate $ln\left(\frac{C_0}{C_t}-1\right)$ depends on t:

$$ln\left(\frac{c_0}{C_t}-1\right) = \frac{K_{Th} q_0 M}{Q} - K_{Th} C_0 t. \quad (3)$$

The experimental data was used to plot the metal concentration (meq/l) at the column outlet versus time (Fig.1). To calculate the degree of sorbent filling, the total metal concentrations were plotted versus time (meq/l). Taking into account the solution complexity and the considerable variation in the metal concentrations, the iron, nickel and magnesium ion concentrations, as well as the total metal ions concentrations, were plotted along the main y-axis, and the concentrations of copper and cobalt ions were plotted along the auxiliary y-axis.

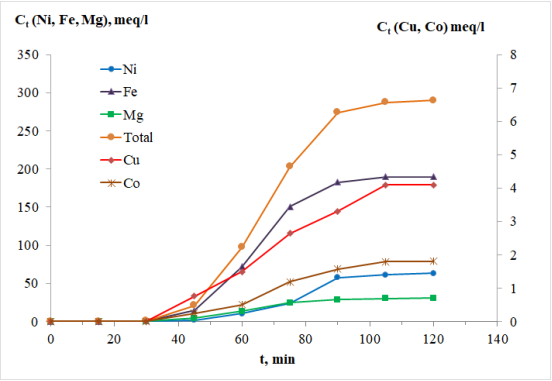

Figure 1. *Graph showing the dependence of the metal ion concentration (C_t) at the sorption column outlet on time: the iron, nickel and magnesium ion concentrations are shown on the main axis, and the copper and cobalt ion concentrations are shown on the auxiliary axis*

The elution curves are S-shaped. The maximum total sorption capacity achieved in practice is 2.328 meq/g. The maximum sorption capacity for each metal is as follows, meq/g: Fe^{2+} – 1.46; Ni^{2+} – 0.59; Mg^{2+} – 0.23; Cu^{2+} 0.033; and Co^{2+} – 0.015. A breakthrough of iron, nickel, and magnesium ions occurs at 50% filling of the column, while cobalt and copper ions start to break through at 74% of column filling. If the working sorption capacity is taken to be 74% of the column filling, then the cationite total capacity constitutes 1.72 meq/g, and the individual cation capacity is as follows, meq/g: Fe^{2+} – 1.12; Ni^{2+} – 0.38; Mg^{2+} – 0.18; Cu^{2+} 0.023; and Co^{2+} – 0.011.

To calculate the Thomas sorption rate constant (K_{Th}, ml/min·mg), the maximum adsorbent equilibrium capacity (q_0, mg/g) was plotted according to Equation (3), that is, the $ln\left(\frac{c_0}{c_t}-1\right)$ coordinate was plotted versus t. The data are presented in Fig. 2 a and b and in Table 1. The high R^2 correlation coefficients indicate the applicability of the Thomas model for describing metal ion sorption by KU-2-8 sulfo-cationite from bacterio-chemical leaching solutions for cobalt-copper-nickelores.

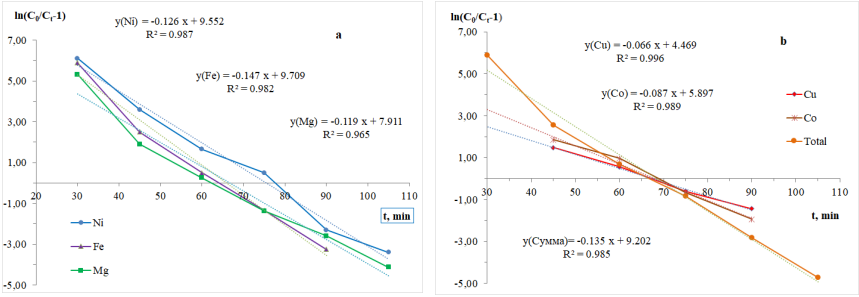

Figure 2. *The dependence of* $\ln\left(\frac{C_0}{C_t}-1\right)$ *on time according to the Thomas model (Equation 3): a – iron, nickel and magnesium cations; b – copper, cobalt cations and total equivalent cation concentration*

Table 1

Regression equation coefficients, sorbent capacity and Thomas model constants (3)

Solution component	Regression equation coefficients		Thomas model constant	Sorbent capacity		Correlation coefficient
	a	b	K_{Th}, ml/mg·min	q_0, mg/g	q_0, meq/g	R^2
Fe	0.147	9.709	0.028	47,2	1.69	0.982
Ni	0.126	9.552	0.068	19,0	0.64	0.987
Mg	0.119	7.911	0.502	2,13	0.278	0.965
Cu	0.066	4.469	0.509	1,19	0.037	0.996
Co	0.087	5.897	1.632	0,49	0.017	0.989
Sum	0.135	9.209	0.465 ml/meq·min	–	2.675	0.985

The R^2 correlation coefficients are in the range of 0.982–0.996, except for magnesium, for which R^2 is 0,965. The theoretically calculated sorption capacity is 2.675 meq/g, which is 12.9% higher than the practical maximum capacity.

The Adams–Bohart model [1, 2, 7] is mainly used to perform calculations on the initial portion of the output curve and is described by the equation

$$\frac{C_t}{C_0} = \exp\left(K_{AB}C_0 t - K_{AB}N_0\frac{Z}{U}\right), \quad (4)$$

where K_{AB} is the kinetic Adams–Bohart coefficient, ml/mg·min; Z is the height of the sorbent layer in the column, cm; N_o is the saturation concentration, mg/ml; and U is the linear velocity calculated by dividing the volumetric flow rate by the column cross-sectional area, cm/min.

Equation (4) is the logarithmic form of this model:

$$ln\frac{C_t}{C_0} = K_{AB}C_0t - K_{AB}N_0\frac{z}{U}. \quad (5)$$

The Adams–Bohart equation parameters are calculated by linearly regressing data for $ln\frac{C_t}{C_0}$ versus t (5).

To calculate the coefficients of the Adams–Bohart model, $ln\frac{C_t}{C_0}$ was plotted against time (as per Equation (4, 5). The data are presented in Fig. 3 a and b. The calculations were performed using the linear regression method. The regression equation coefficients, the kinetic coefficient K_{AB} (ml/mg·min) and the saturation concentration N_0 are presented in Table 2.

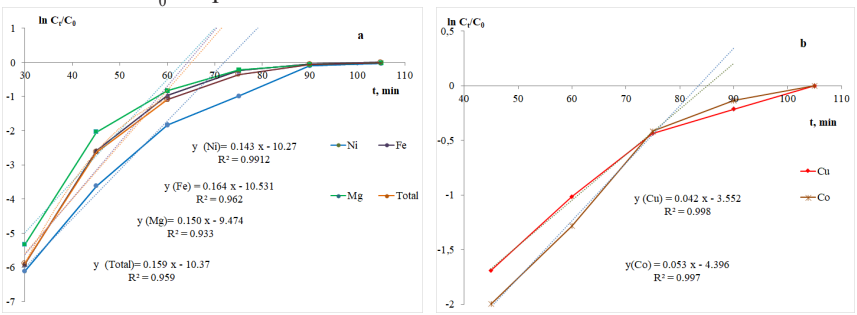

Figure 3. *The dependence of $ln\frac{C_t}{C_0}$ on time according to the Adams–Bohart model (Equation 5): a - iron, nickel, magnesium cations and total equivalent cation concentration; b - copper and cobalt cations*

Table 2

Regression equation coefficients, saturation concentration and Adams–Bohart model constant (5)

Solution component	Regression equation coefficients		Adams–Bohart model constant	Saturation concentration		Correlation coefficient
	a	b	K_{AB}, ml/mg·min	N_0, mg/ml	N_0, meq/ml	R^2
Fe	0.164	10.53	0.031	21.50	0.771	0.962
Ni	0.143	10.27	0.077	8.459	0.287	0.991
Mg	0.150	9.474	0.399	1.502	0.123	0.933
Cu	0.042	3.550	0.322	0.698	0,022	0.998
Co	0.053	4.396	0.994	0.279	0.009	0.997
Sum	0.159	10.37	0.549 ml/ meq·min	–	1.194	0.959

For nickel, copper and cobalt ions, the correlation coefficients are in the range of 0.991–0.998, whereas for R^2 is 0.962 for iron ions and 0.933 for magnesium ions. Note that $ln\frac{C_t}{C_0}$ is linear in time up to 90% sorbent filling.

Conclusion

An experimental study was conducted on using KU-2-8 sulfo-cationite to adsorb heavy metals from bacterio-chemical leaching solutions with complex compositions for cobalt-copper-nickel-ores, and the results showed that breakthrough occurred at 50% sorption column filling for iron, nickel and magnesium cations and at 74% column filling for cobalt and copper cations. The Thomas coefficient was calculated for individual cations and total cations. The total Thomas coefficient was 0.465 ml/meq·min. The Adams–Bohart total kinetic coefficient was 0.549 ml/meq·min. Based on the results obtained by laboratory modelling we can recommend the use of KU-2-8 cation-exchange resin for processing of solutions of bacterial-chemical leaching as well as for the extraction of heavy metals from contaminated mine, pit and waste waters produced by hydrometallurgical plants.

Acknowledgements

The author would like to appreciate the director of the RGC FEB RAS Pashkevich R.I. and to referent Karazia A.I. for translation into English.

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DOI 10.34660/INF.2023.76.40.093

多层钢材的再结晶特征
CHARACTERISTICS OF RECRYSTALLIZATION IN MULTI-LAYERED STEEL MATERIALS

Gavrilova Polina Aleksandrovna
Master
Bauman Moscow State Technical University

Plokhikh Andrey Ivanovich
Associate Professor, Head of Department
Bauman Moscow State Technical University

注解。 本文考虑了再结晶对不同轧制温度下热批量轧制获得的层状钢材中多层结构保存的影响。 并找到了获得多层坯料的最佳参数。

关键词：多层钢材、再结晶、热批量轧制、层状结构。

Annotation. *In this paper, the influence of recrystallisation on the preservation of multilayer structure in layered steel materials obtained by hot batch rolling at different rolling temperatures is considered. And also the optimum parameters of obtaining multilayered billets are found.*

Keywords: *multilayered steel materials, recrystallisation, hot batch rolling, laminar structure.*

INTRODUCTION

At present, intensive research and development is being carried out in the direction of creating multilayer metallic materials. Their use makes it possible to significantly increase the service life of parts and structures operating under high temperature and force loads with simultaneous saving of expensive alloying elements.

One of the ways of obtaining multilayer steel sheets with stable fine-grained structure is multiple hot batch rolling of composite billets.

During the production of layered metallic materials several problems arise related to the preservation of the multilayer structure. One of them is dynamic recrystallisation, which occurs within the layers and prevents the possibility of thinning of the material when a certain thickness is reached.

The kinetics of recrystallisation and structure formation during hot deformation have been considered by many researchers [1-4], but this topic has not been fully disclosed for multilayer materials.

RESEARCH METHODOLOGY

For the study was chosen a composition consisting of two steels: austenitic 08X18H10 and ferritic 08X18, for which was carried out rolling in the same deformation conditions (speed, degree of compression), but at different temperatures: 600°C, 800°C, 1000°C, 1200°C to a thickness of 10mm and 2mm.

The chemical composition of the selected steels is presented in Table 1

Table 1.

Chemical composition of the steels under study

Steel	Alloying elements content, % (by weight)											
	C	Si	Mn	Cr	Ni	Mo	Ti	Al	V	S	P	Cu
										no more than		
08X18	0,08	0,34	0,24	17,2	0,09	0,05	0,05	0,05	0,03	0,003	0,02	0,6
08X18H10	0,08	0,08	0,2	17-19	9-11	-	0,5	-		0,02	0,035	0,3

Two grades of steel sheets with a thickness of 0.5 mm are used as blanks. At the first stage they are cut to measure, surface treated and placed in a package consisting of 100 alternating steel sheets of 50 pieces of each grade (Fig.1). Then the package is vacuumised.

The first process cycle results in sheets with a thickness of 10mm or 2mm. From perpendicular to the rolling direction, samples are cut out for structure investigation.

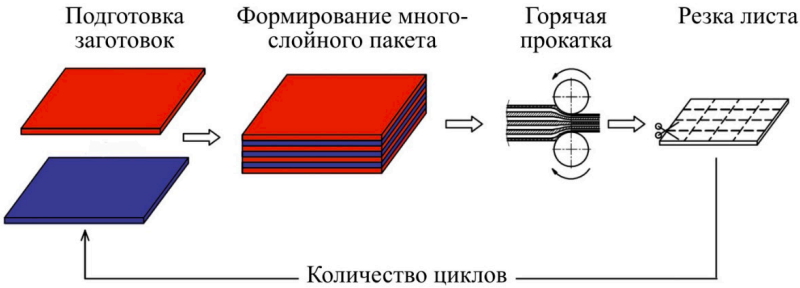


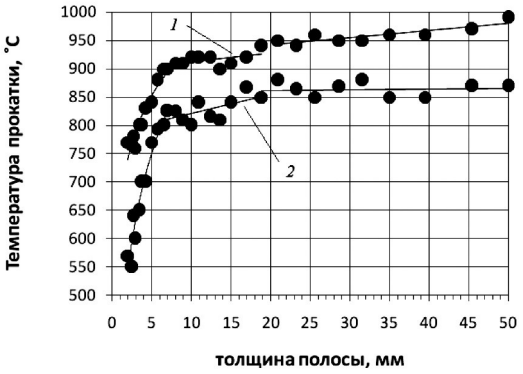
Figure 1. *Scheme of the technological cycle of manufacturing of laminated composite materials*

In this case, it is very important to take into account the total deformation during rolling, which is the sum of fractional rolling operations, consisting of crimping the billet not more than 10 % in one pass and then placing the billet in a furnace heated to the rolling temperature. The percentage of crimping affects the condition of the final structure as well as the amount of interlayer stresses.

The experiments revealed the dependence of the billet temperature on its thickness during hot batch rolling (Fig. 2) [5]. Depending on the rolling temperature, we can conditionally divide the thinning process into 2 stages: rolling in the high-temperature region up to 10 mm and in the low-temperature region at the billet thickness from 2 to 10 mm.

In the high-temperature region, no undercooling occurs, the rolling conditions are subcritical, so the processes of dynamic recrystallisation are realised, characterised by the formation of large grains within the layers.

However, during further rolling, due to a decrease in sheet thickness and an increase in heat losses, the billet cools down below the Ar1 temperature, dynamic polygonisation occurs and a deformed spindle-shaped structure is formed. Thus, during subsequent heating of the billet in the furnace, the sample undergoes a transition from the ferrite region to the austenitic region, which leads to the development of static recrystallisation and, as a consequence, structure refinement.



1 - at the entrance to the rolling mill, 2 - at the exit from the rolls
Figure 2. *Dependence of the workpiece temperature on its thickness obtained with pyrometers*

In this work, the choice of chemical etchant for the obtained grindings was determined by the peculiarity of the material: layers of different compositions. It was necessary to select such a reagent, which is suitable for two steels simultane-

ously. Experimentally, the best etchant was shown to be a mixture of the following composition: 1 part HNO3 + 1 part HCl + 0.1 part picric acid.

Structure studies were carried out on a light microscope “SIAMS 700” at the following magnifications: x100, x500.

Analysis of images for detection of recrystallisation is carried out on the basis of maps of structural states [6] (Fig.3) for steels used in the selected composition: 08X18, X18H12T (analogue of steel 08X18H10).

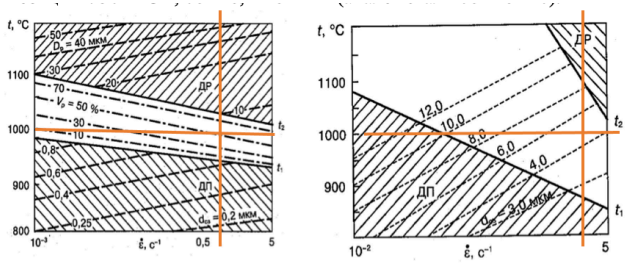


Figure 3. *Maps of structural states of steel during hot deformation***:**
a) - ferritic steel 08X18, b) - austenitic steel X18H12T
DR - dynamic recrystallisation region, DP - dynamic polygonisation region, t1 - temperature of the beginning of dynamic recrystallisation, t2 - temperature of obtaining 100% dynamically recrystallised structure;
— • — lines of equal fractions of recrystallise grains d (%),
- - - - - lines of equal grain size ($Д_р$) and subgrain size ($Д_{сз}$), μm,
— lines corresponding to the selected deformation parameters

RESEARCH RESULTS AND DISCUSSION

At 600 °C (Fig. 4,5) it can be observed that both steels undergo dynamic polygonisation. The 08X18 steel is actively deformed, which is confirmed by the formation of spindle-shaped grains within this structure. Unfortunately, due to the fact that both steels are in the same composite, it is impossible to select an etchant that would etch both of these structures. Therefore, based on the structural state maps, it can be assumed that similar transformations occur in the austenitic steel layers.

When the billet is rolled to smaller thicknesses, a slight change in the shape of the grains is noticeable, they take a more equiaxed shape. The obtained effect can be described based on literature data [7]. It is known that an increase in the degree of deformation can lead to grain growth due to a decrease in the recrystallisation temperature (Fig. 6).

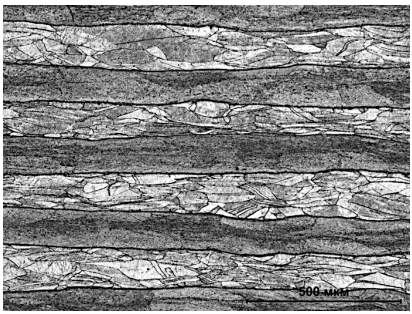


Figure 4. *08Cr18Ni10+08Cr18 specimen 10 mm thick rolled at temperature 600°C, magnification x100*

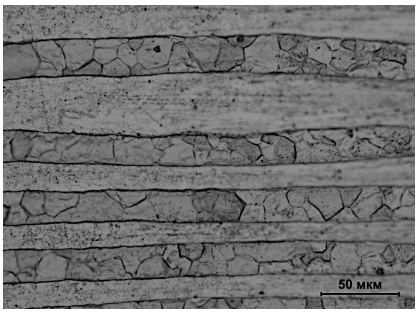


Figure 5. *Specimen 08Cr18N10+08Cr18, 2 mm thick rolled at 600°C, magnification x500*

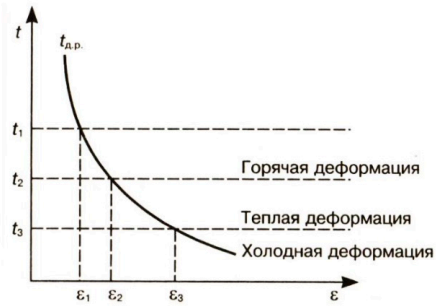


Figure 6. *Dependence of the temperature of the onset of dynamic recrystallisation on the percentage of deformation during hot deformation*

A similar picture is observed at rolling at 800 °C (Fig.7,8). Only this range is characterised by a large increase of grains. At this temperature it is possible to notice high homogeneity of sliding, grains are also deformed in the rolling direction, recrystallisation does not occur yet, which is consistent with the map of structural states, where this temperature corresponds to the region of dynamic polygonisation.

When the same material is rolled to 2 mm, a significant grain growth in the ferritic steel is also observed, which can also be related to the drop in the recrystallisation temperature in the investigated range, as noted earlier.

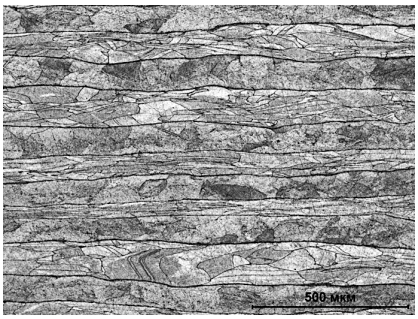


Figure 7. *08Cr18Ni10+08Cr18 specimen 10 mm thick rolled at 800 °C, magnification x100*

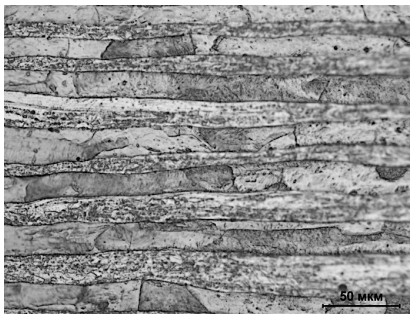


Figure 8. *Specimen 08X18H10+08X18 2 mm thick rolled at a temperature of 800 °C, magnification x500*

The picture changes when rolling at 1000 °C (Fig.9,10). It can be seen that recrystallisation processes in 08X18 steel are active, without formation of spindle-shaped zone. Also in separate layers of austenitic steel it is possible to see formation of bamboo structure, which speaks about the passed dynamic recrystallisation. However, as the degree of deformation increases and the temperature decreases due to thinning, the grains acquire different thicknesses and distortions occur. The reason for this may be: either the onset of recrystallisation by the mechanism of boundary migration, or it is a consequence of changes in the deformation capabilities of these steels. The grains in the layer are orientated differently, some are well deformed, others are poorly deformed, which leads to the obstruction of deformation in some parts of the layer.

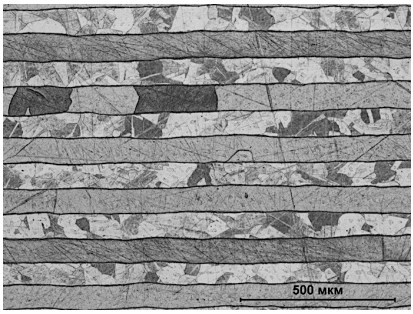


Figure 9. *Specimen 08X18H10+08X18 10 mm thick rolled at temperature 1000°C, magnification x100*

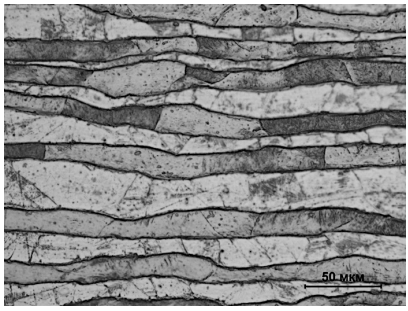


Figure 10. *Specimen 08X18H10+08X18 2 mm thick rolled at a temperature of 1000 °C, magnification x500*

When the temperature is increased to 1200 °C (Fig.11,12). and the layers are thinned to thicknesses of about 20 μm (Fig. 12), a qualitative change in the behaviour of the multilayer material occurs. If at lower temperatures there is a localisation of recrystallisation processes inside each layer, then with increasing temperature and decreasing thickness of layers there is a change in the mechanism of recrystallisation. In this case, it is carried out by migration of layer boundaries, and a "tooth structure" is formed.

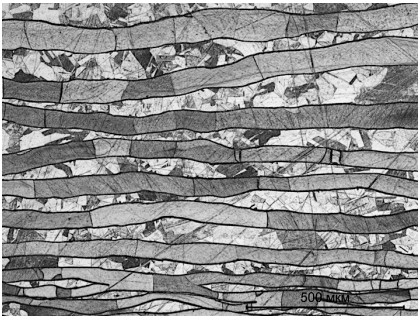


Figure 11. *Specimen 08X18H10+08X18 10 mm thick rolled at 1200 °C, magnification x100*

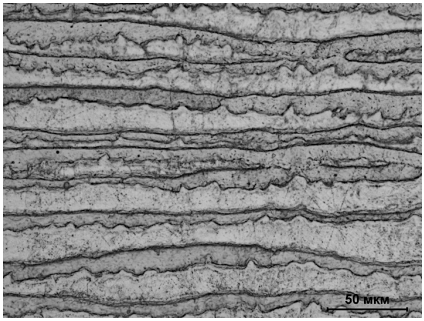


Figure 12. *Specimen 08X18H10+08X18 2 mm thick rolled at the temperature 1200 °C, magnification x500*

To analyse this structure, micro-X-ray spectral analysis was carried out. Due to the beginning of dynamic recrystallisation by migration of boundaries, the absorption of austenitic steel by ferritic steel begins.

If rolling at this temperature up to 2 mm is realised, there is no inheritance of multilayer structure, which leads to the disruption of the material structure. For obtaining multilayer materials this is unacceptable, so this effect should be avoided.

Conclusion

The following regularities have been established for recrystallisation processes taking place in the model composition 08Cr18N10+08Cr18 with thicknesses of 10 mm and 2 mm in the process of hot batch rolling at different temperatures:

1. during high-temperature rolling of 2mm thick samples with layer thicknesses of 20μm, a new mechanism of multilayer structure disorder associated with migration of layer boundaries is observed;

2. optimal is the use of relatively low rolling temperature with the condition of localisation of recrystallisation inside the layers. This makes it possible to preserve the multilayer structure when deforming to smaller thicknesses.

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DOI 10.34660/INF.2023.45.55.094

评估奥氏体铬镍钢晶界物理机械性能的理论方法

A THEORETICAL APPROACH TO EVALUATION OF PHYSICAL AND MECHANICAL PROPERTIES OF GRAIN BOUNDARIES IN AUSTENITIC CHROMIUM-NICKEL STEELS

Matveeva Victoria Andreevna
Assistant
Bauman Moscow State Technical University

Plokhikh Andrey Ivanovich
Candidate of Technical Sciences, Head of Department
Bauman Moscow State Technical University

注解。 对晶界区域材料行为的研究具有特别的科学意义。 这既是由于材料晶体结构缺陷的理论基础的填补，也是由于机械工程和电力工程等广泛的应用领域。 提出了一种测定核工业中广泛使用的08X18Ni10T型奥氏体铬镍钢晶界物理机械性能的理论方法。 晶界材料物理性能的评估是根据规范性文件PNAE G 7-002-86（核电工程规则和规范）进行的。 晶界材料的强度测定是在LAMMPS软件包中进行的，该软件包采用分子动力学方法。

关键词：晶界，奥氏体钢，分子动力学，热时效。

Annotation. *The study of the behaviour of materials in the region of grain boundaries is of particular scientific interest. This is due both to the filling of the theoretical base on defects in the crystalline structure of materials and a wide range of application areas, such as mechanical engineering and power engineering. A theoretical approach to the determination of physical and mechanical properties of grain boundaries in austenitic chromium-nickel steels of 08X18Ni10T type, which are widely used in the nuclear industry, is presented. Assessment of physical properties of the grain boundary material is performed on the basis of the normative document PNAE G 7-002-86 (Rules and Norms of Nuclear Power Engineering). Determination of the strength of the grain boundary material has been carried out in the LAMMPS software package, which implements the molecular dynamics method.*

Keywords: *grain boundary, austenitic steels, molecular dynamics, thermal ageing.*

Introduction

The study of material behaviour near grain boundaries is a promising task that lays the foundation for multiscale modelling of materials under various operating conditions, understanding of cracking processes and timely taking measures to mitigate the effects of material degradation. Assessment of material properties and its stress-strain state under specified operating conditions lays the foundation for resource management of industrial facilities.

In the nuclear industry, the study of cracking processes seems to be the most urgent task due to such factors as the need to ensure long-term uninterrupted operation of equipment and pipelines, economic costs and difficulties of maintenance and repair. Therefore, scientific centres, which are engaged in research in the field of materials ageing problems, pay special attention to meso- and microstructural processes.

The assessment of stress-strain state of materials at the meso-level is impossible without a preliminary assessment of physical and mechanical properties of structural components - in particular, grains and grain boundaries.

Object of research

As an object of research the pipeline of the second circuit of NPP with WWER is accepted. The location of the object of research in the second circuit of NPP implies negligibly small impact of radiation on the material. The pipeline is operated at pressure p = 0,1 MPa, the maximum operating temperature is t = 0,1 MPa, the maximum operating temperature is t = 300 °C.

Estimation of physical and mechanical properties of grain body material

Let us assume that physical and mechanical properties of the grain body material are comparable to those of the bulk material. Since the object of study is operated at elevated temperature, it is reasonable to determine the material properties as a function of temperature. There is a known approach to strength calculations for NPP equipment and pipelines in order to take into account their long-term operation and aging effects of materials: a normative document [1] has been developed, according to which for each material there is a summary table of physical and mechanical properties of the material depending on temperature. Let us refer to this document to obtain information about physical and mechanical properties of the material under study (steel 08X18H10T) at different temperatures. The data are presented in Table 1.

Table 1.

Physical and mechanical properties of 08X18H10T steel according to PNAE G 7-002-86 [1]

Rolling	Quality	Temperature, [K (°C)]							
		293 (20)	323 (50)	373 (100)	423 (150)	473 (200)	523 (250)	573 (300)	623 (350)
Pipeline	σ_{tu} [MPa]	510	471	461	441	421	421	412	412
	$\sigma_{0,2}$, [MPa]	216	206	206	196	187	187	177	177
	δ, %	35	32	30	28	27	26	26	26
	ψ, %	40	40	40	40	40	40	40	40
Young's modulus, *E*, GPa		205	202	200	195	190	185	180	175

It is known [2-4] that the shear modulus G, as well as the elastic modulus E, depends on temperature. The empirical relation (1) is given in [3]:

$$G \simeq \frac{3E}{8} \tag{1}$$

Based on this relationship, it is possible to determine the dependence of shear modulus in the temperature range t = 20 - 300 °C for the grain body and for the grain boundary.

The Poisson's ratio is determined by solving the system of equations (2)-(4) including Lame constants:

$$E = \frac{\mu(3\lambda + 2\mu)}{\lambda + \mu} \tag{2}$$

$$G = \mu \tag{3}$$

$$\nu = \frac{\lambda}{2(\lambda + \mu)} \tag{4}$$

The results of calculating the shear modulus G according to the empirical relation (1) are given in Table 2:

Table 2.

Results of calculation of the shear modulus of the grain body

Temperature, °C	E, GPa	G, GPa
20	205	76,875
50	202	75,75
100	200	75
150	195	73,125
200	190	71,25

250	185	69,375
300	180	67,5

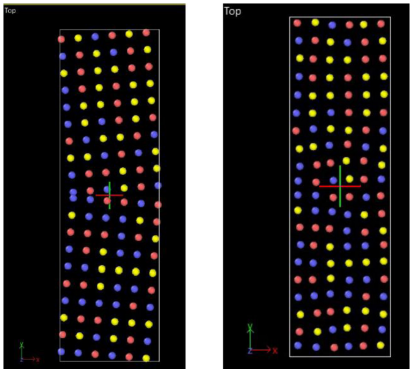
According to the results of the calculation of the Poisson's ratio for the grain body material, it was determined that at t = 20 °C the Poisson's ratio is ν = 0.33, at t = 300 °C the Poisson's ratio is ν = 0.318.

Estimation of physical and mechanical properties of the grain boundary

In [5], based on the works of R.D.K. Misra [6], the value of elastic modulus near grain boundaries in austenitic steel is given in the representation of the grain boundary as a region of vacancy migration under applied load. Namely, in [5], the modulus of elasticity of the grain boundary is $E_{gb} = 2{,}03 \cdot 10^9$ Pa для Cr-Mo-V-2.6Ni steel at T = 883 K, which is ~100 times lower than the elastic modulus of the material. It is assumed that under low loads (up to 40 MPa) the grain boundary obeys Hooke's law due to the migration of vacancies. Determination of the strength limit of the intergranular boundary can be carried out by the molecular dynamics method. For this purpose, an atomistic model of the grain boundary is created, which represents a system consisting of two grains disoriented relative to each other by ~5°. The creation of the atomistic model is implemented in the Atomsk programme. The model is created in several steps:

- Creation of a file containing data on the primitive cell of the Fe GC lattice;
- Creation of two disoriented HCC-crystals of Fe;
- Substitution of Fe, Ni and Cr atoms in the ratio corresponding to the stoichiometric ratio of the considered austenitic steel.

The resulting model after minimisation (Fig.1 (b)) is subjected to a tensile test using the *nve* statistical ensemble in the LAMMPS software package.



(a) *(b)*

Figure 1. *General view of the Fe-Ni-Cr atomistic model: (a) - in the initial state; (b) - model after relaxation. Atoms: red - Fe, yellow - Cr, blue - Ni.*

Based on the test results, the maximum stress value at the moment of fracture corresponding to the strength limit of the grain boundary is recorded. Fracture in the created system corresponds to the moment of time τ = 13 670 ps. The stress-strain curve is presented in Figure 2.

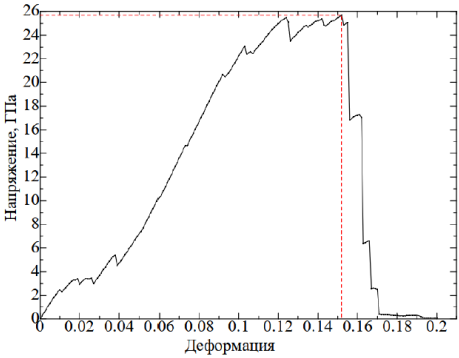


Figure 2. *Stress-strain curve for the Fe-Ni-Cr atomistic model*

The maximum stress corresponding to the failure of the atomistic model is $\sigma_в$ = 25,691 GPa. According to [7], the theoretical grain boundary strength for the atomistic model of steel with carbon content of 0 - 0.08% C varies in the range $\sigma_в$ = 24 – 30 GPa. Thus, the present modelling is in good agreement with the literature data [7].

Conclusion

Thus, using modern software implementing the molecular dynamics method, the mechanical properties of the grain body material and grain boundary of austenitic steel 08X18H10T were determined. Based on the normative document PNAE G 7-002-86 [1], the physical properties of the grain body material and grain boundary as a function of temperature have been evaluated.

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DOI 10.34660/INF.2023.52.49.095

俄罗斯世界: 面向对象设计范式的典范
RUSSIAN WORLD: A MODEL IN THE PARADIGM OF OBJECT-ORIENTED DESIGN

Krylov Vladimir Sergeevich
Ph.D, Assistant Professor
Crimean Engineering and Pedagogical University the name of Fevzi Yakubov

抽象的。 俄罗斯世界的定义没有单一的公式。 面向对象设计范式中的模型导致人们将其理解为全球世界网络表示中的共空间。 俄罗斯世界是一个不同于全球社会空间的异次元空间。

关键词: 俄罗斯世界、面向对象设计、回合制策略、社交空间、社交网络。

Abstract. *There is no single formula in the definition of the Russian world. The model in the paradigm of object-oriented design leads to understanding as a co-space in the network representation of the global world. The Russian world is a space of a different dimension, which is different from the global social space.*

Keywords: *Russian world, object-oriented design, turn-based strategy, social space, social network.*

At present, both in Russia and abroad, there is no single formula for defining the Russian world. All proposed definitions of the Russian world based are solely on opinions, which are a verbal formula for an intuitive idea of the Russian world. Each opinion, one way or another substantiated accompanied by some text. Justifications emphasize the contradictions of most of the definitions with each other. Accordingly, intuitive representations are also incompatible and mutually exclusive [4, 6, 11, 12].

The Russian world poorly studied in modern science both as a concept and as a reality, despite extensive and intense discussions. Various authors actively use the term Russian world, but each one fills it with his own meaning, in accordance with his personal opinion about the problem. Therefore, it is almost impossible to form a single, generalized opinion. The essential characteristics of the Russian world that are important for understanding presented largely not by knowledge, but exclusively by opinions. That is, there is no common platform for uniting heterogeneous ideas about the data and facts of the reality of the Russian world, its development in the modern environment, ideology and concept.

The improvement of information technology (IT) has provided a wide range of researchers with available hardware and software for collecting, processing initial data and analyzing them. It became possible to use previously inaccessible tools and technologies for experimental and theoretical research in various scientific fields. First of all, in interdisciplinary research. Based on these technologies, new integrated scientific directions are emerging [1, 5].

In the paradigm of object-oriented design, a methodology for qualitative analysis of the dynamics and transformation of complex nonlinear systems has developed and tested [5]. For example, social communities and systems. This paradigm underlies all modern advances in computer science and information technology. The first step in the OOP methodology is a detailed qualitative analysis of the dynamics of specific complex systems, based on the results of which a formalized description of the models is compiled, and according to the formalized description, the appropriate quantitative methods and technologies are selected for the development of simulation computer models of real systems [1, 3, 15].

The rapid inclusion of the achievements of computer science and information technology in all aspects of society indicates that the OOP paradigm is the common platform that will unite heterogeneous ideas about data and facts, opinions and judgments about the reality of the Russian world, its development in the modern environment, ideology, concept .

The Russian world is undoubtedly a certain community and is a complex system operating in an already united material and informational reality. A qualitative study of its structure and interaction dynamics is a necessary, obligatory stage. The result of a qualitative study is a qualitative analysis that defines the input data and abstractions for the formal model. The analysis goes through several cycles or iterations. A complete and detailed report on the results of the analysis contains a lot of information, many pages of the text of the report.

The purpose of the article is to present some conclusions obtained from the results of a qualitative analysis of the first iteration of the Russian World community concept in the object-oriented design paradigm.

The entire range of definitions of the Russian world divided into three groups: Civilization, regional civilization; A cultural phenomenon that has developed because of knowledge of the Russian language and knowledge of Russian culture; Russian soft power.

The definition of the Russian world as a civilization considered traditional. It believed that, as a cultural phenomenon, it creates an independent context of the community and acts not as different parts, but as a separate, independent partner in the world. For example, the Russian world is understood as a community of Russian-speaking and familiar with Russian culture residents of the post-Soviet space. In this capacity, it presented as a large-scale alternative to Anglo-Saxon globalization [12].

Accordingly, the concept of the Russian world is associated with a new understanding of national identity in Russia in the era of globalization, with the need to create an ideological base to strengthen the geopolitical positions of Russia [12, 16, 18].

The Russian world as an idea has a long history. The term "Russian world" appeared in the 19th century. It used in a sense close to the concept of "Slavic world", "Eurasian-Russian cultural world". However, a number of foreign political scientists argue that the concept of the Russian world arose only in the 90s of the last century. [16, 18]

Russian liberal science with great difficulty recognized the right to the hypothesis of the existence of the Russian World after the speech of the President of the Russian Federation V.V. Putin at the First World Congress of Compatriots Living Abroad in 2001. He used the term Russian world, saying that this concept has always gone beyond the geographic boundaries of Russia, beyond the boundaries of the habitat of the Russian ethnos [11]. Nevertheless, the reality of the Russian world began actively discussed only after 2007, when the President of the Russian Federation at a meeting with the creative intelligentsia again voiced it. In 2008, the Russkiy Mir Foundation established by presidential decree. Naturally, immediately after the speech of the President of the Russian Federation, interest in the Russian world arose. Its reality and concept began to be widely discussed in a wide variety of media, public and scientific journals, at various Internet forums and conferences [6, 11].

The discussed variants of the concepts of the Russian world offer a very diverse set of meanings. For example, how the Russian World project initially aimed at consolidating and supporting the Russian-speaking diaspora, which numbers up to 30 million people worldwide. Therefore, the implementation of the Russian World project largely depends on what meaning put into the content of the soft power strategy for various regions.

The traditionally unpredictable behavior of Russians in the understanding of the West usually explained by the fact that Russia is a different civilization, with other civilizational roots that come from Byzantium, the eastern Roman Empire, and not the western one. From this, researchers of various kinds usually deduce the inevitable confrontation between Russian and Western civilizations [10, 13]. However, it practically not taken into account that during its existence, Russia has regularly become the object of an organized attempt to destroy it. Both Sweden, Poland, France, Britain, Germany and the most diverse unions of these countries, attacked it. This in a special way influenced the ideas about the Western world and the strategy of relations with the Russian world with it.

The history of Russia is a history of continuous invasions from all sides, and above all from the West. As a result, a certain type of thinking has developed,

which is difficult to understand from the outside. Russians include not only direct seizure of territory or military expansion into attempts to invade. The CIA control (together with the US State Department) of Ukraine and other states in the post-Soviet space also considered an invasion. Therefore, Russians are more likely to fight not for territory, but for Russia as a concept. They attacked regularly and many times, but no one ever won. In the Russian mind, conquering Russia means killing all Russians. However, you cannot kill everyone. The population be can restored over time. However, once the concept is lost, Russia will be lost forever. Moreover, since the Russians are fighting more for a concept than for a specific piece of Russian territory, they are always ready to retreat first. Then they always come back.

For example, in the 90s, Western managers flooded Russia with cheap imports, setting a long-term goal - to destroy local industry and Russian production, to turn Russia into a simple exporter of raw materials, which will be defenseless against the embargo, and which can forced easily to lose sovereignty. However, this process unexpectedly came to the opposite result. Russia has largely restored the almost destroyed industry and commodity production of agriculture.

Everything turned Otto von Bismarck predicted: “Even the most prosperous outcome of the war will never lead to the collapse of Russia ... even if they are subsequently separated by international treaties; they will reunite with each other as quickly as the separated ones find this way to each other drops of mercury. This is the indestructible State of the Russian nation, strong with its climate, its spaces and its unpretentiousness, as well as through the awareness of the need constantly protect its borders. This State, even after a complete defeat, will remain our offspring, striving for revenge over the enemy ... “[14]

Repeated attempts to institutionalize the Russian World, to formalize it as some kind of social phenomenon that can become a kind of movement organized by a public association, and even an institution with an ordered and definite structure of relations, a management hierarchy, discipline, rules of conduct, ended in failure. The Russkiy Mir Foundation, in a sense, legalized the idea, the concept of the Russian World. Nevertheless, no more. The Fund and the Russian World exist independently of each other.

Thus, the Russian world arose exists in special objective conditions associated with the peculiarities of Russian history in the presence of certain subjective factors. As a result, a special reality has developed. In relation to which, first, it is necessary to determine the origin of the Russian world, its essential characteristics, attributes, as well as the prospects for the development of this phenomenon and concept. The Russian world exists outside the boundaries of state borders. This concept is not geographical, not religious, and certainly not ethnic.

The concept of "Russian world" is currently on the rise. It is largely in the field of discourses about the Russian-speaking diaspora and politics, relations with compatriots. The "liberal" interpretation of the Russian World as a cultural network community of relatives of natives of Russia proper, scattered all over the world, acquired a negative meaning during the 2000s [8]. Nevertheless, the network representation not only has been preserved, but is gaining momentum and is filled with other, including ideological content.

The definition of the Russian World as a network community means that it is a kind of social space. Everyone who belongs to the Russian World is simultaneously a member of several communities, which also have a network organization [2]. He enters the social space with his individual social network. As a result, the social space acquires a structure of layers representing communities. Just as geographic maps present layers that unite various objects with one theme. For example, railways and highways, cities and settlements, and so on. Each layer can contain information related to one or more topics. Therefore, for the purposes of studying land resources, these can be soil types, their composition, land use, agro ecology, land assessment, and the like.

This representation of social space is intuitive from the habitual use of maps on the Internet. An individual network is a multilayer structure. In the same way as maps in a geographic information system (GIS) are multi-layered structures in their organization. Each of us is a member of different, even non-intersecting and incompatible social networks [15].

Technologies for the development of geographic information systems (GIS) well superimposed on the study of social space, both an individual participant and a community. Just like on a geographical map, each layer of social space has its own metric, in accordance with the type of its network organization. Accordingly, the layers represented by communities with strong and weak connections have different organization [2].

GIS systems developed in full accordance with the methodology of object-oriented design. Its essence lies in the design, development of a model from data, that is, from a description accepted for a certain subject area, including a geographical region. The first stage of development aimed at finding data abstractions that are most suitable for solving a specific task, problem [1, 3].

Available software for the development of GIS allows you to conduct research on the qualitative analysis of the multilayer organization of social space, represented by individual social networks, social communities. For example, to analyze the mechanisms of restoration of the Russian world after external influence, the formation of immunity to destruction from within. Below are some conclusions obtained from the results of a qualitative analysis, including the use of GIS modeling programs [3, 17]:

The Russian world is not only a concept, an idea - it is a real-life community in the social space. It has properties that are not determined by the metrics generally accepted for the analysis of social networks. Qualitative analysis allows you to determine the basic requirements for determining the necessary metrics.

The Russian world is not a civilization, not a cultural phenomenon, and not soft power. The Russian world is a social space.

The Russian world is a social space of a different dimension, different from the general social space.

All possible forms of its institutionalization are nothing more than projections onto the common social space from the dimension of the Russian world.

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DOI 10.34660/INF.2023.99.55.096

利用耐旱指数评价西西伯利亚南部森林草原条件下春软麦的耐旱性
EVALUATION OF SPRING SOFT WHEAT FOR DROUGHT TOLERANCE UNDER CONDITIONS OF THE SOUTHERN FOREST-STEPPE OF WESTERN SIBERIA USING DROUGHT TOLERANCE INDICES

Yakunina Nadezhda Anatolievna
Candidate of Agricultural Sciences, Senior Research Officer
Omsk Agrarian Research Centre, Omsk, Russia

摘要。 实验部分工作于2020-2022年在FSBSI“鄂木斯克农业科学中心”种子生产部门的基础上进行。 育种系以三组成熟度为代表——中早熟、中熟和中晚熟。 作为标准，使用品种 Pamyatit Aziev、Duet、Element 22。为了评估样品的耐旱性，使用了基于胁迫和有利条件下产量比较的指数系统的综合评估。 计算以下指数：平均生产力（MP）、产量稳定性指数（YSI）、耐性指数（TOL）、耐逆指数（STI）、耐旱指数（DI）。 计算所有指标的总排名得分。 根据结果，鉴定出总得分最好的5个材料：G 6/17、G 7/17、G10/17、G 15/17。 因此，该样品在性状总体上表现出最好的结果，因此可以用于育种工作。

关键词：小麦，品种，育种系，产量，耐旱指数。

Abstracts. *The experimental part of the work was carried out on the basis of seed production department of FSBSI “Omsk Agrarian Scientific Centre” in 2020-2022. Breeding lines were represented by three groups of ripeness - medium-early, medium-ripe and medium-late. As standards were used varieties Pamyatit Aziev, Duet, Element 22. To assess the samples for drought tolerance, a comprehensive assessment of the system of indices based on the comparison of yields in stress and favourable conditions was used. The following indices were calculated: average productivity (MP), yield stability index (YSI), tolerance index (TOL), stress tolerance index (STI), drought tolerance index (DI). The total rank score of all indices was calculated. According to the results, 5 accessions with the best total score were identified - G 6/17, G 7/17, G10/17, G 15/17. Thus, the samples showed the best result on the totality of traits, so can be used in breeding work.*

Keywords: *wheat, variety, breeding line, yield, drought tolerance indices.*

The climate of the southern forest-steppe of Western Siberia is characterised by continentality - a relatively small amount of precipitation, inconstancy of temperature indices and their significant variation in relation to average values, which plays an important role in the formation and development of grain crops. Frequent change of cold and warm air masses provides sharp and rapid changes in weather, which leads to climate instability. Extreme conditions related to temperature and moisture availability of plants are the most frequent cause of productivity reduction or its sharp fluctuations from year to year. One of the main environmental factors affecting the plant is temperature, as there is a close relationship between plant productivity and physiological limitations of their adaptation to temperature stress [Yakunina N.A.,2013].

With lack of moisture for a long period of time in combination with high temperatures, such phenomenon as drought can be observed. Adaptability of plants to high temperatures is laid genetically, determining the adaptation of plants to unfavourable habitat conditions, as well as adaptation to lack of water, and is characterized as drought tolerance. It is expressed in the ability of plants to tolerate dehydration due to the development of high water potential of tissues with functional preservation of cellular structures, transpiration, as well as due to adaptive morphological features of stems, leaves, generative organs, increasing their endurance, tolerance to the action of long-term drought [Volodko I.K., 1983].

To create a crop, plants consume a large amount of nutrients. The need for nutritional elements depends on the hereditary traits of plants, in turn, the increase in productivity is inextricably linked to the adaptability of cultivated plants, their resistance to unfavourable environmental conditions. Therefore, the development of effective ways to increase resistance to stresses and obtain high yields are among the main tasks of breeders [Kalashnikov, 2005, Popolzukhina, 2020].

To comprehensively assess plants for resistance to abiotic factors, drought tolerance indices are used [Kalybekova, 2022]. They are based on the comparison of yield in favourable and stress conditions. As a rule, several resistance indices are used to assess the drought tolerance of samples.

The aim of the study was to evaluate varieties and promising lines of spring soft wheat for drought tolerance in the conditions of the southern forest-steppe of Western Siberia using a set of indices.

Materials and methods. The experimental part of the work was carried out on the basis of the seed production department of FSBSI “Omsk Agrarian Research Centre” in 2020-2022. The breeding lines were represented by three groups of ripeness - medium-early, medium-ripe and medium-late. As standards were used varieties Pamyati Aziev, Duet, Element 22. Field experiments were laid on the predecessor of fallow with a seeding rate of 5.0 million germinating grains per hectare on plots of 15 m2 in 4-fold repetition. All observations and records were

in accordance with the methodology of the State Commission for Variety Testing of Agricultural Crops [Dospekhov, 1985]. To determine drought tolerance, a comprehensive characterisation of the accessions by a set of indices, namely mean productivity (MP), tolerance index (TOL) [Rosielle, Hamblin, 1981], yield stability index (YSI) [Bouslama, Schapaugh, 1984], drought tolerance index (DI) [Lan, 1998], stress tolerance index (STI) [Fernandez, 1992] were used. This methodology is used to rank sets of soft wheat varieties [Pakul, 2018, Kalybekova, 2022].

The best sample is ranked 1 in terms of yield, all indices are ranked in descending order of values, TOL index - in ascending order, as the best sample reduces yields least in a dry year. The total score of all drought tolerance indices was calculated. Correlations of resistance indices with each other and with grain yield of the studied breeding lines were analysed.

The hydrothermal conditions of the growing season 2020 - 2022 were contrasting and generally reflected the peculiarities of the region. The classification of moisture availability was determined by the HTC indicator [Perevedentsev, 2012]. In 2020, in June, July, the average temperature was within the norm, and in May, August it exceeded the mean annual data by 1-2°C. The sum of precipitation for May - August was below the norm and totalled 169 mm, or 82% of the mean annual values (206 mm). The HTC was 0.77, which characterised this year as moderately dry. The year 2021 was characterised by aridity, insignificant amount of precipitation (164 mm or 79.6%) fell during the spring-summer period throughout the growing season, the temperature was 2-4°C above the norm. In 2021, the hydrothermal coefficient was 0.58, indicating severe drought during the period of plant growth and development. In 2022, the HTC was 1.02, drought was observed at the beginning of the growing season (May-June), and in the second half of July, the precipitation totalled 121.2 mm or 202%. The main precipitation fell in the third decade of the month 96.6 mm, or 161% of the mean annual values, and insignificant amount of precipitation was observed in August.

Results and discussion A complex indicator of a variety's adaptability to growing conditions is its productivity. Productivity is determined by the genetic information inherent in the plant cell, as well as by the environmental conditions in which the plants grow. Plant yield is a complex trait with polygenic control, the formation of which largely depends on meteorological conditions during the growing season [Yakunina N.A., 2018]. The creation of wheat varieties with the highest possible yield is the ultimate goal of the breeding process [Zemtsova E.S.].

The evaluation of varietal samples on grain yield showed that the average of varieties in 2020 this indicator was 4.87 tonnes/ha. In 2021, the average yield of the studied lines of spring soft wheat was 4.75 t/ha, varying from 3.85 to 5.54 t/ha.

The average yield of varieties and breeding lines of spring soft wheat in 2022 was 5.68 t/ha. The conducted research allowed to establish that the most favour-

able conditions for the formation of spring soft wheat grain yield were in 2022, when on average for the samples the studied indicator was 5.68 t/ha. The yield for 2021, which was 4.75 t/ha, was taken as an indicator of "yield under stress conditions".

According to the grain yield of the investigated varieties and breeding lines, 5 drought tolerance indices were calculated. According to the results obtained, all the samples were assigned a rank. The highest yield ranks (MR) were characterised by lines: G 15/17, G 10/17, G 7/17, G 6/17. The tolerance index (TOL) shows by how much the yield decreased in a stress year compared to a favourable year. The highest value of this index was found for varieties Element 22, Duet, lines G 7/17, G 15/17, G 10/17 and G 6/17. The highest drought tolerance index (DI) was characterised by breeding lines G 6/17, G 7/17, G 15/17, G 10/17 and variety Duet. The following lines were distinguished by stress tolerance index (STI): G 15/17, G 7/17, G 10/17, G 11/17, G 14/17 and variety Element 22. High yield stability index (YSI) was noted for cultivars G 7/17, Duet, G 6/17, G 15/17, G 10/17 and G 11/17.

In considering favourable and unfavourable growing conditions, the total score of all the calculated indices is used. Based on the results obtained, the total score ranged from 20 to 84. The lines with the minimum total rank were included in the group of the most resistant to unfavourable growing conditions, these included the following: G 7/17,G 15/17, G 10/17, G 6/17.

The study of relationships between traits plays a great role in breeding work, these relationships can be used in the selection and creation of desirable plant varieties [Genetics..., 1984]. Most of the traits determining yield are interrelated, as a result of which a change in some traits leads to a change in other traits.

When using the Spearman rank correlation coefficient (Zaitsev, 1973; Bennani et al., 2017), the closeness of the relationship between the traits is conditionally assessed, considering values of the coefficient less than 0.3 as a sign of weak closeness of relationship; values more than 0.3 but less than 0.7 as a sign of moderate closeness of relationship, and values of 0.7 and more as a sign of high closeness of relationship.

According to the obtained data, we calculated correlation coefficients between drought tolerance indices and yield of cultivars under favourable and stress conditions.

High positive correlation was found between average productivity and stress tolerance index (0.99), as well as yield stability index (0.73), between hardiness index and drought tolerance index (0.89), According to calculations, close positive correlation was also found between stability index and stress tolerance (0.76). Weak correlation was observed between stability index and average productivity (0.24), stress tolerance (0.19).

Conclusion The conducted research allowed us to identify promising samples with high productivity, in the medium-ripening group - G 15/17, G 7/17 G 16/17. Among medium-early samples G10/17, G 8/17 and G 6/17 are of interest, as well as breeding lines of medium-late group G 11/17, G 14/17 G and G 17/17.

To evaluate the accessions for drought tolerance, we used a comprehensive evaluation by a system of indices based on a comparison of yields under stressful and favourable conditions. The total score of ranks for all indices was calculated. According to the results, 5 samples with the best total score index were identified - G 6/17, G 7/17, G10/17, G 11/17, G 15/17.

Thus, the samples with high tolerance to environmental conditions, both under favourable conditions and under drought conditions, were selected according to drought tolerance indices and can be used both for further testing and as sources for selection of spring soft wheat.

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DOI 10.34660/INF.2023.30.73.097

塔吉克斯坦的自然灾害及其预防和消除措施
NATURAL DISASTERS IN TAJIKISTAN AND MEASURES TO PREVENT AND ELIMINATE THEM

Gafurov Safarkhon Jurakhonovich
Candidate of Physico-mathematical Sciences, Associate Professor, Head of Department
Tajik National University

Rajabzoda Phariduni Kishvar
Candidate of Biological Sciences, Associate Professor, Dean
Tajik National University

抽象的。 文章讨论了导致塔吉克斯坦共和国境内发生紧急情况的消极因素。我们研究了一些具有紧急性质并导致人口正常活动中断、生命损失、物质资产破坏和毁坏的现象，其中包括洪水、龙卷风、冰雹、闪电、地震、泥石流、山体滑坡、 干旱、山体滑坡、雪崩等。一些地震事实引发了许多间接威胁，如山体滑坡、落石、雪崩、泥石流、土壤液化和冰川运动等。提出了在州一级研究这一问题的建议 制定一套措施，用于在自然和人为紧急情况下警告和培训人口行动。

关键词：突发事件、环境形势、自然灾害、地震、干旱预报、预警。

Abstract. *The article discusses negative factors that contribute to the occurrence of emergency situations on the territory of the Republic of Tajikistan. We have studied some phenomena that are of an emergency nature and lead to disruption of the normal activities of the population, loss of life, destruction and destruction of material assets, which include floods, cyclones, hail, lightning, earthquakes, mudflows, landslides, droughts, landslides, avalanches, etc. .. Some earthquake facts are presented that provoked numerous indirect threats, such as landslides, rockfalls, avalanches, mudflows, soil liquefaction and glacier movement, etc. Recommendations are given for studying this problem at the state level to develop a set of measures for warning and training population actions in emergency situations of natural and man-made nature.*

Keywords: *emergency, environmental situation, natural disasters, earthquake, drought forecasting, warning.*

The natural and geological conditions of Tajikistan are very diverse and often contribute to the occurrence of destructive natural disasters. These disasters cause

great damage to the economy and population of the country. Active geological processes in the mountains, the location of the population and objects in potentially hazardous areas and disruption of the natural environment create conditions for the formation or intensification of the threat of natural disasters. Over the past 10 years, the most common hazardous events in the country have been mudflows and avalanches. According to the World Bank, Tajikistan ranks first among countries in Europe and Central Asia in terms of vulnerability to climate change and weather- and climate-related hazards.

Mudflows are the result of intense precipitation, rapid melting of snow, or outburst of glacial lakes. They are observed in the foothills and mountainous regions of Tajikistan, and most of the country's territory is considered mudflow hazardous. The areas with the greatest mudflow activity are the slopes of the Turkestan and Kuramin ridges (northern Tajikistan), the southern slopes of the Gissar ridge, and the basins of the Yakhsu, Vakhsh, Obihingou, Pyanj and Zeravshan rivers (southwestern and central Tajikistan). In the Pamir Mountains, sharp warming can lead to rapid melting of snow and the formation of powerful mudflows from the outburst of glacial lakes.

Snow avalanches often form in the mountains of Zeravshan, Gissar and Darvaz. The main cause of avalanches is freshly fallen snow, and the peak danger of avalanches occurs in January–March. Avalanches can disrupt traffic on the country's main roads and power lines.

Landslides are common in places where geological (rock, soil and high seismicity) and climatic factors (rainfall) contribute to their formation. About a thousand landslide areas pose a threat to populated areas, water facilities and roads.

Some of them are often The most destructive, difficult to predict, uncontrollable natural disasters are earthquakes. An earthquake refers to a natural disaster that occurs suddenly and spreads quickly. During this time, it is impossible to carry out preparatory and evacuation measures, so the consequences of earthquakes are associated with huge economic losses and numerous casualties. The number of victims depends on the strength and location of the earthquake, population density, height and seismic resistance of buildings, time of day, the likelihood of secondary damaging factors, the level of training of the population, forces and means of emergency response. The destructive power of an earthquake, like a nuclear weapon, is enormous, but not limitless 7.

Earthquakes are typical throughout the country and can destroy housing, infrastructure and cause large landslides. The territory of Tajikistan is located in the interaction zone of three large mountain structures: Pamir, Hindu Kush and South Tien Shan. More than 5,000 earthquakes are recorded here annually. Strong earthquakes over the past 100 years occurred in 1911 in Sarez (as a result of a rock collapse, Lake Sarez was formed), in 1949 in Khait (as a result of a landslide, 28

thousand people died) and in 1989 in Gissar (in the area of erosion of rocks under the influence of filtration water from the irrigation system caused a landslide, killing 300 people).

Hazardous weather events include heavy snowfall and rainfall, dust storms, hail and other phenomena that cause damage to communities and the economy. Intense rainfall can cause flooding and increase soil erosion. Heavy snowfalls create problems for transport and agriculture. Snow avalanches often form in the mountains of Zeravshan, Gissar and Darvaz. The main cause of avalanches is freshly fallen snow, and the peak danger of avalanches occurs in January–March. Avalanches can disrupt traffic on the country's main roads and power lines 6.

Hail can damage fruit trees and worsen pasture conditions. Severe droughts are rare, but they can affect large parts of the population and undermine food and energy security. In recent years, this phenomenon was observed in the country in 2000/2001.

Extreme heat waves (above 40°C) are possible in the southern parts of the country, with a warming climate trending toward more days with high temperatures. Heat spells have a negative impact on the health and well-being of vulnerable groups (children, the elderly and pregnant women) and on agriculture. As a result of exceptionally warm and dry conditions in 2022, most glaciers in high mountain regions of Asia have suffered intense mass loss. This will have serious implications for future food and water security and ecosystems. Prolonged low temperatures in mountainous areas can reduce river flows and thereby affect power generation. Being combined with winter energy shortages and the impact of low temperatures on agriculture, this can negatively impact the population and economy, creating a complex water and energy crisis.

Having analyzed all these negative factors that contribute to the occurrence of emergency situations on the territory of the Republic of Tajikistan, we can draw the main conclusion that the population is not sufficiently protected from their occurrence. This problem needs to be studied carefully. And first of all, at the state level, develop a set of measures to alert and train the population to act in emergency situations of a natural and man-made nature.

With appropriate measures to predict, prevent, timely notify the population of the approaching moment of their occurrence, timely adoption of protective measures and disastrous consequences, it is quite possible to avoid them or minimize them.

In accordance with the legislation of the Republic of Tajikistan and international regulations recognized by the Republic of Tajikistan, the Committee for Emergency Situations and Civil Defense is taking organizational, legal and practical measures to strengthen bilateral and multilateral cooperation with partner

countries, international organizations in the field of prevention and response to emergency situations .

To improve the functioning of the Unified State System for the Prevention and Elimination of Emergency Situations, as well as to increase the level of material and technical base and human resources in the field of protecting the population and territory of the republic from emergency situations, reducing natural disasters, the following must be carried out: installation of a weather radar, modernization, improvement and expansion of the early warning system and monitoring of natural phenomena, training and retraining of personnel, creating freelance rescue groups, voluntary rescue teams, improving and providing them with rescue equipment, etc.

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科学出版物

上合组织国家的科学研究：协同和一体化

国际科学大会的材料

2023 年 9 月 8 日。中国北京

编辑A.A.Siliverstova
校正A.I.尼古拉耶夫

2023 年 9 月 8 日。中国北京
USL。沸点：98.7。 订单253.流通500份。

在编辑和出版中心印制
无限出版社