



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

Materials of the
International Conference

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国际会议

参与者的英文报告

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

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

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These Conference Proceedings combine materials of the conference – research papers and thesis reports of scientific workers. They examines tecnical and sociological issues of research issues. Some articles deal with theoretical and methodological approaches and principles of research questions of personality professionalization.

Authors are responsible for the accuracy of cited publications, facts, figures, quotations, statistics, proper names and other information.



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Foreword

We thank all participants of our conference "Scientific research of the SCO countries: synergy and integration" for the interest shown, for your speeches and reports. Such a wide range of participants, representing all the countries that are members of the Shanghai Cooperation Organization, speaks about the necessity and importance of this event. The reports of the participants cover a wide range of topical scientific problems and our joint interaction will contribute to the further development of both theoretical and applied modern scientific research by scientists from different countries. The result of the conference was the participation of 56 authors from 7 countries (China, Russia, Uzbekistan, Kazakhstan, Azerbaijan, Tajikistan, Kyrgyzstan).

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

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

Fan Fukuan,

Chairman of the organizing committee of the conference

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

Full Professor, Doctor of Economic Sciences

前言

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

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

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

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

内容分析和评估广告环境对受众的影响
**CONTENT ANALYSIS AND ASSESSMENT OF THE IMPACT
OF THE ADVERTISING ENVIRONMENT ON THE AUDIENCE**

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注解。广告是日常生活中不可或缺的一部分，广告与几乎所有社会领域都有联系，对一个人有很大的影响力。广告对消费者的潜意识有直接影响，在广告的帮助下，广告可能会影响消费者的行为。但是，在规划广告活动时，有必要考虑所有风险因素并进行分析，这正是内容分析这样的方法有助于做到的。

本文的相关性是毫无疑问的，因为内容分析是一个强大的工具，不仅有助于探索竞争对手和市场感兴趣的玩家的广告产品，并随后有竞争力地规划他们的广告活动，而且还有助于显着影响广告观众的环境。

关键词：广告内容分析，广告环境对受众的影响

Annotation. *Advertising is an integral part of everyday life, advertising is in contact with almost all spheres of society and has a great influence on a person. Advertising has a direct impact on the subconscious of the consumer, with the help of advertising it is possible to influence consumer behavior. However, when planning an advertising campaign, it is necessary to take into account all risk factors and conduct an analysis, this is precisely what such method as content analysis helps to do.*

The relevance of this article is not in doubt, as content analysis is a powerful tool that helps not only to explore the advertising product of competitors and players of interest in the market and subsequently competently plan their advertising campaign, but also to significantly influence the advertising environment on the audience.

Keywords: *content analysis in advertising, the impact of the advertising environment on the audience*

Content analysis is a systematic objective method of quantitative research of materials used to identify patterns of advertising practice or components of a brand advertising strategy, such as positioning, sales offers and creative style. The main purpose of content analysis in relation to communications is to identify the most common trends of a particular market or product category. When developing a new advertising campaign, the choice of its tools will be more realistic if there is information about advertising strategies and competitors positioning. Content analysis helps to build up from competitive advertising, to find its own, special position in the minds of consumers, increases the chances of success [7].

Content analysis of advertising is a method of quantitative and qualitative research, thanks to which you can better understand and study the practice of advertising activity, the strategy of advertising a specific brand, as well as assess the impact of advertising on the target audience and its effectiveness [3].

Important characteristic features of the application of content analysis in advertising are (Figure 1) [4]:

1) systematic. Research advertising content analysis method should be conducted systematically and consistently. Compliance with this principle significantly affects the degree of reliability and quality of research results. The selection of advertising and sampling, which is studied in the course of content analysis, should be carried out in accordance with sound rules, as well as the selection of advertising in the process of content analysis;

2) objectivity. Content analysis of advertising should be objective. The value of the results obtained and the conclusions reached can be lost if the impact of personal prejudice on the advertising selection process itself is allowed. To keep content analysis effective, the following should be respected:

- clearly defined coding categories;
- well-trained coders that work independently;
- objectively and clearly developed rules for the selection and study of advertising;
- analysis of the obtained data corresponds to the level of measurement of the selected information.

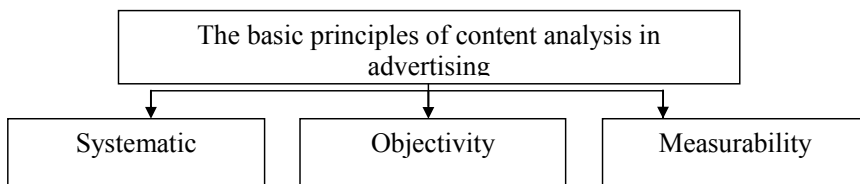


Figure 1 - The basic principles of content analysis in advertising [4]

For example, when researching competitors or successful players in the field of advertising, it is necessary to collect the most objective information without personal views, predispositions and personal opinions;

3) measurability. In the study of advertising, you need to rely on numerical indicators, and not on verbal language, which will help to reveal the essence of the studied question. For example, the phrase “80% of a competitor’s advertising slogans uses photos of beautiful people” helps to convey more information to the audience than “our competitor often uses photos of beautiful people”. When deepening in certain details, it is important to detect general patterns and express them in a numerical range [4].

The content analysis procedure is rather poorly covered and needs to be considered in more detail (Table 1).

Table 1 - The stages of content analysis in advertising

Stage 1	Formation of questions of interest to the researcher and clarification of the objectives of the future analysis
Stage 2	It is necessary to determine the general population of the studied materials.
Stage 3	Creation of sample research plan

In total, there are several main stages that help to study the necessary advertising. Let us dwell on the main ones among them [2].

Stage 1 - the formation of questions of interest to the researcher and clarification of the objectives of the future analysis.

Before taking on the analysis itself, you need to decide what to analyze and why. This is what the first stage is for. Questions and hypotheses for research can be formed on the basis of certain market conditions, a variety of theoretical background, previous research experience. The hypothesis may be, for example, this: “in previous studies it was shown that women respond better to advertising in which there is a minimum of aggression and a call for rivalry. Based on this data, we want to check whether this advertising model is suitable for a businesswoman.”.

It is also important to ask such questions before analyzing someone else's advertising as:

What are the advantages of their product competitors pay attention to?

What means of attention are they using?

What is the tone of the advertising information?

Depending on the goals set before the content analysis, one can form many questions of this kind.

Stage 2 - you need to determine the general population of the studied materials.

On the basis of the tasks set and the formed hypotheses, it is necessary to make up the so-called general population - data and materials that are to be analyzed. This is required in order to not deviate your attention to secondary things and phenomena in the process of work, but to concentrate on specific things that interest you.

The correct formulation of the general population is approximately the following wording: “The object of the content analysis is the advertising campaign of the toothpaste of some brands. The study subject to advertisements placed in a certain period there is something. This wording does not cause questions, it is clear and clear. It would be wrong to formulate the general aggregate as follows: “It is necessary to analyze the advertising of our competitors.” With such a definition, absolutely nothing is clear and it cannot direct research in the right direction.

Stage 3 – Creation of sample research plan.

At this stage, it is necessary to clearly define how exactly advertising samples necessary for content analysis will be selected. Here it is also important to put quite definite, clear and limited frames. It's one thing to solve the problem of exploring car ads in the COSMOPOLITAN magazine numbers for 2015, it's quite another to try to solve the problem of the type to explore all the tomato paste ads made on the local radio station over the past 10 years. Obviously, the second option is much less resolvable than the first [2].

It is necessary to provide a number of other important points when working with advertisements of a competitor. For example, it is necessary to decide how to handle advertising messages that are repeatedly duplicated over a certain period of time. In most cases, duplicates can simply be skipped, but there are times when they are important too. For example, the frequency of repetitions of certain visual images makes the advertising consumer to remember them much better.

It is necessary to create research categories in order to cover as many distinctive features of a competitor's advertising as possible. Of course, categories should concern only the advertising nuances under study. This may be the format of the advertisement, the structure of its announcement, the tone of presentation, the fonts used, the scenery in frames and the like.

According to A.M. Logvinova, in the development and practical application of content analysis, there are several stages: the hypothesis, the formulation of the topic and objectives of the study; determination of the general population of the study; highlighting the categories of analysis - the most common, key concepts that correspond to research objectives; selection of the unit of analysis (linguistic unit of speech or content element); data analysis and interpretation [4].

Thus, content analysis of advertising is a hybrid of quantitative and qualitative approaches. In general, this is a fairly common research method, and if used properly, content analysis helps very well to study advertising practice in general, track specific advertising strategies and draw conclusions about the effectiveness or ineffectiveness of advertising campaigns.

For content analysis, we selected the “bulk mascara” product group. The purpose of the study is to determine the most capacious and effective advertising appeals and assess the impact of the advertising medium on the audience. The object of analysis - television commercials of three manufacturers of mascara: Bourjois, Max Factor and Maybelline. The averaged results of the analysis are presented in table 2.

For the purpose of psycholinguistic evaluation of the text, we used the VAAL system, which allows us to predict the effect of the unconscious effects of texts on a mass audience. For this, there are 24 scales represented by pairs of antonymous adjectives of the Russian language. With their help, the emotional coloring of the advertising slogans and keywords used in the commercials was determined [5].

Table 2 - Comparative characteristics of mascara commercials [5]

Comparative parameter	Bourjous	Max Factor	Maybelline
Tagline	None	«Max Factor: Professionals recommend»	«Everyone is delighted by you, and you by Maybelline!»
Average video length, sec.	20	23	23
Broadcast frequency, times/day	7	12	10
The structure of the commercial	The plot (the girl gets into a difficult situation), the climax (paints the eyelashes with Bourjois mascara), the denouement (thanks to the use of mascara, the situation is successfully resolved)	Change of shots with a posing girl (paints eyelashes, is photographed, goes on the catwalk) - the lack of an interconnected plot	Alternate frame change "girl" - "bright mascara packaging" (up to 4 times) - no plot
Scene	Public places (club, cafe, elevator)	Scene, catwalk, backstage	Unclear
Characters	Girl and young man	Girls	Girls
Main advantages of the product	"Double brush - double volume"	"3 times more volume"	"Colossal volume"
Secondary advantages of the product	None	Does not make eyelashes heavier ("easy-to-lift eyelashes")	Collagen

The Bourjois company did not present its slogan in the video, therefore, for the analysis, we selected the most vivid phrase, in our opinion, "absolute weapon". The VAAL system identified these words as "something strong, loud, bright, majestic, beautiful, powerful, scary". On the basis of what we have concluded that this phrase has a positive impact on potential buyers, prompting them to purchase goods. This coloring of words corresponds to the positioning of the goods in the video: mascara is the main means of achieving a previously inaccessible goal.

The most accented words in Max Factor carcass advertising are “light” and “luxury.” So, on a scale the first of them is represented by such descriptive adjectives as gentle, feminine, weak, small, the second word is rough, heavy, masculine. Thus, the influence of this pair is ambiguous and in different directions, which can negatively affect the audience [5].

The dominant words of advertising for Maybelline - “colossal” and “volume” - give the impression of something angular, but strong, good, stately, bright. Thus, it can be concluded that in regard of the emotional impact the accents placed correctly.

Speaking about the coloring of the advertising slogans of companies, it should be noted that the VAAL system considers Max Factor's slogan not to have pronounced phonosemantic characteristics, and Maybelline gives the impression of a low-lying, weak, quiet and dull [6].

Thus, there are many factors that determine the effectiveness of the impact of commercials on consumers. The presence of some of them can compensate for the absence of others, but the process of creating advertising should be treated as carefully and creatively as possible, especially under the conditions of the modern market and competition.

The method of content analysis provides an opportunity to analyze the main types of advertising argumentation. Thus, to see the strengths and weaknesses of competitors, to analyze the method of positioning their educational products and services.

The research results prove that the actual language units coexist in the system with non-verbal symbols, complementing each other; that in the perception and understanding of one or another advertising text, a certain role is played by unconscious structures, the impact on which in combination with the structures of consciousness will contribute to the full realization of the marketing function of the advertising product. The conceptual field of advertising discourse is based on universal human concepts and ideas that develop into some more or less ordered system reflecting the hierarchy of values, pragmatic interests and intentions of linguistic personalities acting as participants of communication, which is carried out in the context of advertising discourse.

In general, we can conclude that the use of content analysis in scientific research contributes to a deeper understanding of the practice of advertising and the existing relationship between the characteristics of advertising and advertising exposure.

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经济中的金融周期及其表现的迹象
**FINANCIAL CYCLE IN THE ECONOMY AND SIGNS
OF ITS MANIFESTATION¹**

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注解。 本文探讨了经济周期性的问题,以及这种周期表现的特征。此外,作者还关注周期性的财务方面,这使我们能够谈论经济中金融周期的表现及其特征。

关键词: 周期性, 经济周期, 金融周期, 危机, 复苏, 周期迹象。

Annotation. *this article examines the problems of the cyclical nature of the economy, and the characteristics of the manifestation of such cycles. In addition, the authors paid attention to the financial aspects of cyclicity, which allows us to speak about the manifestation of financial cycles in the economy and their characteristics.*

Keywords: *cyclical, economic cycle, financial cycle, crisis, recovery, cycle signs.*

Recently, under the conditions of instability of economic development, attention has been growing to studying the problems of the cyclical nature of the economy, as well as to identification of the factors causing destabilization of the economic system. At the same time, cyclicity is a mechanism for the development of the system, as a result of which the economy reaches a new level of development. The problem of cyclical development of the economy does not lose its relevance for more than two hundred years. The outstanding economists have devoted their works to the problems of the cyclical nature of the economy and the study of factors contributing to the economic recovery from the crisis (J. Kitchin, K. Zuglyar, S. Kuznets, J. B. Say, J. Hicks, P. Samuelson, W. K. Mitchell, C. Marx, E. E. Slutsky, R. Elliott, E. Hansen, J. Tinbergen, N.D. Kondratiev).

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Cyclicality is a natural process of development of the national economy and the world production as a whole. It characterizes the uneven development of various forms of the production and expresses the movement from one macroeconomic equilibrium to another. Cyclic fluctuations can be caused by changes in the rate of production, money supply, uneven accumulation of capital, and technical innovations.

It seems to us very interesting to consider the financial aspects of the manifestation of cyclicality in the economy, taking into account that financial cycles can manifest themselves in the cyclical nature of economic development.

Financial cycle - periodically repeated ups and downs of economic activity over a number of years. With all this, financial cycle differs from economic cycles. The financial cycle determines the change in financial regulators, including the dynamics and structure of the money supply, the ratio of non-cash and cash payments, the emergence of quasi-money and money substitutes, the dynamics of changes in the volume of speculative operations on the stock market in the economy and other factors. Also, equally important segments, that are actively involved in the formation of the financial cycle in the economy, are the money, credit and stock markets and operations performed on them.

Economic development is always associated with an imbalance, with a deviation from the average indicators of economic dynamics, which is manifested by ups and downs (crises) in the economy. One of the clearest manifestations of the imbalance is inflation (the rise in the general price level, the depreciation of the national currency) and unemployment (low employment).

In the phase of a downturn in the economy, the real GDP of the country decreases, and increases during the boom period. The duration of the financial imbalance in the economy (i.e. the financial cycle) is the sum of the periods of recession and recovery. The recovery phase in the financial sector begins with an increase in the availability of attracted resources and the intensification of business and investment strategies of enterprises, reduction of unemployment and income growth, growth in consumer demand and an increase in the production of goods and services. There is an active opening of new enterprises and modernization of old ones due to increased investment and entrepreneurial activity. The stock market is experiencing an increase in the market value of shares. This increases the credit activity of banks in order to place credit resources to potential borrowers.

During the economic downturn, the financial cycle is characterized by inverse processes: the demand for goods and services is declining, the innovation and business activity of enterprises is slowing down, the level of unemployment is increasing, and income and the exchange value of shares are declining. At the same time, the amount of profit of economic entities is significantly reduced, the demand for credit is falling due to the reduction in the production of goods and services, and interest rates are falling. In the case of a prolonged recession, a decrease or slowdown in the growth of commodity prices is observed.

There are also such turning points of the financial cycle as a boom (the end of the rise and the beginning of the recession) and the bottom (the end of the recession and the beginning of the rise). At the top of the recovery phase (boom) in the financial cycle, unemployment reaches extremely low values, and the utilization of the production capacity of enterprises, on the contrary, peaks (90-100%). There is a need for long-term lending to the economy, but at the same time, the possibilities for repaying debt are reduced. During this period, in the economy, the interest rate, the level of prices and wages are very high.

The lowest point of the cyclical fall of the economy is the bottom. This period is characterized by critical values of production and employment. There are mass bankruptcies of enterprises, which is associated with a complete stop of individual industries.

There are six groups of economic parameters that characterize the state and dynamics of the economic situation under cyclic conditions: cyclical (they increase during the period of economic growth, decrease during the period of recession); countercyclical (in the period of economic growth - decrease, in a period of recession - increase); acyclic (dynamics of indicators does not coincide with cyclical changes); advanced (reach a maximum or minimum before approaching the turning points of the cycle); delayed (lagging behind economic trends); coinciding (change in accordance with fluctuations in business activity) [1, P. 173-179].

The basis of the species classification of existing cycles in the economy is the factor of their time duration, as well as the manifesting features and their peculiarities.

So, J. Kitchin is the founder of the study of cycles in the short term. From the point of view of the scientist, these cycles have a duration of 2-4 years (sometimes 2-3 years). He associated such a time lag with oscillatory processes in the world's gold reserves. At the moment, the cycles of J. Kitchin are associated with the presence of a time lag in the movement of information and decision making and a decrease in production volumes [2, p. 210].

K. Zhuglyar explained the existence of economic cycles with changes in monetary policy. He was the founder of the theory of medium-term cycles, which are repeated every ten years; therefore, the duration of this cycle is determined by him at 7-12 years (sometimes 6-13 years). The scientist argued that any crisis is an opportunity to improve the economy and free it from structures that contribute to the glut of the market and the production of unnecessary goods. His worldviews coincide with the calculation of industrial cycles, that are caused by the need to update fixed assets [2, p. 210-211]. In addition, the financial cycles, in our opinion, can also manifest themselves in the cycles described by K. Zhuglyar due to the fact that they are linked to the financial sector of the economy — monetary policy.

S. Kuznets also operated on medium-term periods in the study of cycles in his theory of building cycles, in which he linked cycles to the need to renovate residential buildings and industrial premises every 18-25 years (sometimes 15-20 years) [2, P. 211].

The founder of the theory of long cycles is N.D. Kondratyev. He considered cycles of 50-60 years. Kondratieff's large cycle is a consequence of the disruption and rebalancing caused by periods of accumulation and distribution of capital associated with the introduction of new goods

needed by a developing society to replace obsolete [2, p. 30].

Russian economist M.I. Tugan-Baranovsky is the founder of the "theory of capital overaccumulation." [2, P. 215] In collaboration with Kassel G., scientists have suggested that economic cycles are due to the need for capital accumulation, i.e. we are talking about the financial aspects of cyclicity. In particular, they suggested that industries that produce manufactured goods are developing at a faster pace than those that produce consumer goods. These cycles are characterized by the fact that they are associated with capital, therefore, they can be considered as financial cycles [3, P. 27].

R. Hawthrey and I. Fisher at the end of the nineteenth - early twentieth century laid the foundation for the monetary theory of economic cycles. These scientists attributed the existence of cycles to imbalances in the monetary sphere, which is associated with the manifestation of financial cyclicity. Howry R. considered fluctuations in interest rates and lending volumes as the main tool in the processes of regulating the investment process and stabilizing the economic situation. [2, P. 216] I.Fisher confirmed in his works that it is possible to reduce the effects of cycling by eliminating fluctuations in the purchasing power of money by regulating the volume of money circulation. Thus, these cycles are also associated with the financial sphere and can describe the features of the manifestation of financial cyclicity.

The founder of the "Keynesian" theory of cycles, J. Keynes testified that the cyclical nature of the economy is due to the fluctuations and interconnection of national income and the consumption of capital. From his point of view, cyclicity increases when there is a dynamic increase in demand. John. Keynes introduces the concept of the multiplier effect, when the presence of a reserve in production capacity provides a higher rate of growth of national income. Through the process of indexing investments by entrepreneurs, when demand exceeds cash capacity, there is another increase in demand. This effect is observed as long as business and economic activity grows, then when the peak is reached, a new cycle begins [2, P. 216]. Thus, in the worldview of John. Keynes, the moments of the description of the signs of financial cyclicity are also traced.

J. Schumpeter developed the theory of innovations. He explained the cyclical economy by the intermittent effects of the introduction of new technologies and innovations [2, P. 216]. There is no doubt that these technological innovations may also be related to the financial sector. For example, the spread of electronic payments, electronic money, reduction of cash circulation and a number of others.

J. Sismondi testified that the cyclical nature is due to the workers' underconsumption of goods and general overproduction. This theory is called the "underconsumption theory" [2, P. 217].

M. Friedman developed the monetary theory of cycles. He assumed that the main cause of cyclicity in the economy is instability in the processes of money circulation, i.e. financial cyclicity. From his point of view, such cyclicity develops when there is a change in the pace and volume of cash flows. So, if demand grows and cash flow increases, then it pulls production along with it, and vice versa, if demand decreases, it causes a decline in economic activity and a decline in production [3, P. 28].

Thus, in the conditions of economic instability, it is necessary to pay close attention to the study of the institutions and instruments of the financial market that contribute to the manifestation of financial cyclicity in the economy. At the same time, there are certain interrelations and interdependencies among the constituent parts of the financial market.

In our opinion, financial cycles are characterized to a greater degree by the short-term cycles of J. Kitchin and the medium-term cycles of K. Zhuglar. Kitchin cycles are part of longer cycles. Initially, the cause of Kitchin's fluctuations was the change in world gold reserves. At the moment, the Kitchin cycles are associated with the presence of a time lag in the movement of information and decision making and a decrease in production volumes. Thus, in the period of recovery, enterprises are increasing production capacity to the maximum level, which leads to overstocking of the market and an increase in stocks in the warehouse. In this regard, the company is taking steps to reduce capacity utilization. However, this decision is made with a delay in time, since information on the market overstocking (excess of supply over demand) comes later than output. The result of these cycles is a change in the structure of the economy: the strengthening of some and the weakening of other branches of production.

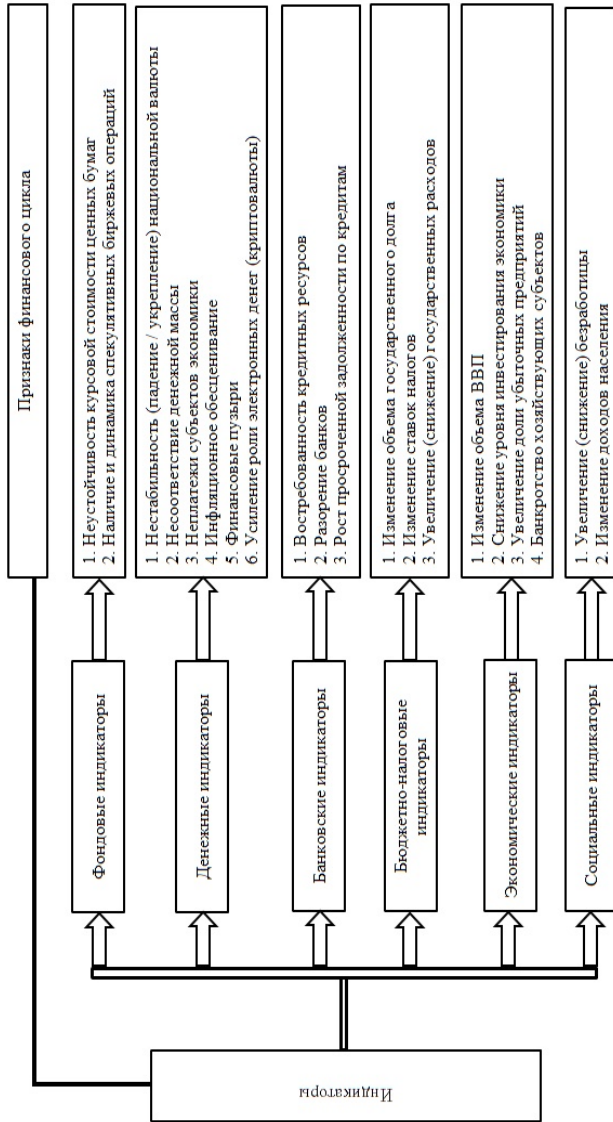


Fig.1 Signs of the financial cycle and reflection in the indicators (compiled by the authors)

In the cycles of K. Zhigular, in addition to fluctuations in the level of capacity utilization, there are changes in the volume of investments in fixed assets. Juglar cycles are closely related to the Kitchin cycles. To the Kitchin's time lags are added the time lags between making investment decisions and creating the corresponding production. There is also a temporary lag between the decline in demand and the elimination of the corresponding production capacity. At the same time, enterprises do not immediately react to a drop in demand; therefore, the elimination of excess production capacity is delayed. A.A. Kochetkov have noted in his work, that the causes of the cycles of J.Juglar should be sought in the sphere of money circulation (or rather, the loan). [4]

The nature of financial cycles in the economy is influenced by scientific and technical progress. With increasing rates of scientific and technical progress there is an ever more rapid updating of fixed capital at all phases of the financial cycle. As a result, overproduction of capital and chronic underload of production are replacing overproduction of goods. This circumstance leads to the erosion of the classical dynamics of the cycle and the cyclicity of the reproductive process as a whole [5, P.24-28].

Consider the signs of the financial cycle, which are summarized in Figure 1.

Based on the presented figure, it can be concluded that the financial cycle is a type of different cycles in the economy. The financial cycle in the economy is characterized by various indicators: economic, fiscal, banking, monetary, stock and social. It should be noted that each type of indicator is characterized by its own manifestation. For example, fiscal indicators manifest themselves in changes in the volume of public debt, changes in tax rates, changes in government spending, and other elements.

The state plays a big role in overcoming cyclical fluctuations in the economy. In the recession phase, government measures should be aimed at boosting business activity. For this purpose, fiscal and monetary policy is pursued. Fiscal policy consists of the following measures: tax cuts, the provision of tax incentives, the possibility of accelerated amortization, etc. In the framework of monetary policy, there is a policy of “cheap” money, which is expressed in lowering interest rates on loans, increasing the bank’s credit resources. During the recovery period, directly opposite measures are taken: an increase in tax rates, restrictions on depreciation policies, the pursuit of “expensive” money policies (an increase in interest rates on loans and a reduction in the bank’s credit resources) [1, P. 173-179; 6, P.409-418].

The current stage of development of the Russian economy is characterized by a strong influence of exogenous factors. There are two main factors that bring about changes in the development of the economy: political and foreign trade. Political disagreements on the world stage have led to negative consequences for the Russian economy. Sanctions against Russia have led to an imbalance in many indus-

tries. Significant components of the external trade factor are the volume and structure of exports, as well as the dependence of the economy on the world market. Since most of the Russian exports are energy products, there is a close dependence of economic development on the dynamics of oil prices [7, P.48-54].

Recently, banking and financial structures through a credit and investment mechanism have become sources of cyclical fluctuations in the country. Money and financial markets have an impact on business activity. Bank credit money creates the conditions for the redistribution of resources between various sectors of production, thereby disrupting the balance at all levels of the economy. Based on a study of various forms of the credit and investment financing mechanism, it can be noted that the financial cyclical nature of the economy is generated not only by an imbalance of supply and demand in production, but also by changes in the financial markets [8, P.69-75].

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俄罗斯联邦简化生产的实际问题
**ACTUAL PROBLEMS OF SIMPLIFIED PRODUCTION
IN THE RUSSIAN FEDERATION**

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注解。改善司法的可及性,简化法律程序,同时考虑到公民的合法权益,是改善俄罗斯司法制度的主要目标之一。保护索赔形式是解决民事案件的传统形式。然而,这是一个相当长的过程,因此恢复权利需要花费太多时间。使用这样的程序解决不复杂的病例似乎过于昂贵。寻求更快捷的解决法院案件的程序形式不仅适用于俄罗斯,也适用于外国。所以在美国,英国,欧盟国家简化解决小额纠纷的形式是积极使用的。本文讨论了目前在俄罗斯使用强制诉讼的问题,分析了司法实践。

关键词: 订单程序, 仲裁程序, 民事诉讼程序, 行政诉讼程序, 法院命令

***Annotation.** Improving the accessibility of justice, streamlining legal proceedings, taking into account the legitimate rights and interests of citizens, is one of the main goals for improving the judicial system in Russia. The claim form of protection is the traditional form of resolving civil cases. However, it is a fairly long process, as a result of which the restoration of the right takes too much time. Resolving uncomplicated cases using such a procedure seems to be overly costly. The search for more expeditious procedural forms for resolving court cases is relevant not only for Russia, but also for foreign countries. So in the USA, England, the countries of the European Union simplified forms of resolving disputes of small sums are actively used. The article discusses the current problems of the use of mandative proceedings in Russia, analyzes the judicial practice.*

***Keywords:** Order proceedings, arbitration process, civil procedure, administrative proceedings, court order*

Order production in the Russian Federation appeared in 1995. A separate chapter was introduced into the Code of Civil Procedure of the RSFSR, which regulated this type of production. Practice has shown the effectiveness of this procedure for resolving disputes, therefore, from June 1, 2016, therefore, from June 1, 2016, the procedure of the writ proceedings was included in the arbitration process.¹ And

¹ Federal Law of 02.03.2016 No. 47-ФЗ “On Amendments to the Arbitration Procedure Code of the Russian Federation.” // Meeting of the Legislation of the Russian Federation of March 7, 2016 N 10 Art. 1321.

a little later, it was also introduced in the Code of Administrative Justice, Chapter 11.1.² Statistics show the relevance of this form of legal proceedings. Courts of general jurisdiction in 2018 considered 9,690,640 civil cases and 3,853,239 administrative cases versus 5,998,000 in 2013.³

The Supreme Court in its Resolution № 62 of December 27, 2016 indicate that a court order - is the judgment (judicial act). 122 Code of Civil Procedure of the Russian Federation and Art. 229.2 of the APC RF. Procedural codes are a comprehensive list of requirements that can be considered in the order of writ. Claim requirements are subject to unconditional return. (Clause 1.1 of Part 1 of Article 135 of the Code of Civil Procedure of the Russian Federation, Clause 2.1 of Part 1 of Article 129 of the APC of the RF, Article 119 of the CAC RF).⁴

The essence of the writ of proceedings consists in the sole decision-making by the judge, on an exhaustive list of requirements, without trial and issuing a court order for the enforcement of movable property and money.⁵ The peculiarities of the material and legal relations submitted to the court, determine the legal nature of the writ proceedings. Comprehensive requirements arising from these legal relations are contained in Art. 122 GIC. These are requirements based on:

- notarized transaction;
- simple written transaction;
- a notary protest of a bill of exchange for default, non-acceptance and non-granting of acceptance.

The amount of the claim must be determined in a fixed amount and cannot be recalculated at the time of the issuance of the court order or before the actual execution. In accordance with Article 229.2 of the APC of the Russian Federation, within the framework of the claim proceedings, the following requirements are considered:

- if they result from a failure to perform or improper performance of the contract and are based on documents presented by the recoverer stating monetary obligations that are recognized by the debtor but not executed if the price of the stated claims does not exceed four hundred thousand rubles;

²Federal Law of April 5, 2016 N 103-Ф3 "On Amendments to the Code of Administrative Judicial Proceedings of the Russian Federation and Certain Legislative Acts of the Russian Federation". // Official Internet portal of legal information.5.04.2016// www.pravo.gov.ru.

³Federal Law of 02.03.2016 No. 47-Ф3 "On Amendments to the Arbitration Procedure Code of the Russian Federation." // Meeting of the Legislation of the Russian Federation of March 7, 2016 N 10 Art. 1321.

⁴Federal Law of April 5, 2016 N 103-Ф3 "On Amendments to the Code of Administrative Judicial Proceedings of the Russian Federation and Certain Legislative Acts of the Russian Federation". // Official Internet portal of legal information.5.04.2016// www.pravo.gov.ru.

⁵Summary statistics on the activities of federal courts of general jurisdiction and justices of the peace.// [Electronic resource]. URL <http://cdep.ru/index.php?id=5> as of 1.05.2019.

- based on a notary protest of a bill of exchange in default, non-acceptance and non-granting of acceptance, if the price of the stated claim does not exceed four hundred thousand rubles;

- on the recovery of mandatory payments and sanctions if the total amount of the sum of money to be collected does not exceed one hundred thousand rubles indicated in the application.

Within the framework of the CAS RF, the enforcement proceedings are established for claims for the recovery of compulsory payments and sanctions (Article 123.1 of the CAS RF). For all these requirements it is characteristic that they are indisputable, the debtor lives or is present in the Russian Federation. The court recognizes the claims as indisputable if they are confirmed by reliable written evidence that is not in doubt and recognized by the debtor. The requirement is considered as recognized by the debtor if from the documents submitted to the court do not contain any disagreement with the requirements. (P. 3 of the Resolution of the Plenum of the Supreme Court of the Russian Federation of December 27, 2016 N 62.) The Supreme Court of the Russian Federation, explaining the peculiarities of applying a court order for administrative legal relations, indicated that paragraph 3 of Part 3 of Art. 123.4 CAS of the Russian Federation obliges a judge to refuse to accept an application for a court order if it is possible to establish from the application and the attached documents the probability of the existence of a dispute about the right. An example of controversy can serve as the presentation of the debtor to the court, before issuing a court order, objections to the claimed requirements.

Thus, the Presidium of the Voronezh Regional Court overturned the judicial order of the magistrate dated 3.11.2017. in case number 44 g-20/2018. The essence of the matter was the demand of citizen BMM. to recover the value of the rendered legal services for the protection of the interests of P.V.A. in the Arbitration Court of the Voronezh Region and the Nineteenth Arbitration Court. In support of their claims, an agreement of October 24, 2016, an agreement of January 19, 2017, an agreement of October 4, 2016, an agreement of October 18, 2016, an agreement of October 26, 2016, an agreement of February 27, 2017 was submitted. The Presidium of the Voronezh Regional Court found that from the documents submitted it was impossible to establish the indisputability of the requirements and the amount of the debt. Submission to the application for a court order agreements on the provision of legal services, copies of copies of court decisions and rulings do not prove the fact of rendering services, the consistency of the volume of services rendered, the lack of complaints about the quality of the work performed. According to civil procedural legislation, the application must be accompanied by authentic documents indicating not only the fact of the conclusion of the transaction, but also documents allowing to determine the existence of an obligation and unambiguously determine the amount of debt to be collected. As part of the writ

*of proceedings, the judge is obliged to check the possible existence of a dispute on the law, when established in accordance with paragraph 3. Part 3. Art. 125 Code of Civil Procedure of the Russian Federation and accept the refusal to receive the application for a court order.*⁶

Another example of the indisputability of the claimed requirements is the presence of a judicial act, which has already established certain circumstances. *The individual entrepreneur filed a claim with the arbitration court for the recovery of a fine for late performance of a monetary obligation. The court of first instance, considering that the debt originated from the contract, does not exceed 400,000 rubles. decided that the recovery should be made in the court proceedings, and since the creditor had not previously applied for a court order, he returned the lawsuit in accordance with paragraph 2.1. Part 1 Art. 129 APC RF.*

The appeal instance did not agree with this position, having recognized the arguments of the court as unlawful, the determination was canceled, the case was sent for reconsideration. According to the court, there was no indisputable evidence that the debtor acknowledged the debt. Previously, when considering another case, a dispute was resolved between the creditor and the debtor about the recovery of the principal and the penalty under this contract for the period preceding stated in the present case, the debt recovered by the court decision was paid by the department on the basis of the writ of execution.

*The cassation instance took the side of the first instance, stating that the requirement to collect fines and interest should be considered recognized by the debtor, if the disagreement with them does not follow from the documents submitted to the court. The existence of a court decision and the enforced recovery on the basis of its funds in another arbitration case does not indicate the existence of a dispute in this proceeding. There is no evidence to support the dispute. In addition, a court order is subject to court if the debtor submits an objection regarding its execution within the prescribed period or otherwise disagrees with the court order.*⁷

In order to speed up court proceedings, reduce court load, increase the responsibility of parties to civil turnover in disputes on recovery of funds for claims arising from contracts and other transactions, as a result of unjust enrichment, they are transferred to court resolution only after the parties comply with the pre-trial procedure. However, this rule does not apply to writ proceedings. This is due to

⁶Resolution of the Plenum of the Supreme Court of the Russian Federation of December 27, 2016 N 62 "On some issues of application by the courts of the provisions of the Civil Procedure Code of the Russian Federation and the Arbitration Procedure Code of the Russian Federation on mandative proceedings". // Rossiyskaya Gazeta of January 13, 2017 N 6.

⁷Resolution of the Constitutional Court of the Russian Federation of November 15, 2007 N 785-OO "On refusal to admit to the consideration of the complaint of a citizen Tishchenko Konstantin Mikhailovich on violation of his constitutional rights in paragraph four of article 122 and paragraph 4 of part 125 of the Civil Procedure Code of the Russian Federation". // Constitutional justice in the CIS and Baltic countries, 2008, N 1.

the peculiarities of the legal nature of the requirements for which a petition for the issuance of a court order is allowed. Requirements must be indisputable and for a small amount. In addition, if the court orders and recommends seeking protection for the violated rule in the procedure of the claim proceedings, compliance with the pre-trial procedure is also not required. This is because the pretrial order is necessary in order to resolve the dispute that arose without the involvement of the court. But in this case, the hopelessness of the direction of the claim is obvious. The debtor is familiar with the application for the issuance of a court order and understands the essence of the claims being made, with a statement about the cancellation of the court order, he clearly shows disagreement with the requirements and unwillingness to repay the debt. Thus, the prejudicial settlement of a dispute in this situation will only lead to an unjustified delay in the restoration of violated rights.

The peculiarities of the material and legal relations to be protected determine the simplified form of the protection of rights established by procedural codes. In this type of proceedings there is no court hearing, the case is considered without summoning the parties, the judge is limited to examining only the circle of evidence presented by the recoverer. A determination cannot be made about leaving the application without movement, leaving without consideration, the writ proceedings cannot be terminated. Considering the shortest possible time to consider a dispute, a simplified procedure for examining evidence, indisputable requirements in this type of proceedings, there is no stage in preparing a case, and no protocol is kept. Participants are not notified of the date of the order and are not summoned to the court for explanations. A motion for adjournment of a case or a break is not filed. However, the order of the court applies to many principles of procedural law, general rules governing the rights and obligations of participants in legal proceedings, most procedural institutions. An application to issue a court order is made according to the general rules. Thus, the applicant is subject to the rules of the claim proceedings for determining jurisdiction at the location or place of residence of the defendant (art. 35 of the APC RF, 28 CCP of the RF, art. 22 of the CAS RF), jurisdiction upon the choice of the claimant (art. 36 of the APC RF, art. 29 CCP of the RF, art. 24 of the CAS RF), and contractual jurisdiction (art. 37 of the APC RF, art. 32 of the CCP of the RF). The rules of contractual jurisdiction are applied even if the jurisdiction of only the claim proceedings is determined in the contract. In order to protect the interests of the debtor, simplified procedures for cancellation and revision of a court order have been introduced. Upon receipt from the debtor within 10 days (20 days under the CAS RF) from the moment of receipt of the objection order, the court order shall be canceled by the judge who accepted it. (art.129 Code of Civil Procedure of the Russian Federation, Part 4 art.229.5 of the APC RF, 123.7 CAS RF). It is noteworthy that the objections of one debtor on a court order issued against several will result in the abolition of the entire writ.

An interesting position was expressed by the Arbitration Court of the Nizhny Novgorod region, who regarded the address with the appeal against the court order as objections to the execution of the court order and canceled it. A court order of the Arbitration Court of the Nizhny Novgorod Region of 08.16.2016 with “NPO Promyshlennaya Energetika”, limited liability company, in favor of Standard, limited liability company, has collected debt under a lease agreement. Disagreeing with the adopted judicial act, the limited liability company “NPO Promyshlennaya Energetika” Sector appealed to the First Arbitration Court of Appeal. However, the appellate court returned the complaint, stating that according to Part 11 of art. 229.5 of the APC RF a court order may be appealed to the arbitration court of the cassation instance within the period established by art. 276 of the APC and revised in accordance with the requirements of Chapter 35 of the APC and art. 288.1 of the APC RF. Since the appeal was filed against a judicial act, which, in accordance with the arbitration procedural legislation, is not appealed, it must be returned to the applicant (part 1 of article 264 of the APC RF).⁸ After the appeal was returned by the appellate court, the court of first instance canceled the court order.⁹

It is necessary to emphasize within the framework of the writ of proceedings, the termination of the proceedings, the abandonment without consideration shall not be applied. When the debtor specifies the grounds provided for these procedural institutions, the court cancels the court order in accordance with part 4 of art. 229.5 APC RF.

The Arbitration Court of the Nizhny Novgorod Region issued a court order to collect 3,000 rubles from the debtor in favor of the Pension Fund to the federal budget. On 30.03.2017, a request for termination of the proceedings was received from the pension fund. 03.04.2017 the claimant received an application for cancellation of the court order under the number A43-7352 / 2017 in regard of the voluntary payment of the debt by the payer of insurance premiums prior to receipt of the foundation's application for issuing the court order to the arbitration court. However, the court, in accordance with the Arbitration Procedural Law, may not discontinue the proceedings after issuing a court order. The definition of the termination of the proceedings is the final judicial act in the case, in the framework of the mandative proceedings - the final judicial act is a court order. The Arbitration Procedure Code of the Russian Federation after issuing a court order provides for its cancellation. Since the claimant submitted documents to the case file confirming that the debtor was not in debt to pay financial

⁸Analytical report on the work of the Voronezh Regional Court of Civil and Administrative (CAS RF) cases in cassation for 6 months of 2018. // The official website of the Voronezh Regional Court [Electronic resource]. URL <http://oblsud.vrn.sudrf.ru> August 1, 2018 as of 01.05.2019

⁹II Resolution of the Arbitration Court of the Far Eastern District of September 27, 2017 N F03-3774 / 17 on case N A04-5152 / 2017. [Electronic resource]. URL <https://kad.arbitr.ru/> as of 1.05.2019

*sanctions, the arbitral tribunal considered the court order in case A43-7352 / 2017 to be canceled.*¹⁰

A court order is not an ideal institution of procedural law. To its undoubted advantages is the efficiency and ease of resolving the dispute. However, this advantage results in shortcomings, the lack of guarantees for an objective and complete examination of the entire body of evidence, the impossibility of taking interim measures, a simplified procedure for canceling a court order, which, in turn, leads to an increase in the time for resolution of the dispute.

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¹⁰The decision of the 1st appeals arbitration court dated September 16, 2016 in the case of A43-21604 / 2016. [Electronic resource] https://kad.arbitr.ru/PdfDocument/7ef2a0b5-bf54-4823-bb16-5eb35eb291a2/5899b759-101f-449a-a76a-8b0b299e73fb/A43-21604-2016_20160916_Opredelenie.pdf. as of 18.05.2019

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法律制度与法律文化：转型问题

**LAW SYSTEM AND LAW CULTURE: THE PROBLEM
OF TRANSFORMATION**

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注解。 文章分析了法律文化状态下社会法律制度的转型模式。 决定从特定形式的法律思维的法律现实中选择的原因 – 法律意识是确定的。 法律意识要素的作用表现出来 – 法律科学和法律教育将法律现实转化为法律现实。 揭示了这一过程对社会物质和精神法律文化形成的重要意义。

关键词：法律制度，法律现实，法律意识，法律科学，法学教育，法律文化。

Annotation. *The article analyzes the patterns of transition of the legal system of society in the state of legal culture. The reasons that determine the selection from the legal reality of a special form of legal thinking - legal consciousness are determined. The role of elements of legal consciousness is shown - legal science and legal education in transforming legal reality into legal actuality. The significance of this process for the formation of the material and spiritual legal culture of society is revealed.*

Keywords: *legal system, legal reality, legal consciousness, legal science, legal education, legal culture.*

The category of the legal system of society was developed in the Soviet and modern Russian legal literature as an integrative concept covering the whole complex of legal phenomena existing in society, in a certain sense as alternative narrowly to the normative understanding of law.

So N.I. Matuzov and A.V. Malko note: “If law traditionally refers to general binding rules emanating from the state, then the legal system is a broader reality, encompassing the entire set of internally consistent, interrelated, socially homoge-

neous legal means (phenomena) through which the official (public) authority provides regulatory -organizing and stabilizing effects on public relations, people's behavior. This is an integrating category, reflecting the entire legal organization of society, the integral legal reality" [1, 83].

S.S. Alekseev writes: "In the legal reality, such interacting elements that have a constitutive meaning stand out - law itself, legal practice, legal ideology. The concept, which encompasses these elements in unity and interrelations, describes the general construction of the law in force in one country or another - the concept of the legal system" [2, 87].

Different aspects of the notion of the legal system are described in detail in the legal literature, especially in a relatively legal context, including in terms of identifying the specific characteristics of the Russian legal system [3]. At the same time, the conceptual theoretical question about the dynamics of the qualitative content of the legal system, which is revealed through its relationship with the legal culture, turned out to be practically not developed. Partly because legal culture, as a rule, is not considered as the ultimate goal to which the legal system naturally moves in its development; partly because the criteria for the values of legal culture are defined through the subjective notions that in the field of legal phenomena it is higher, better, more developed or more perfect, based on which it is impossible to understand what the legal system should objectively strive for.

Within the framework of this article, we will try to outline the principal ways to solve the problem of the relationship between the legal system and the legal culture of society, revealing objective grounds for the transition of the legal system to the state of legal culture and revealing the natural mechanism of such a transformation.

In the aggregate of legal phenomena constituting the legal system, the material part is structurally distinguished - legal reality, which appears as the substantive practical activity of the subjects of social life and the institutions created by them to form legal norms, harmonize them, implement and apply regulatory requirements, identify offenses, establish and implementation of legal liability. All of these legal phenomena materialized in specific legally significant forms are consistently interconnected with each other and ultimately are aimed at achieving a legal order that is consistent with the legal needs of society.

Legal reality has a dual nature. On the one hand, it is the sphere of representation of the essential aspects of law. In the framework of legal reality, on the basis of legal needs, a legal will is formed and acts, which constitutes the essential basis of law [4, p. 253-258]. In the process of achieving the specific goals of the legal will, as a special kind of social will, all the necessary elements of the content of law are consistently created [5, p. 290-297]; the rights corresponding to the content are produced [6, p. 227-232]; objectivized the laws of

law that bind the elements of the content of law and its form into a holistically functioning system [7, p. 108-115]. The sphere of manifestation of the essential aspects of law constitutes legal actuality, which constitutes the quintessence of legal reality [8, p. 150-158].

On the other hand, the manifestation of the essential aspects of law is included in numerous social processes that are the products of the historical development of a given country, its current internal and external state. It is carried out through the activities of specific people and social groups, created by them public and state institutions, falling into dependence on the level of their development. Experiencing direct and indirect effects of objective and subjective, internal and external, permanent and transient causes and conditions, the legal reality in direct existence appears as a mixed flow of essential and non-essential, necessary and accidental, manifests itself not only as a natural sphere in law, but also of various kinds its anomalies [9, p. 170-180].

Legal reality potentially contains in itself the desire to build up elements of legal actuality and to overcome various kinds of deviations, since the goals of the legal will as the essence of law can be adequately realized only in a necessary and legitimate way. In this process, a system of legal values is formed, including those legal phenomena or those of their parties and elements that correspond to the necessary content, forms and patterns of law, and ultimately the legal will as the essence of law and its realized goals. For legal reality, it is valuable that it corresponds to its parameters as a legal actuality.

Values of law, accumulating, form within the legal system a layer of legal culture. However, its identification and separation from other non-value material encounters obvious difficulties. In the legal reality itself there are no direct and clear indications of what is relevant to reality, what is necessary and what is accidental, what is natural, and what is arbitrary. It must also be determined by comparing existing legal phenomena with the correctly understood essence, content, forms and patterns of law. In order to advance towards legal culture, it is necessary to be aware of the essential aspects of the law and to accept them as guidelines for the creation and functioning of legal reality.

Individual people and social institutions that create legal reality as its subjects have special practical interests and needs. Together, they boil down to the establishment of the rule of law that ensures the stability of social ties for the optimal and effective achievement of their economic, social, political, and ideological goals. Satisfying practical needs, subjects produce and reproduce the substantive elements of legal reality in the form of acts of law-making and legal norms, legal facts and legal relations, acts of interpretation and systematization of legal norms, acts of realization and application of law, identifying facts of offenses, establishing and implementing legal liability and others.

The practical nature of the actions of subjects of legal reality determines the clearly expressed utilitarian nature of their thinking. This is a way of thinking for which it is important to get a specific legal result, to achieve object-relevant goals. The subject orientation is the power of practical thinking and the basis of its effectiveness. Oriented to the solution of specific legal problems, practical thinking does not feel the need to disseminate legal reality with a view to highlighting its essential aspects and accumulating the corresponding legal values. For him, the essence of the subject is merged with its existence, the legal reality is inseparable from the legal actuality.

Of course, the essential elements somehow make their way into the sphere of existence, but, like everything in legal reality, it becomes a game of chance, achieved by trial and error, and not the conscious desire of subjects of legal reality. The potential of transforming legal reality into legal actuality does not manifest itself as dominant at this stage, therefore the selection of cultural values proceeds spontaneously, as if by itself, from time to time. Deviations from the natural in legal reality, accumulating, inevitably lead to periodic disruptions in the achievement of practical goals, to incomprehensible for the subjects of legal reality reasons for reducing the effectiveness of certain legal actions and the functioning of the law as a whole.

Practical legal activity, in the course of the realization of the goals of which all diversity of objectively existing legal phenomena is formed, is burdened with contradiction. This is a contradiction between the need to understand the parameters of legal reality as the only adequate form of the manifestation of the essence of law and the impossibility of their revealing with the thinking of practically operating entities within the framework of legal reality. This is a contradiction between the need to move the legal system to the accumulation of cultural values and the impossibility of distinguishing cultural and non-cultural within the framework of legal reality itself. It is resolved through the formation of a special form of legal thinking, different from legal practical thinking, – *legal consciousness*.

Legal consciousness does not replace and does not cancel legal practical thinking, which retains its full significance as an internal basis of legal practice. Legal consciousness exists in parallel with practical thinking as a special form that is not directly related to specific practical interests, goals, tasks and thereby goes beyond the limits of legal reality. Legal consciousness, as opposed to practical thinking, is the sphere of pure spirit, which is layered over legal reality, making it the object of reflection on it. Being not inside, but outside the legal reality allows the legal consciousness to carry out the function of identifying what is essential, natural, valid, inaccessible to legal practical thinking.

Legal consciousness is historically formed, gradually separating from legal practical thinking, completing this process with the formation of *legal science*. In contrast to the contradictory views of legal practical thinking, containing elements of the essential and non-essential, a system of concepts appears, which reflects the parameters of legal reality, that is, the essence, content, forms and patterns of law.

Accumulated in the process of the historical development of legal science, the system of knowledge about legal reality forms the totality of values that form the layer of spiritual legal culture. The process of scientific knowledge is complex and contradictory; flows in not for all available areas of abstract conceptual thinking; especially in the early stages of the development of the legal system, it does not have an empirical basis sufficient for correct conclusions; is under pressure from external, especially economic and political factors. Therefore, scientific knowledge is not alien to the state of delusions or conscious disavowal of the results of scientific research. However, in the end, according to its historical purpose, science served and serves only one ideal - the true knowledge of the real.

Legal science is a necessary step in the development of a legal culture; stage of understanding that in legal reality relates to the values of law, and what is not. However, its concepts, conclusions and findings, no matter how true they are, do not automatically turn into new legal norms, adopted technologies for their harmonization, improved application practices, effective methods for detecting offenses, etc. In order for legal reality to consistently become closer to reality, it is necessary to change its internal component - legal practical thinking. It should begin to transform in the direction of understanding the essential in legal reality and be motivated to the appropriate transformations in practice.

The key role in this process is played by the system of *legal education*, first of all, professional legal education, which determines the state and direction of practical thinking of professional legal stratum. The level of practical thinking of this social group depends mainly on the state and quality of activities in the field of lawmaking, the realization of the law, including the application of law, the enforcement of law and the maintenance of law and order. Professional legal practical thinking is the main object of the impact of legal science through legal education on legal reality in order to produce in it elements of legal actuality, the formation and accumulation of values of legal culture.

The education of practical thinking is an attributive prerequisite for real actions in accordance with conscious parameters of legal reality. But even supported by the introduction of educational qualifications for holding legal positions, the necessity of advanced training, the encouragement of self-education, etc., education itself is not a sufficient basis for the need for practical action in accordance with the principles of legal science. Conceptual material can simply be conserved, as is not required at the moment practice. To activate it, one needs one's own de-

sire of the subjects of legal reality to ensure the effective functioning of the legal system and give it a perfect look, which naturally appears in the period of progressive development of society.

When the achievements of legal science through legal education are introduced into the thinking of practically active actors and coincide with their desire to improve the legal system, the process of materialization of legal culture is launched. The real actions of practical legal workers - judges, prosecutors, notaries, lawyers, employees of other jurisdictional bodies begin to embody elements that correspond to the real content, forms and patterns of law in a meaningful and consistent manner. Legal values cease to be exclusively spiritual wealth, acquiring the form of being substantive legal phenomena corresponding to the essential aspects of law.

Objective for a developing legal system, the tendency towards a legal culture is opposed by a number of factors. The legal system lives and transforms not only on the basis of internal laws, but also under the influence of powerful economic, political, ideological processes, classes, social groups, strata and even individuals that dominate society. All of them act according to their own rules, which do not always coincide with the direction given by the essence of law. The vector of legal science and legal education in the system of influences on the development of the legal system does not seem to be decisive and, in the absence of the deliberate will of the legal community, can only have a spontaneous and indirect impact on the state of legal reality.

Legal culture thus appears as a process of moving from legal reality through legal consciousness (priority - legal science and legal education) to legal practical thinking and practical activity (priority - professional), transforming legal reality into legal actuality. Here, each element and their sequential connection are necessary, and anomalies or failures in at least one of them deform the process as a whole. The unity of these components ensures the promotion of the legal system in the direction of legal culture, where legal culture acts as an aspect of the legal system that, through legal consciousness, moves in the direction of legal reality, objectification of the essential aspects of law and the materialization of relevant values.

In general, this movement has the character of an ever more intensive replacement of the anomalous elements of legal reality with elements of legal actuality; clarification, identification and consolidation of cultural property. The objectivity of the process of transformation of the legal system in the direction of legal culture does not exclude a reverse course, expressed in kickbacks and degradation of legal culture. This tendency also exists, because in legal reality, due to various objective and subjective reasons, elements of rational, actual may be unclaimed, and social instability and defects in the management system can dramatically reduce the potential of the necessary links in the formation of legal culture, in particular, legal science and legal education.

To prevent and overcome regressive tendencies, it is necessary, first, to monitor the state of the legal system, comparing it for the reproduction of legal culture with the preceding stages and identifying possible deformations of its elements. Secondly, to create the necessary conditions for the functioning and development of legal science and legal education, focusing on the needs of the subjects representing these parts of the legal system, and not arbitrary third-party guidelines. Third, to maximally promote the effectiveness of the connection between legal science, legal education and legal practical thinking, realizing that this is where the key element of the progressive development of the legal system lies in the direction of legal culture.

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城市文化在新闻教育中的知识表现
URBAN CULTURE IN JOURNALISTIC EDUCATION
PERFORMATIVITY OF KNOWLEDGE

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注解。文章分析了高等教育的创新策略。知识的表演性鼓励在专家的专业培训中使用新的教育技术。在记者的教育中，博弈论，数字技术的使用以及马赛克在信息的呈现方面都是相关的。本文介绍了一种交际教育方法，该方法在圣彼得堡国立大学新闻与大众传播学院积极运用。展示了有效利用城市空间培训媒体专业人员的技术；研究了游戏社交戏剧，活动价值方法（任务形式），参与节日，论坛和创作晚会等技术。

关键词：新闻，媒体，活动价值方法论，文化交流，民族文化，表演，社会化，游戏社会戏剧。

Annotation. *The article analyzes the innovative strategies of higher education. The performativity of knowledge encourages the use of new educational technologies in the professional training of specialists. In the education of a journalist, the game theory, the use of digital technologies, and mosaic in the presentation of information are relevant. The article presents a communicative approach to education, which is actively used in the Institute of Higher School of Journalism and Mass Communications of St. Petersburg State University. Technologies for the effective use of urban space for the training of media professionals are shown; Such techniques as social dramaturgy of the game, activity-value methodology (in the form of quests), participation in festivals, forums, and creative evenings were investigated.*

Keywords: *journalism, media, activity-value methodology, cultural communication, national culture, performativity, socialization, social dramaturgy of the game.*

Today's student can receive knowledge and skills in a variety of forms and presentations. At the end of the XX century, the so-called performative turn in social cognition takes place, which is aimed at the social construction of reality, and not at its representation. Performativity becomes a new research program that

unites scientists in the field of social and humanities, higher education pedagogy. A dramatic model based on the metaphor of “society as a theater” develops into a broader approach, treating social activity as a cultural performance of radio [1, p. 3-5].

Journalistic text is one of the ways to know reality. A journalistic work allows the reader to participate in mass cultural communication. Media as an agent of non-formal education uses a new methodology. The reason for such changes is external and internal civilization factors. The spiritual values created by journalists are a product of the cultural environment and at the same time its transformer, which transforms the value potential of the social system. In the modern global world, the experience of China in promoting the values of national culture is interesting and productive for the global scientific community. The leading agent of educational socialization is television journalism. For example, such CCTV-4 TV shows about traditional culture as “Dictation of Chinese characters”, “Chinese idioms competition”, “Chinese riddles competition”, “Chinese poetic conference” and “Literary reader” promote traditional axiology, which is actively discussed by the youth audience on Weibo account, which was officially launched in China in 2009, as a platform for providing entertainment services. Weibo statistics data center shows the growth of network users: their number for three years increased by 70 million and reached the figure of 462 million in 2018 [10].

Views on social progress of society have significantly affected the media. Informative and entertaining features began to dominate in them. Actively using the game attitude to reality, the mosaic in the presentation of information, the popularization of scientific knowledge is carried out. Technological progress contributes to the emergence of a universal journalist who is distinguished by efficiency and broad outlook, and is able to satisfy the needs of almost any audience. Journalism is transformed not only under the influence of external, but also internal causes. For example, modernity as a time period is not claimed by historical journalism, and a showman came to the fore. We observe a change in the genre priorities of the media and technological capabilities of the journalistic profession [2, p. 205-207]. These provisions will illustrate on the example of the sociocultural dynamics of Chinese media. In this context, the history of the International Channel CCTV-4 (Chinese International), which was launched on October 1, 1992, is indicative, but its coverage area is limited by Asia only. On January 1, 1993, the program of the China International Channel covered the whole of North America. Today, its geography has expanded significantly and solves the problem of promoting Chinese culture in the global media market. Popular among the audience of the television show "National Treasury", which is conducted by the famous Chinese actor Zhang Goli. Gaming techniques, interesting experts from the world of science and business, cooperation with nine key national museums, such as CCTV and the Palace

Museum, all this provides a high rating of the TV show and its leading position in cultural and educational socialization, the formation of historical memory. This media experience should also be used in the field of education.

Graduates of modern universities need to know productive psychological and pedagogical technologies - to solve practical problems, to adapt to the new role of a specialist, to transfer professional experience. With this approach, education can be viewed as a process of transferring knowledge and cultural values accumulated by the previous generation. By education, researchers understand the creation of the spiritual image of a person, which develops under the influence of moral values. Education is also part of the social sphere, in which external and internal conditions for the development of subjects of the educational process (student and teacher) are created in their interaction, as well as in the autonomous mode of cultural values.

Education indicates to a particular person a specific way out of uncomfortable life dimensions. A person is rapidly moving away from passive consumption of cultural information; not only contemplates cultural values, but also actively uses them [3, p.154-156]. How to attract the attention of students to this problem? You can refer to the traditional form of practical training - field trip.

A field trip as a form of conducting a seminar or a practical lesson allows studying discipline from the point of view of objects, phenomena and processes on the basis of observation in natural conditions. For the teacher, this is a way of establishing or demonstrating the connection of learning with life. The main means of education is direct contact with “sources of culture” [4, p. 80-85]. An important stage of the excursion is the final conversation or writing a creative work, during which the information obtained is included in the total amount of knowledge.

The Russian Museum and the Hermitage, the “Erarta” Museum of Modern Art, and the A. I. Kuindzhi Museum are becoming the creative platform for the classroom and extracurricular student learning education of students, undergraduates and graduate students of the Graduate School of Journalism and Mass Communications of the St. Petersburg State University. Students take part in the program “Formation of a youth audience and cultural theater environment” by the famous “Alexandrinka” - the Russian State Academic Theater named after A.S. Pushkin [5, p. 49].

The rich and eventful cultural environment of St. Petersburg allows both students and teachers to acquire a qualitatively new social experience, to assimilate other role knowledge, and develops creative activity. It is worth emphasizing the productivity of this form of social interaction for foreign students. It provides an insight into originality and inoculture. According to the survey of graduate students in the years 2017-2018 excursions made the alien cultural environment more

understandable for 95% of foreign students; 87% of all students it helped to understand the theoretical aspects of the disciplines studied. Among the respondents, a special sociometric position is occupied by foreign students, mostly Chinese students. It is revealed that the modern sociocultural environment is one of the leading objects of journalistic education.

Modern society in the structure of the paradigm diversity of pedagogy (traditional, scientific, pedagogical and humanitarian) puts forward the information model, which is implemented with the direct participation of, first of all, the media. An important role in non-formal educational socialization is played by the personality factor, namely, the personality of the journalist and its direct participation in the creation of a journalistic work. The modern author uses a new methodology. First of all, this is the activity-value knowledge of the world.

Axiological approach to education as an enlightenment through the media is of particular importance. He directs the attention of researchers to the study of values as the semantic foundations of education, understood as examples of the cultural life of society. As E. Fromm believes, the need for identity is one of the most important universal human needs. And in this case, psychologists, cultural scientists, anthropologists, ethnologists, and sociologists introduce the concept of "sociocultural identity" (from the Latin. "*Identificus*" - "selfsame", "identical") [6, p. 288].

Socio-cultural identity is a person's awareness of his belonging to a certain social community as the bearer of a particular culture. The essence of cultural identity is "the conscious acceptance by a person of relevant cultural norms and patterns of behavior, value orientations and language, understanding of his "I" from the standpoint of the cultural characteristics that are adopted in a given society, in self-identification with cultural patterns of this particular society." Social and cultural experience is acquired during socialization, the leading agent of which, along with such a social institution as education, is journalism. The theory of acculturation and the development of cultural identity seems to be the most productive for understanding the essence of intercultural communication. In this theory, intercultural communication appears as a mutual symbolic process involving the exchange of meanings between people of different cultures. The formation of "intercultural identity" is important in the educational process. The journalist informally carries out educational socialization.

The dynamism of the information system makes new demands not only on journalistic activities, but also on the educational system, which apply new methods and technologies. In this context, the socio-dramatic approach and the theory of social action of Irving Hoffman, who shares the point of view of the philosopher of the Chicago school Charles Kuli that "hypocrisy exists not only in theology and philanthropy, but also in the fields of law, medicine, teaching, even science

... ”[7, p. 68] plays an important role in understanding the methods of journalism. The metaphor of the theater, taken from the works of W. Shakespeare, and Hoffman complements the game theoretical interpretation of reality and introduces the concept of frames into the categorical apparatus - forms of organizing everyday interaction, communication, which manifests itself in both artistic and scientific, educational spheres. The performativity of modern knowledge encourages innovation in the process of training specialists. For example, in the education system, the game theory, the use of digital technologies, mosaic in the presentation of information are most relevant. The data are accepted in the Arsenal of teachers-magazines engaged in training specialists for the media. Today, teaching methods are being used productively to ensure the dialogue interaction between the student and the teacher. In modern conditions the communicative approach to education is especially important. The reason of methodological changes, first of all, is in external civilizational factors that require the dialogue nature of relations between the subjects of instruction. At the Graduate School of Journalism and Mass Communications, St. Petersburg State University, new means of communicative and informational interaction (social networks and social media, gaming techniques, testing, participation of students in social and psychological research) implemented through the educational system, are closely linked to such a traditional form of cultural knowledge, as a tour (as a way of emotional and psychological knowledge of reality). The Russian Museum and the Hermitage, the Erarta Museum of Modern Art and the Museum of A.I. Kuindzhi, the Museum of Political History, and the “Krasin” icebreaker museum are becoming a creative platform for learning. There are not only guided tours, but workshops, trainings, business games, discussions, tests on special disciplines of the cultural direction. Students take part in the program “Formation of a youth audience and cultural theater environment” of the Alexander Pushkin Russian State Academic Theater. Meetings with representatives of the creative and research department of the theater, acquaintance with the museum, attendance of dress rehearsals and premiere performances expand the range of students' knowledge about art and help them master the writing of such genres as a report, review, psychological portrait. To help listeners and with the direct initiative of students, the Department of Theory of Journalism and Mass Communication have created (<http://jf.spbu.ru/artclub/7224/8194.html>) at the Institute. Among its activities are excursions to the Palace of Congresses (Konstantinovsky Palace) - not only acquaintance with architecture, but acquiring skills for the formation of the professional culture of future journalists, advertisers, and public relations specialists. Students visit the press center, communicate with its staff.

What is the role of cultural institutions in shaping the aesthetic taste and professional culture of the student? How is the modern cultural space formed and how

can a journalist build his relationship with him? An attempt to answer these questions has been undertaken in various forms of classroom and extracurricular work. One of the directions in the training of journalists, which allows you to master the methodology of intercultural communications, is participation in festivals, media forums, creative meetings with artists; among them are the Alexandrinsky International Theater Festival, the Silver Lyre International Music Festival, the Dialog of Cultures media forum, the International Cultural Forum.

The multimedia character of the representation of the cultural life of the megapolis in the classroom on special disciplines contributes to understanding the dynamics of modern artistic culture, in particular, architecture, design, and applied art, about which journalists tell their audiences. Students of special seminars (“Urban culture and lifestyle”, “Psychology of interaction in the media sphere”) study the technologies used to create the aesthetics of urban space and new communication strategies directly in the cultural environment of the city. The objects of their scientific analysis and media coverage were: one of the first laser show on the water in St. Petersburg, the festival of light (for example, in 2017 at the time of its holding, the Northern capital turned into the “cradle of the Russian revolution”); the first media facade in the city (on the building of the head office of Bank Saint Petersburg in 2011). Cultural semantics of St. Petersburg is an effective means of communication, and immersion into the cultural space of a megacity is one of the activity-value methods of knowledge of the world that forms the professional culture of a specialist.

The information and communicative resource of modern science ensures the effectiveness of the production of new knowledge. This communicative situation, for example, in D. Price is characterized by a metaphorical comparison of science with a mosaic puzzle, and it is legitimate to use the allegory for analyzing the dynamics of modern processes in higher education. We consider the concept of interactive ritual, created by I. Hoffman and developed in the works of R. Collins [8, p. 234-278], as the starting point in pedagogical interaction. With a constant communicative interaction, individual representations and emotional energies of individuals are included in the holistic system of sustainable interaction and the joint creation of knowledge. To achieve this pedagogical goal, a variety of cultural, organizational and other environments is used in the educational process.

Information technologies, values of mass culture cause the emergence of new forms of information presentation. The historian of the theater, the creator of the modern theory of theatrical communication N. N. Evreinov extends the law of the theater to any social processes, advancing the idea of “theatrical life”. This idea is actively used in the educational field. Professor of the St. Petersburg State University I. N. Blokhin focuses on the specifics of the embodiment of the theatrical concept of communication in the media [9, p. 360]. Such a game form of organization of educational activities is popular as a quest with which the following skills are

developed: teamwork, solving intellectual problems, creativity, developing an intuition in a creative person, the ability to anticipate and predict. The quest is used in St. Petersburg State University online courses (for example, "Fundamentals of university ethics").

Of course, the methods of modern education are varied. The relevance of classical concepts based primarily on the representation of knowledge, the rule of logic, the construction of true judgments is replaced by a performative turn in social knowledge and active use in educational practice of the theory of social action, in particular, social drama, constructivist structuralism, the theory of institutionalization and social exchange. Today, social and humanitarian science, as well as the institute of higher education, are in a state of searching for new paradigm foundations of scientific knowledge.

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18年治疗非肿瘤病因的食管气管瘘的经验
**18 YEARS OF EXPERIENCE IN THE TREATMENT
OF TRACHEOSOPHAGEAL FISTULAS OF NON-TUMOR
ETIOLOGY**

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注解。 本文分析了自2000年以来食管气管瘘患者手术治疗的结果。完成了32例分瘘手术。 4例患者进行了瘘管分离，增加了狭窄气管切除术，2例行气管成形术，1例行食管成形术。 5名患者（16%）观察到术后并发症。 在一起案件中，登记死亡。

关键词：食管气管瘘，气管，狭窄，胸外科。

Annotation. *The article analyzes the results of the surgical treatment of patients with tracheoesophageal fistulas since 2000. 32 operations to divide the fistula were completed. Four patients had fistula separation with augmented resection of the stenotic trachea, two had tracheoplasty, one with esophagoplasty. Postoperative complications were observed in five patients (16%). In one case, the death was registered.*

Keywords: *Tracheoesophageal fistula, trachea, stenosis, thoracic surgery.*

Tracheoesophageal fistula (TSF) of non-tumor etiology is a rare but extremely serious complication of prolonged artificial lung ventilation (ALV) [1-16]. In most cases, it occurs in the cervical and upper thoracic regions of the trachea in the area of the cuff of the endotracheal or tracheostomy tube. The cuff pressure on the membranous wall of the trachea leads to its ischemia, necrosis and the subsequent formation of an anastomosis between the posterior wall of the trachea and the esophagus. This is facilitated by the presence in the esophagus of the probe for enteral nutrition or decompression of the stomach [7,14]. Another reason for the formation of TSF non-tumor etiology is the discrepancy between the size of the tra-

cheostomy cannula and the internal lumen of the trachea. The significantly smaller size of the tracheostomy tube leads to its frequent displacement and traumatization of the tracheal mucosa, which contributes to the formation of an anastomosis between the trachea and the esophagus in the distal end of the tracheostomy cannula [6]. The probability of this complication increases in patients receiving hormonal preparations, suffering from diabetes, cachexia, with purulent complications in the area of tracheostomy [4, 5, 7]. According to various data, the frequency of TSF varies from 0.5% to 5% among patients who underwent prolonged ALV [4, 5, 7].

With the TSF formed, as well as with the gut-like intestinal fistula, its spontaneous closure is almost impossible, therefore, the only possible way to cure TSF patients is surgical operation [2,7,10].

Objective: to present our experience in treating TSF patients.

MATERIAL AND METHODS

From 2000 to 2018, 32 patients with tracheoesophageal fistulas were operated on by us. All patients were hospitalized from other medical institutions with TSF diagnosis. The age of patients from 20 to 58 years. There were 21 men (65.6%), women - 11 (34.4%). Disease duration was from a month to 3 years. The diameter of the fistula from 5 mm to 35 mm. In 23 patients, prolonged artificial ventilation of the lungs through a tracheostomy was the cause of the development of fistulas, and in 7 patients through an endotracheal tube. In 2 patients, fistula was a complication of tracheal stenting for cicatricial stenosis. In 6 patients, the tracheoesophageal fistula was combined with tracheal stenosis. 15 patients arrived with gastrostomy. In one patient, the esophagus was crossed proximal to the fistula and placed on the neck in the hospital at the place of residence to stop the throwing of its contents into the trachea. 7 patients, due to the small size of the fistula, took food through the mouth, one patient ate through a probe, which he independently led into the stomach through the mouth three times a day for a year.

Operations were performed under general anesthesia. In all cases, cervical access was used (collar-shaped incision by Kocher or an incision along the anterior margin of the left sternocleidomastoid muscle). With localization of the fistula in the upper thoracic region of the trachea, a section in the neck was supplemented with a partial sternotomy up to the 3rd rib. In the absence of tracheal stenosis before the operation, in all cases we managed to suture the defect in the trachea, without resorting to its resection. The hole formed in the trachea after dissociation of the fistula was sutured by atraumatic needles (vicril 000) with a single interrupted suture with tying knots outside the tracheal wall. The defect in the esophagus was closed on the probe with a double-row suture with atraumatic needles (vicryl 000) with knots inside. To the suture line on the esophagus, the medial leg of the sternoclavicular bone-muscle was hemmed, thereby isolating the suture line on the esophagus from the suture line on the trachea.

25 patients underwent disengagement of the trachea and esophagus with the closure of defects in them and the interposition of muscles between them (usually the area of the sternocleidoid muscle). Four patients were separated by a resection of the stenotic trachea, two by tracheoplasty, one by esophageal plasty.

Nutrition of patients in the postoperative period was carried out through the gastrostomy, and in its absence through a nasogastric tube, which was administered during the operation. Eating through the mouth was allowed no earlier than 7 days after surgery.

Postoperative complications were observed in five patients (16%). The treatment of a patient operated 20 years after radiation therapy for Hodgkin's lymphoma granulomatosis ended in death. A patient with tracheal stenosis, a tracheo-esophageal fistula, was separated from the fistula with a circular resection of the trachea. The postoperative course was complicated by the failure of the seams of the anastomoses on the trachea and esophagus, mediastinitis. In 1 patient, due to a violation of the regimen (feeding through the mouth on the 2nd day after the operation), there was a failure of the stitches on the esophagus. The defect in the esophagus independently closed after 10 days. On the 14th day, the patient in satisfactory condition was discharged. In 1 patient, increased bleeding of tissues was noted on the first day after the operation, which required removal of sutures from the wound and stopping of bleeding by electrocoagulation. In 2 patients marked suppuration of the wound in the neck without recurrence of the disease. Healing by secondary intention.

DISCUSSION

TSF non-tumor etiology is a severe life threatening iatrogenic complication. The first publications about the occurrence of such complications appeared in the middle of the last century after the widespread introduction into the practice of intubation anesthesia and prolonged ALV [7, 8, 11].

Symptoms of TSF vary according to the clinical situation. Primary diagnosis is difficult due to the critical condition of the patient on the ALV. The clinical picture is manifested by pulmonary complications caused by the forming fistula. In the early stage of fistula formation during the period of artificial ventilation of the lungs, a sudden increase in the number of aspirated tracheal secretion, and especially the appearance of gastric contents and food in it, may indicate its presence [2,4-8,10]. However, the clinical diagnosis of established TSF, as a rule, does not cause difficulties. It manifests itself by paroxysmal cough, which occurs during a meal. Endoscopic examinations are the leading method for confirming the presence of a fistula: esophagoscopy and tracheoscopy. It should be borne in mind that small fistulas are difficult to detect during esophagoscopy, since the fistula can be closed by folds of the esophageal mucosa. The most informative is tracheoscopy,

in which it is possible to determine the size of the fistula, the distance from the vocal cords and carina, the presence or absence of tracheal stenosis [4, 7, 10]. Accurate information for the surgeon on the size and location of the fistula can also be provided by computed tomography.

Given that the conservative treatment of patients with tracheoesophageal fistula is ineffective, the only radical way to eliminate non-tumor fistula nature is surgery [2,4,7,10].

The principles of TSF surgery were first formulated by Grillo H.C.C. et al. in 1976 [6,8]. A radical method for treating tracheoesophageal fistulas is the separation of the esophagus and trachea with the closure of defects in them and the interposition of the muscles between them (usually the area of the sternocleidomastoid). One of the options for TSF dissociation is the so-called transtracheal approach, in which the defect in the wall of the esophagus is approached after crossing the trachea. The defect in the esophagus is sutured in two rows of stitches and impose an anastomosis between the crossed trachea [2,7]. With large TSF (more than 1 cm), it is not always possible to suture a defect in the membranous wall of the trachea without narrowing its lumen. In such situations, surgery is complemented with tracheal resection. Mathisen et al. reported treatment of 38 patients with TSF. Disconnection of the tracheoesophageal fistula was performed in 9 (24%) patients. The remaining 76% of patients required tracheal reconstruction [11]. We, in the absence of tracheal stenosis before the operation, in all cases managed to suture the defect in the trachea, without resorting to its resection.

According to most surgeons, surgical intervention is possible only when the patient's condition is stabilized and after he has taken independent breathing [4-6,10,11,15], although some authors do not consider ALV to be an absolute contraindication to surgery [14]. Preparation for surgery is very important, affecting its result, it can take several weeks and even months. To reduce the likelihood of deterioration of the patient who is on the ALV, to achieve its stabilization and improvement allows the generally accepted set of measures. It consists in replacing the tracheostomy tube with the location of the cuff of the tube distal to the fistula, which helps prevent the esophagus from being thrown into the tracheobronchial tree. It is advisable to remove the probe for enteral nutrition, providing the patient with food parenterally or via eunostomy, and using the gastrostoma for decompression of the stomach [2,5,6, 8,10].

Anesthesia in patients with TSF has its own characteristics, although it follows the same principles as for tracheal resection. Small fistulas (less than 0.5 cm) have little effect on the ventilation of the lungs, while with fistulas larger than 1 cm, it is difficult due to the release of air into the esophagus and stomach, and ventilation with positive pressure is generally impossible [6]. During surgery, in order to maintain adequate ventilation of the lungs, the endotracheal cuff should be located

below the TSF. For large sizes, TSF is advisable to intubate under the control of a fiber endoscope. In the absence of tracheal stenosis, orotracheal intubation is performed. In the presence of tracheal stenosis in patients with a tracheostomy, the trachea is intubated through the tracheostomy opening with the subsequent transition to "shunt-breathing" or high-frequency ventilation of the lungs, if it is necessary to perform a resection of the trachea.

Postoperative complications reach 32-56%, mainly caused by the failure of the seams and the recurrence of the disease [4]. K.R.Shen et al. from the Mayo Clinic, analyzed the results of operations in 35 patients [16]. Postoperative complications were noted in 54.3% of patients, mortality was 5.7%, and relapse of the disease occurred in three patients. The most frequent complications were respiratory failure (17.1%), pneumonia (14.3%), failure of stitches on the esophagus (11.4%), revision of the wound due to bleeding (11.4%).

Of great importance is the experience of treating patients with TSF. So, A.Muniappan et al. Based on the analysis of the results of treatment of 74 patients with TSF over a 35-year period showed a decrease in mortality from 10.5% during the period of mastering the technique of the operation to 2.8% in recent years [12].

In Russia, V.D Parshin et al. [2] have the greatest experience in treating patients with TSF. Analysis of the treatment of 107 patients showed that it is possible to cure this severe category of patients in 97.8% of cases. However, it should be noted that such excellent results are possible only in a specialized thoracic department, which has extensive experience in operations on the trachea and esophagus.

Thus, the radical treatment of patients with tracheoesophageal fistulas consists in the simultaneous disconnection of the fistula with the closure of defects in the trachea and esophagus and the transposition of muscles to isolate the suture line on the esophagus from the suture line on the trachea. The operation is performed in a planned manner after the patient is transferred to independent breathing and the state is stabilized. In the absence of tracheal stenosis, a tracheal defect may be sutured without its reconstruction. Careful adherence to preventive measures when managing a patient who is on a long-term ALV, especially for the care of the tracheostomy, will reduce the risk of developing such a formidable complication of prolonged artificial ventilation like TSF.

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胃癌粘膜脂质体的现象

PHENOMEN OF MUCOSAL LIPOMATOSIS AT GASTRIC CANCER

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抽象。在体重指数与脂肪瘤病严重程度之间没有相关性的情况下，检测到胃癌（GC）粘膜脂肪瘤病的高发病率，这可能使其成为一种独立现象。与对照组相比，脂肪瘤病在肿瘤区域外的粘膜厚度增加（形态测定分析）在肠道和弥漫性GC类型以及肠道类型的GC中引起统计学显著性 - 粘膜下层，浆膜下层和厚度的统计学显著差异与弥漫型胃癌相比，胃粘膜的总厚度。粘膜脂肪瘤病在胃癌中的意义尚不完全清楚，但已知脂肪组织的作用（内分泌功能，免疫炎症的发展等），与粘液性间质变性和转化生长因子 β (TGF β) 的积累有关。) 不排除局部脂肪组织沉积对癌发生的影响，这需要继续研究。

关键词：胃黏膜脂肪瘤，胃癌。

Abstract. *A high incidence of mucosal lipomatosis at gastric cancer (GC) was detected at the absence of a correlation between body mass index and the severity of lipomatosis, which probably makes it possible to consider it as an independent phenomenon. Lipomatosis causes a statistically significant, compared to control, increase in mucosal thickness outside the tumor zone (morphometric analysis) in intestinal and diffuse types of GC, and in intestinal type of GC – statistically significant differences in the thickness of the submucosa, subserous layers and the total thickness of the gastric mucosa in compared with diffuse type of gastric cancer. The significance of the phenomenon of mucosal lipomatosis in gastric cancer is not completely clear, but the known effects of adipose tissue (endocrine function, development of immune inflammation, etc.), association with myxomatous stromal degeneration and accumulation of transforming growth factor beta (TGF β) do not exclude the influence of local adipose tissue deposits on carcinogenesis, which requires continue research.*

Key words: *gastric mucosal lipomatosis, gastric cancer.*

Introduction. Adipose tissue (AT) is a special type of connective tissue. Fat cells (adipocytes, or lipocytes) develop from undifferentiated cells of mesenchymal origin, which also give beginning to endothelial cells, mesothelium cells, smooth myocytes, fibroblasts, osteo- and chondroblasts [1]. Existence is not excluded of two populations of adipocyte-progenitor cells – ASCs (adipose-derived stromal cells), derived from CD34-positive cells vascular fraction of AT that are negative for the expression of markers of blood (CD14, CD45) and endothelial cells (CD31), and AT–MSCs (adipose tissue – mezenchymal stromal cells – mesenchymal stromal cell adipose tissue) derived from CD34-negative cells [2].

Like pluripotent cells, ASCs express the transcription factors Oct-4, Sox-2 and Rex-1, which probably accounts for a wide range of their directed differentiation into the cells of tissues of all three germ layers. Transformation potential into induced pluripotent cells in ASCs much higher than fibroblasts. Shown, that ASCs can differentiate into tumor-associated fibroblasts capable for potentiating the growth of active tumor cells without affecting resting tumor cells; does not exclude the possibility of the development of tumor cells from ASCs [3].

In recent years, AT is considered as a complex endocrine and immune organ, and not just fat reserve or energy depot. The endocrine function of AT is primarily associated with the leptin produced by adipocytes [1, 4]. Leptin modulates a number of other biological processes — immune responses, cytokine (CK) production, angiogenesis, and carcinogenesis. The receptors leptin have homologous similarity with receptors of the first class of the CK, associated with Janus-kinases and activation of signaling pathway of transcriptional Jak/Stat which violation of regulation often takes place in the process carcinogenesis. The connection between leptin and cancer has been noted in many papers. In vitro leptin has proliferative effect, influence on mobility and tumor cells invasiveness [4].

In contrast to leptin, the level of adiponectin, which is secreted predominantly by visceral adipocytes, negatively correlates with obesity.. The antitumor effect of adiponectin associated with increased insulin sensitivity, decreased insulin-like growth factor-1 (IGF-1), and suppression of the expression of proinflammatory CK [4].

The leading place in the development of metabolic disorders in obese people is assigned to inflammation connectide with obesity, which is associated with an increase in the number of fat cells that produce proinflammatory CK causing inflow in AT of immune cells, in particular, macrophages. The activation of the inflammatory cascade in AT is expressed in the subsequent accumulation of CD8+ T-cells-effectors, reducing the number of CD4+ helper and regulatory T-lymphocytes. Activation of CD8+ T-lymphocytes contributes, in turn, to a new influx and accumulation of macrophages in AT, which forms vicious circle of interaction CD8+ T-lymphocytes, macrophages and AT cells [4, 5]. Moreover, in vivo adipocytes

themselves can be transformed into macrophages [4]. Large the value of obesity-related inflammation is attributed to the microvessels of AT, the endothelium of which expresses IL-33 and receptors to it - ST2 and is involved in the pathogenesis of many diseases, including atherosclerosis and heart disease [6].

Adipocytes can reduce the efficiency of oxygen diffusion, which leads to tissue hypoxia, the development of inflammation and increased infiltration AT by macrophages. A quantitative increase in adipocytes leads to an increase in the production of pro-inflammatory CK and an increase in resistance to insulin [4]. Many of these cytokines are able to activate transforming growth factor beta (TGF β); therefore, it is not by chance that obesity is associated with an increase in the level of this growth factor [7].

Reported effects of adipose tissue, a high frequency of detection among patients with gastric cancer of persons with overweight and obesity, as we reported earlier [8–9], determined the special attention to the lipomatosis of the gastric mucosa (GM) revealed when studying of surgical material in these the patients. Along with cystogenesis [10], lipomatosis of GM turned out to be the second important phenomenon noted among the features of gastric cancer associated with systemic non-differentiated dysplasia of connective tissue (DCT).

Aim. To assess the frequency and severity of lipomatosis of the gastric mucosa in patients with stomach cancer.

Materials and methods. The study included surgical material from 110 patients with gastric cancer (70 men and 40 women aged 29-79 years) who were treated in the oncology department of the Surgut Regional Clinical Hospital. According to the analysis of clinical data, two groups were formed: Group 1 - 63 patients with gastric cancer, which also had visceral signs of systemic non-differentiated DCT (involvement of three or more organs of different systems), confirmed by instrumental methods of research (fibrogastroscopy, ultrasound examination of internal organs, echocardiography, computed tomography, etc.) and the results of examination of patients by various specialists; group 2 – 47 patients with GC, but with no signs of DCT. Groups are comparable by sex, age, structure staging of gastric cancer according to the classification of TNM. In the structure of histotypes of the GC intestinal type is prevailed – in groups of 47,6% and 40,4%, diffuse type (DGC) was 34,9% and 34,0% accordingly, in other cases diagnosed mixed GC.

A morphological study of GC was carried out after the preparation of paraffin sections using the standard method with hematoxylin-eosin staining (Nikon Eclipse Ni light microscope M570E, Japan). Rating of severity of lipomatosis of gastric mucosa was carried out according to the assessment scale developed by us (Table 1).

Table 1
Grading scale of lipomatosis of the gastric mucosa

Degree of lipomatosis severity	Criteria
I degree	Small focal accumulations of fat cells in the submucosa without a noticeable change in its thickness
II degree	Pronounced foci of adipose tissue in the submucosa with an increase of vascular density (neoangiogenesis) in them and a sharp increase in the thickness of the submucosa, areas of expansion of adipose tissue in the muscular membrane or an increase of fat deposits subserous.
III degree	Powerful foci of adipose tissue in the submucosa with an increase in their density vessels and a sharp increase in the thickness of the submucosa, pronounced expansion of adipose tissue in the muscle membrane, an increase in the deposits of adipose tissue subserous with a significant increase of the thickness of the mucous membrane in general

To assess the thickness of the GM as a whole and its individual layers, NIS-Elements BR computer software was used after obtaining a digital image using a Nikon DS-Fi 2 video camera (Japan). Morphometric analysis of the thickness of the gastric mucosa and its layers was carried out at the IGC (n=10) and DGC (n=10), the comparison group consisted of 9 cases - surgical and autopsy material (GM) of patients without stomach cancer.

Comparative statistical data analysis in the study of the thickness of the GM was performed using t-criterion Student, the structure of the severity of lipomatosis – using χ^2 -criterion to identify correlations between the body mass index (BMI) and the severity of lipomatosis, the Spearman's rank correlation coefficient was used. Critical level significance when testing statistical hypotheses was assumed to be 0,05.

Results and its discussion. Overweight or obesity of varying severity (BMI> 25 kg / m²) is generally found in 61,5% of patients with gastric cancer included in the study, in groups, the proportion of such patients was 56,7 and 68,2%, respectively.

Morphological study of lipomatosis group GM was detected in 62,1% and 63.2% of cases, respectively. In a comparative analysis of groups by the structure of the severity of lipomatosis showed no statistically significant differences (Fig. 1), as well as separately in groups, and in general, there was no correlation between the severity of lipomatosis and BMI in stomach cancer (rs = 0,167, p = 0,526). Probably, this allows to consider lipomatosis GM as an independent phenomenon, not related to the general obesity, as well as to consider it further with GC in general, regardless of the presence or absence of CTD.

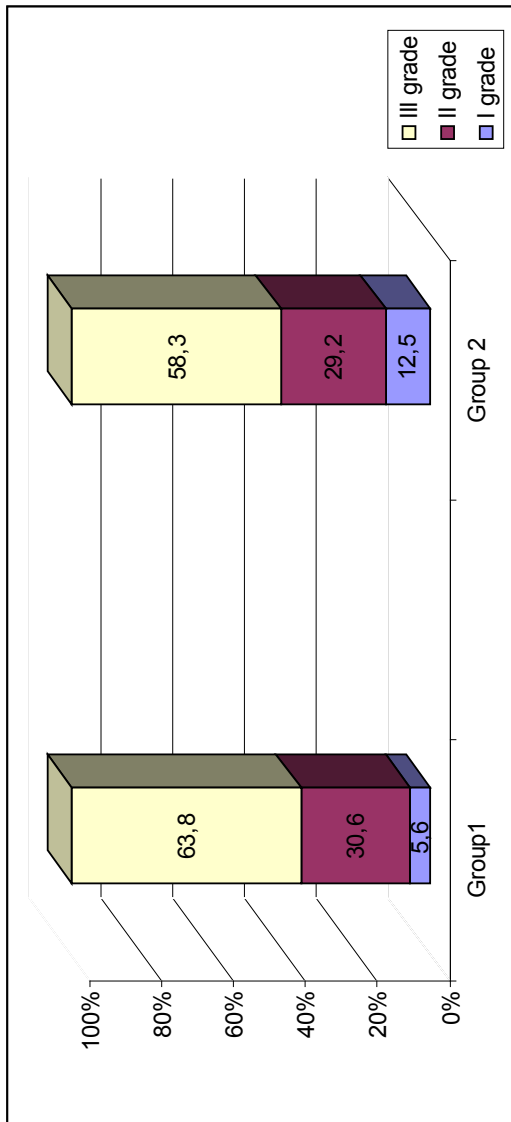


Fig. 1. The severity of mucosal lipomatosis at gastric cancer.

Focal accumulations of fat cells of different area were determined in the submucosal and subserous layers of the GM, and quantitative and topographical features of adipose tissue found reflection in the estimated scale of lipomatosis (Table 1). Often these were massive adipose tissue deposits with complete submucosa replacement and the expansion of fat cells in the muscle membrane with the disintegration of smooth muscle cells (Fig. 2). Lipomatosis submucosal of GM is often associated with foci of myxomatous degeneration, thickening of the muscle plate, angiomatosis and advanced stage of the disease (III – IV stage gastric cancer).

Few GM thickness studies according to morphometry [11] and transabdominal ultrasound studies indicate that total thickness of the wall of the stomach ($M \pm m$) does not exceed 5–7 mm, in particular, according to the data of endoscopic ultrasonography and laser Doppler flowmetry, the coolant thickness does not exceed 5 mm while maintaining differentiation of all its layers [12–13].

Morphometric analysis of the total thickness the GM and its individual layers outside the tumor zone in intestinal and diffuse types of gastric cancer revealed statistically significant differences when compared with the comparison group (Table 2); significant differences in the thickness of the submucosal, subserous layers and the total thickness of the GM in comparison with DGC.

Table 2
Comparative analysis of mucosal thickness at gastric cancer (mm)

Layers of gastric mucosa	Intestinal GC, n = 10 (1)	Diffuse GC, n = 10 (2)	Control, n = 9 (3)	t_{1-3}	t_{2-3}	t_{1-2}
GMP	1,84 ± 0,23	1,84 ± 0,23	1,45 ± 0,23	0,9118	1,2188	0,2353
SML	1,84 ± 0,23	1,76 ± 0,413*	0,40 ± 0,099	4,6344	3,2381	2,9207
ML	1,84 ± 0,23	2,32 ± 0,363*	1,27 ± 0,11	5,2813	2,7632	1,3617
SubS	1,84 ± 0,23	0,56 ± 0,17	0,51 ± 0,02	3,4848	0,2941	2,9730
GM in generally	1,84 ± 0,23	6,48 ± 0,293*	3,63 ± 0,11	30,3252	9,1935	12,7778

Note: GMP - gastric mucosa proper; SML – submucosal layer; ML – muscular layer; SubS – subserous layer; GM – gastric mucosa; ^{2*} - the differences are statistically significant in comparison with DGC; ^{3*} - differences are statistically significant at comparison with control, $p < 0.05$.

It is possible that the connection of an increased amount adipose tissue in the body with gastric carcinogenesis can exist at different levels – systemic, associated with overweight and obesity, or increased BMI, and organ, associated with local accumulation of fat tissue, or lipomatosis of GM.

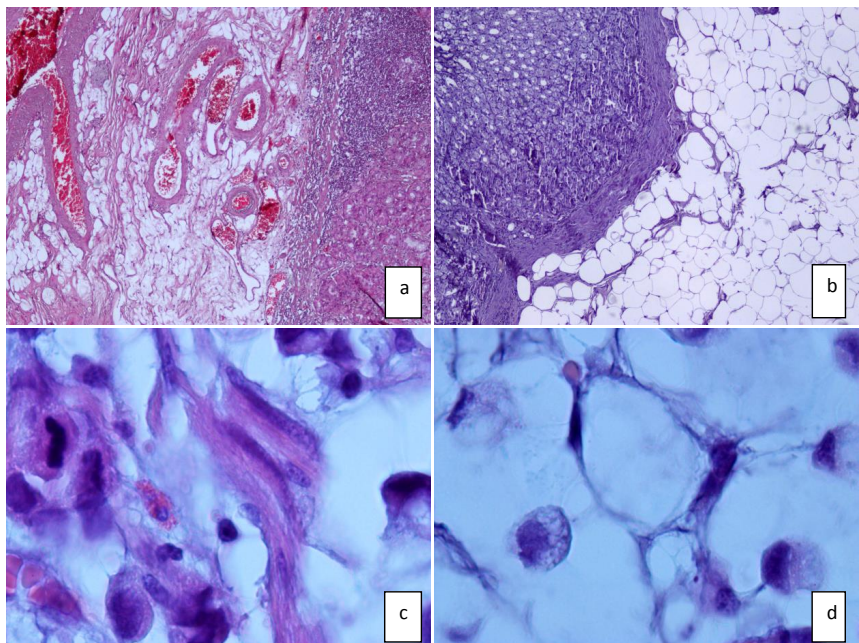


Fig. 2. *Lipomatosis of the mucosa at gastric cancer*

Note: a) group 1, IGC, submucous lipomatosis with foci of myxomatous degeneration, angiomatosis. $\times 100$; b) group 2, IGC, submucous adipose tissue replacement. $\times 100$; c) individual smooth muscle cells in the expansion of adipose tissue in the muscle membrane. $\times 400$; d) lipocytes. $\times 400$; a – d - hematoxylin-eosin staining

Hypothesis explaining the relationship of increased BMI and gastrointestinal carcinogenesis in particular colorectal cancer, based on the fact that insulin resistance, which is formed during obesity, causes direct mitogenetic and antiapoptotic signals of insulin and IGF-1 – growth factor, which is produced mainly in the liver, plays important role in the regulation of growth and development of many tissues, especially in the prenatal period. Like insulin, IGF-1 levels are related to energy status, often elevated in obesity, depends on the IGF-1 binding protein and the number of receptors for it. However, it is possible that IGF-1 adipose tissue can stimulate the epithelio-mesenchymal transition and thereby tumor metastasis. Cell culture has shown that IGF- α 1 induces epithelio-mesenchymal transition by activating PI3k / Akt-GSK-3 β -ZEB2-signal paths [14]. Insulin can affect the synthesis of IGF-1, reducing the content IGF-1 binding protein and increasing the amount of bioavailable IGF-1. Insulin, IGF-1 and IGF-2 and their receptors activate extra-cellular signal-regulating kinase (ERK) and phosphatidylinositol-3 kinase (PI3K) of cellular mitogenic pathway. The relationship between the components of the “insulin-insulin-like growth factor” system and increased BMI are complex and not completely understood [4, 15].

In the single works on local fat deposits, or lipomatosis of GM, the rarity of this phenomenon is noted and the possibility of existence is described of two variants of gastric lipomatosis – in the form of a lipoma (in the presence of a connective tissue capsule, limiting adipose tissue) and diffuse adipose tissue infiltration of the submucosal and subserous layers [16-17]. In the same studies, there is a high frequency of the combination of lipomatosis with ulceration of the GM and complications of bleeding. The work [17] is devoted to the description of the case, also characterized by a combination of intestinal GC and lipomatosis of GM.

In the genesis of lipomatosis of GM does not exclude the possibility of embryonic displacement of adipose tissue, hereditary predisposition, lipid metabolism disorders, chronic irritation, or inflammation, effects of chemotherapy, etc. [16]. As possible hypotheses in explaining the phenomenon of lipomatosis in our study, probably, regional influential features of northern latitudes on the features of lipid metabolism (“polar tension syndrome”) cannot be excluded; ability to recruit from bone marrow mesenchymal stromal cells giving onset of tumor-associated fibroblasts and lipocytes.

Conclusion. Thus, the significance of the phenomenon of lipomatosis in the mucous membranes in gastric cancer is not completely clear, but the known effects of adipose tissue, the presence of stem in it cells, development of immune inflammation, association with myxomatous degeneration of the stroma, accumulation of TGF β do not exclude the influence of local adipose tissue deposits on carcinogenesis, continue research.

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明显圆环情况下假肢参考材料的选择
**THE CHOICE OF REFERENCE MATERIALS
IN PROSTHETICS
IN CASES OF PRONOUNCED TORUS**

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抽象。临床数据表明,各种形式的假肢床具有完全的可移动板层假体。然而,在明显环面的情况下,基本材料的选择尚未充分研究。在目前的文献中没有描述案例raznoformatnyh制造可移动层状义齿具有最小厚度的基础在不同基础材料的环面区域。

关键词: 可摘义齿, 上颌圆环, 基础材料, 完全adentia, 丙烯酸假牙, 丙烯酸低聚物, 尼龙假肢, 聚氨酯。

Abstract. *Clinical data indicate a wide variety of forms of prosthetic bed with full adentia for removable lamellar prosthesis. However, the choice of basic materials in cases of pronounced torus is not sufficiently studied. In the current literature are not described case raznoformatnyh the manufacture of removable laminar dentures with a minimum thickness of basis in the area of the torus from different base materials.*

Keywords: *Removable dentures, upper jaw torus, base materials, full adentia, acrylic dentures, acrylic oligomers, nylon prostheses, polyurethane.*

Research objective.

Research objective is to study the intense deformed status of prostheses from different basic materials with sharply expressed torusy with calculation of minimum admissible sizes with different basic materials.

Material and methods.

For achievement of the goal the following tasks were set and solved:

1. Define the main physicomechanical properties of basic materials
2. Recreate a mathematical model of the full removable plate prosthesis at a full edentia imposed on model of a prosthetic bed with sharply expressed torusy with the one-sided or bilateral application of chewing loading
3. The finite-element method to investigate the intense deformed status of basis of a prosthesis in the field of a torus

4. Make calculation for each of the studied materials minimum admissible thickness of prostheses for warning of risk of changes at threshold values of chewing loading.

For creation of a mathematical model the physical real model of a toothless upper jaw with torusy, the having height of 4 mm was created. On this plaster model the removable plate prosthesis was made.

Using the laboratory Zfx Evolution PRO scanner received the scan of real plaster model and the scan of a real prosthesis.

After conversion to a STL format combined the above-stated scans in uniform virtual model.

For creation the distributed chewing loading in 50 Newtons was put from both and on the one hand a tooth alignment.

To set boundary conditions - in laboratory of materials science of TsNIIS and ChLH by the test machine Zvick together with Tatyana Fiodorovna Sutugina determined physicomechanical parameters of basic materials, necessary for the final and element analysis: strength at a bend and the elasticity module at a bend for 6 basic dental materials of domestic production used in the Russian Federation:

- Pentalur - on the basis of polyurethane;
- Belakril of GO M - on the basis of methylmethacrylate of hot polymerization;
- Nolatek - on the basis of acrylic oligomer.

We established that the most high strength at a bend samples from the material Pentalur = have 95.5 MPas, and the lowest – Nolatek = 41.6 MPas.

The indicators of physicomechanical properties of domestic basic materials received by us are presented in table 1.

Table 1
Physicomechanical properties of domestic basic materials

№	Name (brand) of basic material	Strength at a MPa benda	The elasticity module at a bend, MPa	Deformation at a bend, %
1	Belafril-M GO	95±9,3	2417±135	6,1±1,5
2	Nolatek	41,6±3,3	2043±96	2,2±0,3
3	Pentalur	95,5±1,1	2049±187	6,7±0,03

Results of a research.

We established that the highest durability at a bend samples from the material Pentalur = have 95.5 MPas, and the lowest – Nolatek = 41.6 MPas.

The highest rate of the module of elasticity at the material Belakril of M of GO of =2417 MPas, the lowest – at the material Pentalur of =2049 MPas.

The obtained data are used by us for calculations with a finite element method on the above-stated mathematical model.

In fig. 1 pictures of tension arising in different zones of basis of a full artificial limb at its loading are presented. Brightly red areas of the maximum tension are clearly visible. We determined tension arising at change of thickness of basis over torusy, modeling its isolation accepted in prosthetic dentistry and compared the level of tension arising in basis to material strength on a bend.

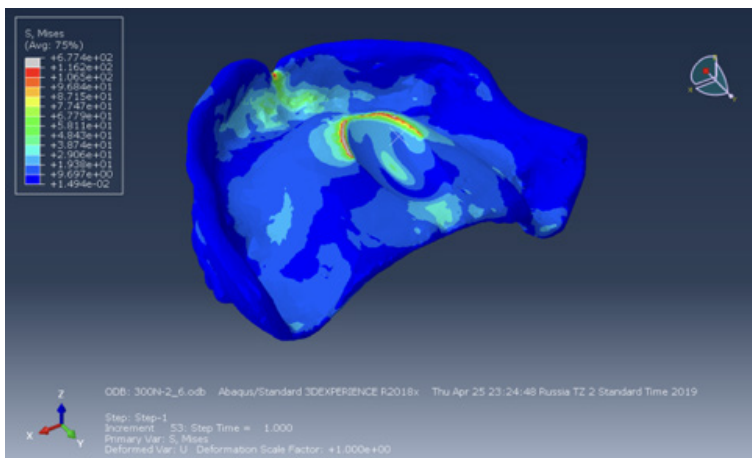


Fig. 1

In fig. 2 pictures of tension arising in different zones of basis of a full artificial limb at its loading are presented. Brightly red areas of the maximum tension are clearly visible. We determined tension arising at change of thickness of basis over torusy, modeling its isolation accepted in prosthetic dentistry and compared the level of tension arising in basis to material strength on a bend.

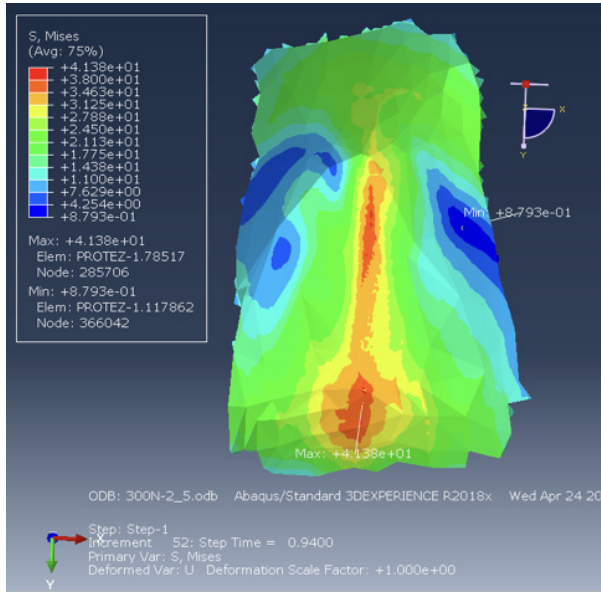


Fig. 2

Conclusion.

The calculations which are carried out by us showed that the minimum admissible thickness of bases removable the of dentures in a thinning zone for isolation of a palatal torus at acrylic Belakril plastic of M of GO and Pentalur polyurethane are 2.3 mm.

For the light-cured basic material Nolatek, thickness in a zone of isolation of a torus has to be not less than 3.5 mm that is almost unacceptable. Therefore such material according to us should not be applied to production of a total removable artificial limb in the presence of the expressed palatal torus.

At the moment we carry out clinical approbation of the offered method of prevention of changes of bases of full removable artificial limbs at the expressed torus. At observance of the offered dimensional parameters we did not observe any case of a change of basis of an artificial limb. The term of observation small - up to 2 years.

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TCES疗法对病理性焦虑模型大鼠旷场试验水平活动的影响
**INFLUENCE OF THE TCES-THERAPY ON THE HORIZONTAL
ACTIVITY IN THE OPEN FIELD TEST IN RATS
WITH PATHOLOGICAL ANXIETY MODEL**

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注解。焦虑症，包括与帕金森病相关的焦虑症，是现代医学的实际问题。其中一种有前途的创新方法是经颅电刺激—TES治疗，它对神经免疫—内分泌调节具有稳态和抗应激作用。本文介绍了一项实验研究的结果，该研究旨在评估TES治疗对“开放性野外试验”中病理性焦虑大鼠水平活动水平的影响。通过在大鼠中长期全身施用鱼藤酮神经毒素，模拟帕金森病及其伴随的病理性焦虑。之后，对主要组的大鼠进行7次经颅电刺激。在实验期间获得的数据表明在开放场试验中暴露于TES疗法的大鼠中焦虑样行为的严重性降低，这表明所测试的治疗影响方法的抗焦虑作用。

关键词：经颅电刺激，TES治疗，旷场试验，焦虑，鱼藤酮，帕金森病

Abstract. *Anxiety disorders, including those associated with parkinsonism, are an actual problem of modern medicine. One of the promising innovative methods for their correction is transcranial electrostimulation - TCES-therapy, which has a homeostatic and anti-stress effect on neuroimmune-endocrine regulation. The article presents the results of an experimental study aimed at assessing the influence of TCES-therapy on the level of horizontal activity of rats with pathological anxiety in the "open field test". By chronic systemic administration of rotenone neurotoxin in rats, parkinsonism and its attendant pathological anxiety were modeled. After that, 7 sessions of transcranial electrostimulation were performed on rats of the main group. The data obtained during the experiment demonstrate a decrease in the severity of anxiety-like behavior in rats exposed to TCES-therapy in an open field test, which indicates the anxiolytic effect of the tested method of therapeutic influence.*

Keywords: *transcranial electrostimulation, TCES-therapy, open field test, anxiety, rotenone, parkinsonism*

Introduction. Treatment and prevention of anxiety disorders of various forms is an urgent task of our time, due to the high prevalence of this group of mental diseases among the population [1]. The basis of anxiety disorders is pathological anxiety, which, unlike physiological, what helps the body to cope with difficult and threatening environmental conditions, or prepare for adverse changes, on the contrary - reduces its adaptive capacity [2]. Pathological anxiety is often a comorbid disease, including organic brain damage. One example of a concomitant pathological anxiety of this kind is the anxiety disorder that accompanies parkinsonism [3], [4]. One of the causes of parkinsonism - neurotoxins that cause depression of mitochondrial complex I, such as rotenone [5], can also provoke pathological anxiety [6].

A possible method of correcting pathological anxiety can be transcranial electrostimulation of the brain — TCES-therapy that enhances the production of β -endorphin, which has a homeostatic and anti-stress effect on neuroimmune-endocrine regulation [7].

Assessing the level of anxiety (anxiety-like state) in models using laboratory animals allows such a behavioral test as an “open field” test, based on the contradiction of two innate motivations in rodents - to explore new environments and avoid open spaces.

Purpose of this study was an assessment of changes in the horizontal activity of rats with a model of rotenone parkinsonism in the “open field” test under the influence of TCES-therapy.

Materials and methods. The experiment involved 145 males of non-linear rats weighing 170 ± 25 g. By chronic systemic administration of rotenone for 4 weeks [8], animals formed a state equivalent to pathological anxiety associated with parkinsonism. The surviving rats (during the period of administration of rotenone, 25% of the animals died) were divided into two groups. The comparison group ($n = 40$) - rats with an experimental model of parkinsonism without treatment and the main group ($n = 40$) - rats with an experimental model of parkinsonism, who underwent 7 sessions of TCES-therapy. Transcranial electrostimulation of rats of the main group was carried out from the 4th to the 5th week of the experiment with a modified two-programmed electrostimulator "TRANSAIR-03" with a current of 2.0-2.6 mA.

An assessment of anxiety-like behavior was performed in the open field test. The Open Field apparatus had a square-shaped arena, with a side of 1 m, marked up into 25 equal squares with a side of 20 cm each. 9 central squares formed the central zone, 16 squares bordering the sides of the structure - peripheral. The horizontal activity of animals was estimated by two parameters - the number of sectors covered in the entire installation and separately by the number of sectors covered in the central part of the installation within 5 minutes. Statistical processing of

the results was carried out using MS Excel 2013 software (Microsoft Inc., USA) and a software package for performing statistical analysis and data visualization Statistica 12 (StatSoft Inc., USA). The hypothesis about the type of distribution was checked by means of the Shapiro-Wilk criterion. Due to the difference in the distribution of the obtained values from the normal, the methods of non-parametric statistics were used. Data were presented as medians, lower (25%) and upper (75%) quartiles (Me (Q1-Q3)). For pairwise comparison of two independent groups, the Mann-Whitney U-test (MW-test) was used. Differences were considered statistically significant at $p < 0.05$.

Results and discussion. The levels of the total horizontal activity of rats in the open field test are presented in table 1.

Table 1. The overall level of research activity in the “open field” test.

Week of experiment	Total number of squares covered in the “open field” test by the comparison group rats, Me (Q1-Q3)	Total number of squares covered in the “open field” test by rats of the main group, Me (Q1-Q3)	p-value (MW-test)
4th week of the experiment	41 (21-51)	33 (18-56)	0,792
5th week of the experiment	22 (6-28)	58 (2-85)	0,009

As can be seen from this table, there were no statistically significant differences between the comparison group and the main group at week 4 ($p = 0.792$). On the 5th week, after the week-long course of TCES-therapy passed by rats from the main group, the number of sectors in the arena of the open field test was statistically significantly higher ($p = 0.009$) than in rats from the comparison group in 2, 63 times, which can be interpreted as an increase in the level of research activity and, consequently, a decrease in the level of anxiety. While in the comparison group rats the level of horizontal activity fell from 41.0 to 22 sectors - 1.86 times, the main group had the opposite effect - an increase in the level of horizontal activity 1.76 times - from 33 to 58 sectors, which indicates an increase in the research activity of rats and a decrease in their level of anxiety.

Table 2 shows the data on the level of horizontal activity of rats of the main group and the comparison group in the central zone of the arena.

Table 2. The level of research activity in the central zone of the arena in the “open field” test.

Week of experiment	The number of squares covered in the central area in the “open field” test by the comparison group rats, Me (Q1-Q3)	The number of squares covered in the central area in the “open field” test by rats of the main group, Me (Q1-Q3)	p-value (MW-test)
4th week of the experiment	5,5 (2-9)	4,5 (2-8,5)	0,546
5th week of the experiment	2 (2-2)	3 (2-6)	0,037

From the data presented in Table 2, it can be seen that at the 4th week between the main group and the comparison group in the level of research activity in the center of the arena, no statistically significant differences were observed ($p = 0.546$). At week 5, both groups of rats experienced a decrease in the level of motor activity in the central zone of the arena. At the same time, it had a different level - there are statistically significant ($p = 0.037$) differences between groups - in rats from the main group, the number of sectors covered in the center of the arena is 1.5 times higher than in rats from the comparison group. This indicates a decrease in the level of anxiety in rats of the main group.

Conclusions. The observed decrease in the severity of anxiety-like behavior in rats after a 7-day course of TCES-therapy, in comparison with rats not exposed to its effect, allows us to conclude that the tested method has anxiolytic activity in relation to pathological anxiety in rats with a rotenon parkinsonism model.

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一例成骨不良的影响在新生儿宝宝
**A CASE OF OSTEOGENESIS IMPERFECTA CONGENITA
IN A NEWBORN BABY**

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注解。先天性不完全性成骨是一种罕见的疾病。本文讨论了早期新生儿适应期儿童各种遗传类型疾病的鉴别诊断和不完全成骨的临床病例。

关键词: 先天性不完全性先天性, 不完全性成骨类型, 新生儿。

Annotation. *Congenital imperfect osteogenesis is a rare disease. The article discusses the problem of differential diagnosis of various genetic types of disease and clinical case of imperfect osteogenesis in a child in the period of early neonatal adaptation.*

Key words: *osteogenesis imperfecta congenita, types of imperfect osteogenesis, newborn children.*

Osteogenesis imperfecta congenita – a congenital imperfect osteogenesis or Frolik's imperfect osteogenesis – is a systemic disease manifested by generalized osteoporosis, multiple fractures and relaxation of ligament system [1,3,8]. Deafness and blue sclera are sometimes observed in this disease. There are two forms: congenital imperfect ossification (osteogenesis imperfecta congenita) and later imperfect ossification (osteogenesis imperfecta tarda). This rare disease occurs in children with a frequency of 1 per 10,000–20,000 live births [2]. The cause of osteogenesis imperfecta is an (OI)-genetic defect – a mutation of the COL1A1, COL1A2, LEPRE1, CRTAP genes responsible for synthesis of type I collagen and cartilage protein. At this, a fibrillogenesis and mineralization are disturbed with the formation of abnormally fragile bone tissue, which is unable to bear the load [2,10,14].

According to modern classification, there are eight genetic types of the disease [4]: Type I is the most common and mild form, occurs in 50% of patients with OI, which is inherited in an autosomal dominant manner and manifested by a blue

tinge of sclera, early hearing loss and moderate bone changes; Type II is a perinatal-lethal, autosomal recessive type of inheritance. Children are born with multiple bone fractures and die in the neonatal period from respiratory and cardiovascular complications; Type III is the most severe form of OI in children who survive in the neonatal period, which is inherited in an autosomal recessive manner and manifested by severe progressive deformities, multiple spontaneous fractures and imperfect dentinogenesis; the sclera is not changed; Type IV is characterized by a moderate degree of damage, wide clinical variability, a small number of fractures arising delayed by the end of the first year of life, curvature and shortening of the limbs, weakness of ligaments [4,11]. Clinically, type V of osteogenesis imperfecta is close to type IV, characterized by spontaneous formation of hypertrophied bone calluses and the interosseous plate calcification of the tubular bones diaphysis. The type of inheritance is autosomal dominant. Imperfect osteogenesis of type VI is extremely rare, with clinical symptoms and severity similar to type four. A distinctive feature is the specific pathology of bone mineralization, detected during biopsy [15]. Imperfect osteogenesis of type VI, VII, and VIII are inherited by recessive type. Imperfect osteogenesis of type VII can occur as a second or fourth type [16]; VIII type is characterized by extreme growth retardation and bone mineralization deficiency.

The clinical picture of osteogenesis imperfecta includes a wide range of both skeletal and extraskelatal symptoms. The main symptoms of the disease are fractures of tubular bones, ribs, clavicles with development of the limbs and torso deformations. Fractures can occur in the prenatal period, during childbirth, in the postnatal period, or delayed, at the age of 1-12 years, accompanied by pain, swelling, and crepitation of fragments. Due to repeated multiple fractures, the limb is shortened and bent. Fractures of the clavicles and ribs, shortening and curvature of the spine lead to the chest deformation. The skull deformation is often found due to softening of the cover plates. Large sizes of fontanelles and their late closure are also noted [1,8,9].

Osteogenesis imperfecta is a generalized disease of the connective tissue, which also includes extraskelatal symptoms, such as: blue tinge of sclera, imperfect dentinogenesis, progressive hearing loss, muscular hypotension and ligaments overstretching, contractures, umbilical and inguinal hernias, insufficiency of the cardiac valve system. Atelectasis, pneumonia, obstructive bronchitis, pulmonary hypertension are often developed due to the chest deformation, and as a result lead to the “pulmonary heart” [2,3,14].

The diagnosis of osteogenesis imperfecta is based on a specific clinical picture, X-ray diagnosis of bone pathology, molecular analysis of collagen (DNA analysis of abnormal genes in a blood or saliva sample), and biochemical examination of collagen in a skin biopsy specimen (analysis of protein in fibroblast seeding). In

addition, the study of bone mineral density (densitometry) and invasive diagnosis (bone tissue biopsy) are used. Biochemical parameters (calcium, potassium, alkaline phosphatase, hydroxyproline in the urine and blood) do not show noticeable changes [11,13,15].

Since this disease cannot be cured, the purpose of therapy is minimizing the number of fractures, surgical correction of deformations, increasing bone mass, reducing bone fragility and pain. Rehabilitation includes water treatments, exercise therapy, massage, personalized amount of physical activity and drug treatment - repeated courses of bisphosphonates (pamidronate, zoledronate, etc.) and hormone therapy [7,11,13,15]. Since the disease is rare, every clinical case of osteogenesis imperfecta in children is of interest.

The purpose of the study is to investigate the course of osteogenesis imperfecta in the neonatal period.

Own research and discussion of the results: a clinical case of osteogenesis imperfecta in a newborn child is presented. The girl was admitted to the department of pathology of newborns and premature babies of the regional clinical hospital with complaints of physical developmental delay, bone tissue pathology, and neurological disorders. It is known from the past history that this child is from the second pregnancy, which at 28 weeks was accompanied by moderate preeclampsia, moderate anemia and hydramnion. The delivery took place in the central district hospital, the second in a row, urgent, in the breech presentation. The dry period lasted 24 hours, the amniotic fluid was bright, a girl was born with a mass of 3,200 g, height - 50 cm, head circumference - 32 cm, chest circumference - 30 cm. The Apgar score was 6-7 points. The rehabilitation of the upper respiratory tract and artificial ventilation of the lungs were performed in the delivery room. Due to the neurological symptoms, the condition at birth was severe, which manifested in the following: weak cry, muscular hypotonia, hyporeflexia. A large labor tumor on the head, occupying a projection of the parietal and occipital bone, and the severely restricted abduction of the lower limbs in the hip joints were found. The diagnosis was "Perinatal hypoxic traumatic injury of the central nervous system of the 2nd degree, syndrome of motor disorders. Cefalohematoma. Congenital hip dislocation?" The child was transferred to the second stage of nursing on the 7th day of life. Upon admission, the following was noted: disproportionate physique due to shortened and deformed limbs, flattening of the skull in the projection of the left parietal bone, softening of the bone tissue in the type of "felt hat" in the parietal and occipital areas, increasing the size of the large fontanel (5x5 cm). The shortening and curvature of the proximal parts of the upper and lower limbs due to multiple fractures, the varus position of the thighs, and the severely restricted abduction of the lower limbs in the hip and knee joints were also found. A sharply painful bone formation was palpated on the right thigh. Internal organs were without pathological abnormalities. A spontaneous locomotor

activity was reduced, reflexes of the innate automatism of the oral and palmar-oral groups were well activated. Reflexes from the lower limbs were not detected due to severe pain when the child was verticalized.

The acetabulum cap skewness, acetabular index on the right - 27 degrees, on the left - 20 degrees, bilateral varus deformity of the femoral bones, on the right - a consolidating fracture in the middle third of the thigh were detected on an X-ray picture of the lower limbs. The X-ray examination of the skeletal system revealed the following multiple birth defects: bone fragmentation in the parietal and occipital regions — signs of a perforated skull; a fragment of a vertebra between C4 and C5 cervical vertebrae; signs of fracture of the right clavicle. The child underwent a comprehensive laboratory and instrumental examination, consultation of a geneticist and neurologist; follow-up supervision by an orthopedist. Other pathological changes in blood tests and ultrasound examination of internal organs were not identified. The girl was diagnosed with “Imperfect osteogenesis, multiple fractures of upper and lower limbs, fracture of the middle third of the right thigh, varus deformity of the lower limbs, bilateral hip dysplasia. Consequence of perinatal hypoxic and ischemic CNS injury, syndrome of reflex excitability of the 1st-2nd degree. Cephalohematoma of the occipital region”.

The following treatment was prescribed: a coxit dressing type tire, breastfeeding, calcium and vitamin D preparations, nootropics, a gentle massage of the back muscles, limbs, therapeutic exercises to strengthen the muscles of the trunk, limbs, and feet.

As a result of the therapy, the following positive dynamics was observed: fracture healing after two weeks, an increase in the activity and range of limb movements in the hip and knee joints, the child began to stretch and straighten the legs, there were no new fractures. Short-term stand on feet appeared. The skull bones became more dense, there were extensive compaction of the bone tissue of the skull. A breastfed baby noticeably increased in height (+5 cm) and weight (+960 g). The girl was discharged under the supervision of a district pediatrician at the age of 38 days with recommendations to continue taking calcium and vitamin D preparations, and conduct a routine examination with correction of therapy in the specialized department of the Healthy Child Center (Moscow).

Phenotypic features and course of the disease, namely, the birth of a child in healthy parents, suggest a recessive mode of inheritance of the disease. The presence of a disproportionate physique, shortened and curved limbs (the result of multiple intrauterine fractures), a spontaneous femur fracture in the first days of life, coxa vara, multiple deformities of the skull bones, clavicle, spine; and the absence of changes in the color of sclera, respiratory and cardiac complications - all this suggests that in this case osteogenesis imperfecta of type II, IV or VII occurs. Stabilization of the girl's condition during the first month of life and the absence of repeated fractures exclude the perinatal-lethal type II disease.

The child certainly needs an in-depth examination in the conditions of a specialized department at the federal-level hospital, including: DNA diagnostics, collagen and protein research, bone mineral density assessment. According to the examination results, it is possible to establish the exact type of osteogenesis imperfecta, and therefore the prognosis of the disease, and the prescription of pathogenetic treatment and rehabilitation measures.

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土壤形成技术条件下细菌的变异性（以西锡西亚矿业开采和加工废弃物为例）

**VARIABILITY OF BACTERIA IN THE TECHNOGENEOUS
CONDITIONS OF SOIL FORMATION (ON THE EXAMPLE OF
MINING AND PROCESSING WASTES OF MINERALS
IN WESTERN SIBERIA)**

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注解。这个问题涉及从表面上存在数十年的硫化物矿石中提取有价金属的老龄煤和废物的生物开采问题。值得注意的是，这些物体参与成土作用是一个长期过程，因为金属和非金属性质的有毒物质会影响微生物定殖者的生命活动。已经确定，在老年倾倒中，存在具有环境意义的可行和重要的微生物，显示出可变性，为它们提供适应性活动。在某些情况下，在固氮菌中检测到形态学和生物化学修饰。固氮菌菌落的生长性质由运动细胞的年轻阶段的持续时间决定。一些菌株表现出抗真菌特性。显然，通过固氮菌的遗传记忆提供了具有高毒性物质的废物中微生物的毒性。在为再生技术物体创造新的生物技术时，必须考虑积极繁殖细菌菌株。

关键词：变异性，细菌，废物，土壤形成，有毒物质。

Annotation. *The problem of the biogenic mining of old-age dumps of coal and waste from the extraction of valuable metals from sulphide ores, which have been on the surface for decades, is covered. It is noted that the involvement of such objects in pedogenesis is a long-term process, since toxicants of a metallic and non-metallic nature affect the vital activity of microbial colonizers. It has been established that in old-age dumps there are viable and vital microorganisms at an environmentally significant level, showing variability, providing them with adaptive activity. In some situations, morphological and biochemical modifications were detected in azotobacteria. The nature of the growth of azotobacter colonies is determined by the duration of the young stage of cells that are motile. Some strains*

exhibit antifungal properties. The toxicity of microorganisms in wastes with a high content of toxicants is provided, apparently, by the genetic memory of azotobacter. Actively breeding bacteria strains must be considered when creating new biotechnologies for the recultivation of technogeneous objects.

Key words: *variability, bacteria, waste, soil formation, toxicants.*

Within the south-east of Western Siberia there is a large amount of minerals, the extraction and processing of which is accompanied by the loss of valuable soils and the formation of industrial wastes. They slowly undergo hypergenesis and biogenic soil formation, because they contain high concentrations of toxic elements. The chemical composition of samples of old-age coal mining and ore processing (50-100 years), determined by the method of XRF-MI (Institute of Nuclear Physics SB RAS, Novosibirsk) and ICP-MS on a high-resolution mass spectrometer (in the chemical analytical center «Plasma», Tomsk), indicates the presence of certain ecotoxicants of metallic and nonmetallic nature in quantities exceeding the clarke values in the lithosphere and the maximum permissible concentrations in the soil. Our long-term studies of coal mining wastes and ash and slag, as well as iron ore dressing, cyanidation of gold-bearing ore, recycling of sphalerite concentrate clinkers during copper extraction showed that all of them are lifeless. They contain soil aerobic microorganisms in a viable state in quantities corresponding to environmental significance, judging by the fouling of mineral lumps of fine earth. At the same time, microorganisms exhibit morphological and biochemical variability, which ensures their survival in technogeneous conditions.

A similar phenomenon was discovered in the past century in Russia and abroad. It has been identified among the entomopathogenic bacteria *Bacillus thuringiensis* under the influence of physical and chemical mutagens: UV rays and ethyleneimine, as well as in *Penicillium chrysogenum* strains producing penicillin in the process of fermentation. Variability was found among streptomycetes and bacteria of *Bacillus mesentericus fuscus* in the presence of herbicides, as well as algae and cyanobacteria under the influence of chemical mutagens and radiation.

An analysis of the literature showed that with high doses of mutagens, entomopathogenic bacteria showed a change in the shape and structure of colonies, color, intensity of spore and crystal formation, a decrease in the number of R-form colonies and a significant increase in the content of dwarf and branchy forms, inhibition of the biosynthesis of spores and crystals. Along with changes in the morphology of the colonies, the morphology and cytology of the cells changed, including cell evacuation, and cell pathology was diagnosed. But moderate doses of mutagens contributed to the growth of highly virulent bacteria with the activation of physiological and biochemical properties. In the case of penicillin mushroom producer with insufficient aeration, low pH, overheating of nutrient

media, the process of formation of ball-shaped colonies, different in density and size, was observed. In this case, the ball formation was transmitted to the following generations of fungi. Against the background of herbicides in bacteria, R-, S- and rhizoid types of colonies were formed, differing in size and pigmentation. In the presence of herbicides, the morphological properties of the R- and S- variants were hereditarily established. Cell sizes and some biochemical properties changed. In turn, cyanobacteria were negatively affected by some toxicants more than bacteria. Under the action of nitroso compounds, morphological, pigment, and antibiotic-resistant mutants appeared in cyanobacteria. But the radioresistance of Cyanophyta exceeded that of *Escherichia coli* and *Bacillus subtilis*. The resistance of cyanobacteria to radiation and some chemical agents is explained by the presence of protective systems: photoreactivation and repair (recombination type). They entrenched as a result of their selection in remote periods, maintaining a high level of genetic stability of cyanobacteria - one of their most important biological properties, providing that archaic, relict preservation of many modern species of this group, which differ little from the fossil Precambrian forms found by paleomicrobiologists.

At the beginning of the current century, studies of the evolutionarily established features of the vital activity of microorganisms, contributing to an increase in the diversity of their morphophysiological forms, including within the same species, turned out to be in demand in soil science.

Deciphering the evolutionary and ecological aspects of the diversity of prokaryotes turned out to be a new strategy for identifying and studying the adaptive capacity and intraspecific structural diversity of prokaryotes in different soil environments. While it is completely obvious that new cell types, both dwarf and giant, including cyano and azotobacteria, both evolutionarily close to each other and constantly found in soils of different genesis, significantly complicate the identification of species in situ, in particular, free living and symbiotic. But an understanding of the naturalness of the morphological heterogeneity of individuals in populations of soil microorganisms is extremely important for theory and practice, including for recultivation, but requires deep interdisciplinary research.

In our complex long-term observations, microbial populations constantly found heterogeneity in a number of morphological, physiological and biochemical properties of their constituent cells under technogenic living conditions. On the surface of overburden, ash and slag and ore dumps of the Kuzbass (Kemerovo region), viable microorganisms of different physiological groups were present in an amount corresponding to ecological significance. At the same time, dwarf colonies of oligotrophic microbes, both oligocarbophilic and oligonitrophilic microbes, dominated. For example, the share of colonies of psychrophilic oligotrophic bacteria with a diameter of less than 0.2 mm was more than 83.4% of viable bacteria

on coal waste (Artamonova, Androkhonov, Sokolov et al., 2011). The maximum of dwarf colonies of mesophilic oligotrophic bacteria was detected on the ore sludge from the Abagur tailing - 95.9%. Cyanobacteria developed on overburden in the form of films and in a free-living state. The films of cyanobacteria accumulated many chemical elements, including Zn, Pb, Cu, Cr, As, Th, U in quantities exceeding the clarke values. The membranous form of growth of cyanobacteria in such a geochemical environment, of course, is an effective adaptation of cyanobacteria. This adaptation is also inherent in azotobacter developing on the waste from the processing of polymetallic ore, where it showed antagonistic properties with respect to micromycetes.

Azotobacter developing on weathered anthracite waste (Gorlovskoye deposit, Novosibirsk region) and in soils adjacent to the sub-basement watercourse was characterized by colony variability, which also indicates the manifestation of adaptive reactions of the bacterium, its adaptive capabilities. On the surface of dumps, represented predominantly by loess-like carbonate loams, where U, Th, As were absent, colonies with mycelial type of growth prevailed. In weathered anthracite, where these elements were present, luscious colonies of flat growth type with pronounced layering dominated. In samples with a high arsenic content, predominantly mucous colonies of the rhizoid type of growth were encountered. In the latter two cases, the colonies are colored probably with melanoid pigments. The presence of endometabolites of yellow, red, orange, possibly carotenoid nature was noted around the colonies. The highest growth rate of the bacterium occurred in loam and under the plant communities: sorrel and grasses, the lowest growth rate - in areas with weathered loam (Artamonova, Bortnikova, 2018). In the course of the sub-tail stream (at the source, geobarrier and estuary), heterogeneous colonies also developed in the soils. At the source of the watercourse, where the highest content of Ni, Zn, Cd, Co, Cu, Rb, Y was detected, lysing pigmented colonies prevailed, registered in a day. Here, the amount of Ni, Zn, Sr, Zr and As exceeded their clarks in the crust. The growth rate of the colonies was minimal compared to the distant from it plots and plots located on the dump. As far from the source, azotobacter colonies dominate, in morphology and physiology, close to those in the original control soil. The reduction of ecotoxins in the soil at the geobarrier and near the mouth is caused by their partial sorption by algae, mosses, roots and leaves of rogocea, as was previously reported (Artamonova, Bortnikova, 2016).

On the 100-year-old dump of sulfide-containing gold cyanidation wastes (Beloklyuchevskoye deposit, border of Kemerovo and Novosibirsk regions) and in the adjacent soils of the sanitary protection zone under the *Azotobacter chroococcum* birch forest were present everywhere, as well as the ammonifying bacterium *Bacillus mycoides*, which indicates the nitrogen-fixing activity of azotobacter. At

the top of the blade, colonies with a flat type of growth, pigmentation around the colonies, and mucus production prevailed. In the dump cone, where the maximum values of Fe (24.6%), Cu (1100 g/t), Pb (1600 g/t), As (680 g/t) exceeding their clarke values are registered, colonies with slow growth (4 times compared with the top position). At the same time, young mobile (due to flagella) cells aggregated, became slow-moving, which led to their accumulation, the formation of layered colonies of the “swarming” type. In technologically polluted soils of the SPZ colonies of flat and mycelial type of growth were encountered equally with pronounced production of mucus around the colonies, despite the presence of Mn (480 g/t), Zn (116 - 204 g/t), Cd (0.48 - 0 , 64 g/t). Their content exceeded that of the dump. The accumulation of manganese could contribute to the formation of durable complexes with humic acids, as well as fallen birch, which belongs to the mangalophilic plants. The accumulation of zinc and cadmium in soils, apparently, is associated with penetration through the leaves from the atmosphere and subsequent migration from litter to the soil. However, in such a geochemical environment, the duration of the young stage of the azotobacter provided the moving cells in the presence of mucus to multiply and spread in a “sliding” manner with the formation of mycelial growth, which contributes to the development of new econiche in nature.

We assume that adaptive polymorphism, which ensures the survival of bacteria in technogeneous conditions, is achieved in part by the utilization of sulfur, which is present in the pyrite minerals of coal and ore bearing rocks of the Siberian region against the background of phosphorus deficiency. It is known that sulfur, as a high-energy element, retains “key” positions in the energy metabolism of phylogenetically ancient chlorophyll-containing and chlorine-free organisms. Therefore, it is quite possible to implement the adaptive activity of azotobacter under the anthropogenic conditions of habitat, embedded in the “biochemical memory”. The development of cyanobacteria and azotobacter on the planet initially occurred in the presence of an excess of sulfur. And it is possible that with a deficiency of phosphorus in the environment or any disturbance of phosphorus metabolism, when there is a mobilization of the whole complex of adaptive reactions aimed at the survival of microorganisms, sulfur is involved in the energy transformations of these microbes. Considering also that both bacteria developed in the distant times in the presence of excess nitrogen in the air of the planet, retained in the Holocene the ability to fix atmospheric nitrogen, it is difficult to overestimate their participation in modern soil formation on waste mining and processing of minerals. Moreover, the growth of bacteria contributes to a neutral and alkaline environment, a high content of Ca and Mo in it.

It should also be said that the adaptive polymorphism of azotobacter in technogeneous habitat conditions is fixed in the genetics of the bacterium: as the cultures

age, the number of chromosomes in the cells and the DNA content increases — in the stationary growth phase, cultures can contain more than 100 copies of the chromosome per cell. When you transfer to fresh nutrient medium, the original DNA content (one copy) is restored. In addition to chromosomal DNA, plasmids were found in representatives of the genus *Azotobacter*, and the possibility of transforming the genus *Azotobacter* with exogenous plasmid DNA was also proved. Such features provide the genus, in which only 6 species, survival in extreme conditions, including technogeneous. The reasons for the modification changes, especially adaptive modifications, should be sought, apparently, in the regulation of the action of the azotobacter genes. The definition of the chromosome nucleotide sequence has not yet been completed. Nevertheless, there is a scientific interest in identifying the genes whose expression is induced or repressed by various types of stress exposure of the external environment in order to use this information in the development of new biotechnologies for the remediation of technogeneous objects with azotobacter with specified properties to speed up modern soil formation on various waste materials processing of minerals. Thus, the presence of cyanobacteria and azotobacteria in the vital state in industrial wastes is a good reason to expand the fundamental knowledge about the diversity of adaptive reactions of bacteria and to develop new extraordinary approaches to optimize modern soil formation.

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石榴 (*Punica granatum* L.) 果皮和果皮提取物的化学分析
**CHEMICAL ANALYSIS OF POMEGRANATE
(PUNICA GRANATUM L.) FRUIT AND PEEL'S EXTRACT**

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抽象。 通过使用标准化学合成方法进行实验。 在品种“Qora qayim”，“Qizil anor”，“Oq dona / Tuyatish”，“Achik dona”的果皮的乙醇提取物（70%）中鉴定出维生素A（0.015–0.063 mg / 100 ml），B₁（0.034–0.064mg / 100ml），B₂（0.024–0.052mg / 100ml），B₅（0.023–0.038mg / 100ml），B₆（0.025–0.082mg / 100ml），C（4.805–11.546mg / ml）100ml）和E（0.014–0.612mg / 100ml），以及常量营养素（K, Ca, Mg, Na）和微量营养素（Mn, Zn, Cu, Se）。结果表明，石榴果实（*Punica* L.）的外皮是一种具有化学成分的多络合物性质，是一种有希望的药物开发剂。

关键词：石榴，提取物，果皮，维生素。

Abstract. *The experiments were carried out by using methods of standard chemical synthesis. In the ethanol extract (70%) of the fruit peel of varieties "Qora qayim", "Qizil anor", "Oq dona/Tuyatish", "Achik dona" were identified vitamins A (0.015–0.063 mg/100 ml), B₁ (0.034–0.064 mg/100 ml), B₂ (0.024–0.052 mg/100 ml), B₅ (0.023–0.038 mg/100 ml), B₆ (0.025–0.082 mg/100 ml), C (4.805–11.546 mg/100 ml), and E (0.014–0.612 mg/100 ml), as well as macronutrients (K, Ca, Mg, Na) and micronutrients (Mn, Zn, Cu, Se). The results show that the rind of pomegranate fruits (*Punica* L.) is a polycomplex property by chemical composition and a promising agent in the development of pharmacological drugs.*

Keywords: *pomegranate, extract, the fruit peel, vitamins.*

Pomegranate (*Punica granatum* L.) fruits are attracted by researchers' interest as they are rich for biologically active compounds, microelements and vitamins. The products obtained from the processing of pomegranate fruits are widely used in various juices, meat and fish processing products, pharmacology, and other medicinal products [Cowan, 1999; Dahanukar et al., 2000; Das et al., 2009; Radhika et al., 2011].

The purpose of this research was to compare the varieties of certain pomegranate varieties' (*Punica granatum* L.) produced in the Mirzachul oasis and the amount of vitamins and macro–microelements contained in the fruit and peel's.

Material and methods. In the researches, some of the local varieties of pomegranate (*Punica* L.) ("Qora qayim", "Qizil anor", "Oq dona/Tuyatish", "Achik dona") cultivated in Syrdarya region of the Mirzachul oasis of Uzbekistan were selected as the object. Extraction and analysis of ethanol (70%) extract from the fruit and sheath of pomegranate (*Punica* L.) varieties is carried out jointly with the staff of the Laboratory of chemistry of lower molecular compounds at the Institute of Bioorganic chemistry. High–performance liquid chromatography (HPLC) method of determining the vitamin D group (thiamin – B₁, riboflavin – B₂, pyrotoxin – B₆, pantothenic acid – B₅, biotin, cyanocobalamin – B₁₂, folic acid) has been reported that it is possible to obtain reliable results [Ellekr et al., 2004; Amidzic et al., 2005; Aslam et al., 2008; Sami et al., 2014]. Chromatographic process at +25 °C, HPLC–based diode matrix (DAD) detector for firm "Agilent Technologies–1200" (USA) was performed on high–performance liquid chromatography device. In experiments, the pomegranate (*Punica granatum* L.) fruit and inductively coupled argon plasma were analyzed by Mass–spectrometry method (ISP–MC NEXION–2000, Perkin Elmer USA) [Rowayshed et al., 2013]. The results were statistically processed by a special software package OriginPro v. 8.5 SR1 (EULA, USA). The results of experiments processed mathematically–statistically using standard biometric methods [Lakin, 1990].

Result and discussion. The sheath and fruits of the first varieties of pomegranate were separated and mechanically mixed in sterile conditions. The weighted samples weight (5–10 g) were measured ("CAS_CUW220H"; China, the accuracy was 0.01 g) and the tubes (V=300 ml) were added and 50 ml of ethanol solution (70%) was added. Tubular magnetic fridge (Russia) 60 min. It was stored at +110 °C under temperature conditions. In the next step the mixture was extracted 2 times in 25 ml of ethanol solution (70%). The filtrate was dissolved in 100 ml of ethanol (40%) and was incubated for 10 min at 7000 rpm. during centrifugation. The deposition was removed and the resulting solution was used as a porcine extract in the next chemical analysis. In the experiments, the following results were obtained in the Mirzachul oasis of the Republic of Uzbekistan, as a result of the HPLC analysis of some of the pomegranate varieties grown in Syrdarya region

("Qora qayim", "Qizil anor", "Oq dona/Tuyatish", "Achik dona"). Pomegranate (*Punica granatum* L.) contains vitamins of A (0.164 mg/100 g), vitamin B₁ (0.123 mg/100 g), vitamin B₂ (0.07 mg/100 g), Vitamin C (12.9 mg/100 g), vitamin E (3.99 mg/100 g) that many other researchers have reported [Ellekr et al., 2004]. In addition, using HPFC method, juice of varieties of pomegranate includes vitamin A (44–236.1 mg/100 ml), vitamin B₁ (30.8–124.1 mg/100 ml), vitamin B₅ (114.9–301.5 mg/100 ml), vitamin B₆ (12–90.3 mg/100 ml) was found to be vitamin C (10.4–35.4 mg/100 ml) [Akhavan and Barzegar, 2017]. In the next series of experiments, the yield of local varieties of pomegranate varieties and macroelements and microelements in the sheath was analyzed as well. It is necessary to mention that during the conducted researches in the content of pomegranate peel's (*Punica Granatum* L.) there were determined the followings Ca (338.5 mg/100 g), K (146.6 mg/100 g), Na (66.43 mg/100 g), P (117.9 mg/100 g), Fe (5.93 mg/100 g), Zn (1.01 mg/100 g), Mn (0.8 mg/100 g), Cu (0.6 mg/100 g), Se (1.03 mg/100 g) [Rowayshed et al., 2013]. When analyzing the chemical composition of 23 types of commercial fruit juices by some researchers, K (209.3–251.7 mg/100 ml), P (9.3–15.1 mg/100 ml), Ca (1.1–14.9 mg/100 ml), Mg (2.1–10.4 mg/100 ml) and Na (2–12.8 mg/100 ml) were found [Eksi and Ozhamamci, 2009].

Conclusion. In this research, the Mirzachul oasis of the Republic of Uzbekistan has been acknowledged as a pomegranate produced in Syrdarya region by the varieties of "Qora qayim", "Qizil anor", "Oq dona/Tuyatish", and "Achiq Dona" varieties of vitamins (A, B, C, E), as well as macroelements (K, Ca, Mg, Na, R) and microelements (Fe, Mn, Zn, Cu, Se). The obtained results can be used as a scientific basis for the analysis of the chemical composition and pharmacological activity of pomegranate (*Punica granatum* L.) extract.

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乌兹别克斯坦共和国安集延市一些学校四类学生的身体和智力发展水平之间的关系

THE RELATIONSHIP BETWEEN THE LEVELS OF PHYSICAL AND INTELLECTUAL DEVELOPMENT OF STUDENTS IN IV CLASSES OF SOME SCHOOLS IN ANDIJAN CITY OF THE REPUBLIC OF UZBEKISTAN

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抽象。 在这项研究中,发现安集延市一些学校的学生(IV级)的基本身体指标(身高,体重,胸围)符合标准和规范,以及身体和智力之间存在相关性。根据NS: M: R型($r > 0.7$)的“计算”,“空间定位”,“记忆”,“逻辑思维”测试进行的实验中I-V类学生的发展。

关键词: 学龄儿童, 身体发育指标, 智力发展水平。

Abstract. *in this study, it was revealed that basic physical indicators (height, weight, chest circumference) of pupils (IV classes) of some schools of Andijan city comply with standards and norms, as well as the existence of a correlation between the physical and intellectual development of students of I-V classes in experiments carried out according to tests "Computation", "spatial orientation", "memory", "logical thinking" of the NS:M:R type ($r > 0.7$).*

Keywords: *schoolchildren, indicators of physical development, level of intellectual development.*

In modern conditions, the intellectual potential of the population, in particular the younger generation, along with the demographic, territorial, technological, economic/social parameters of this or that society, is the most important basis for its progressive development [Bogus, 2002].

The physiological age of childhood/adolescence that corresponds to the schooling age is the specific sensitive period of physical and mental development in the human organism, and the proper formulation of the forms, methods and means of organizing this activity in the future is determined by the physical and intellectual status of the individual and establishment as a useful person in the society [Thurstone, 1931; Bogus, 2002].

In turn, experimental analysis of the link between the level of biological/physiological and intellectual development of schoolchildren allows minimizing the impact of various stress factors in the teaching process and optimizing the effectiveness of the learning process [Bogus, 2002].

It is emphasized that the organization of the educational process at school in terms of ontogenesis in accordance with the physiological age periods occupies an important place in optimizing the level of their intellectual development [Budrina and Kholodnaya, 2006].

The **purpose** of this study was to study the relationship between the levels of physical and intellectual development of students in I–V classes of some schools in Andijan city of the Republic of Uzbekistan.

Material and methods. Experiments are conducted in 2019 at school of #17, located in Andijan city of the Republic of Uzbekistan. Experiments in our studies were carried out in full compliance with principles of the Declaration of the Helsinki International Medical Association (World Medical Association, WMA) for determining the functional/intellectual parameters of school pupils. The experiments were conducted with the written consent of the parents of schoolchildren and school administrations and the oral agreement of the schoolchildren themselves. In studies, generally accepted standard physiological test methods were used in analyzing the level of physical fitness [Sbruyev and Kudryavtsev, 1986; Godik et al., 1994; Spirin, 2002; Gorobiy, 2007; Frolov, 2009].

In studies in assessing the level of mental development of primary school children (grades 1–5), the standard test method was used [Thurstone, 1931; Bogus, 2002]. When analyzing the level of mental development of schoolchildren, it is considered expedient to use tests while simultaneously performing several intellectual operations. In particular, one of the standard tests is considered the test "calculation", "spatial orientation", "memory", "logical thinking" of the NS:M:R type, here N – "calculation", expressing the ability to solve basic arithmetic operations, S – the ability of the "spatial orientation" of the thinking apparatus associated with the function of the brain; M – function "memory", expressing memorizing and speeds of information processing; R – expresses "logical thinking", defining the ability to find out the laws of interrelation on the basis of reducible digital and geometric figures [Thurstone, 1931; Bogus, 2002].

Result and discussion. The table below shows the average values of physical development indicators (height, weight, chest circumference) of pupils (classes I–V) of some secondary schools in the city of Andijan, Republic of Uzbekistan (1 table).

1–table

Average values of physical development indicators (height, weight, chest circumference) of pupils (I–V classes) of some secondary schools in the city of Andijan, Republic of Uzbekistan ($M \pm m$)

Anthropometric indicators		School №1				
		Classes				
		I	II	III	IV	V
height (cm)	Boys	123,2±4,5	132,3±2,5*	128,7±3,6*	136,5±2,4**	146,5±2,2**
	Girls	121,3±2,3	126,5±4,3*	133,4±3,1*	143,2±3,6**	139,3±2,8**
Weight (kg)	Boys	23,3±0,2	28,4±0,3*	26,1±0,1*	31,9±0,2	40,4±0,1**
	Girls	23,04±0,1	25,6±0,2*	29,5±0,2*	30,8±0,1**	31,4±0,2**
Chest circumference (cm)	Boys	57,6±2,4	58,2±1,5*	63,2±2,8*	63,4±1,5**	71,9±2,4**
	Girls	57,4±1,8	58,3±1,3*	64,8±3,5*	63,8±2,6**	65,8±3,4**

Note: 10 boys and 10 girls were selected from each class ($n=100$) *, ** – expresses the degree of statistical significance of the difference between the values of 1 experimental group as compared with other groups (II–V classes) (* – $p < 0,05$; ** – $p < 0,01$).

The average values of the basic physical indicators (height, weight, chest circumference) in schools (grades I–V), where the studies were conducted, in a general state correspond to standards and norms.

In studies have been identified the existence of a correlation between the physical and intellectual development of students of I–V classes in experiments carried out according to tests "Computation", "spatial orientation", "memory", "logical thinking" of the NS:M:R type ($r > 0.7$).

In general, it is registered that the level of mental development among people determines the categories of social difference and constitutes the biological and physiological bases for conducting successful professional activities and, in turn, ensuring consistency between the physical and mental development of students in the educational process has current relevance [Meretukova, 1994].

Mental development is an indicator that determines the effectiveness of mental activity in the process of obtaining knowledge by students, and it is assumed that the level of expression of such mechanisms of complex bio–functional activities such as attention, feeling/touch, memory, mental apparatus is directly related to the level of physical development [Bogus, 2002]. Also, mental development as a biological process is associated with heredity [Piaget, 1994] and is expressed by sensory–motor reflex processes that consistently develop from the initial stages of ontogenesis to the final periods of school education [Vygotsky, 1984; Bogus, 2002].

Conclusion. Thus, in the carried out studies, it was revealed the existence of tangible dependencies between the levels of physical and intellectual development of pupils of grades I–V of some schools in Andijan city of the Republic of Uzbekistan. The obtained experimental results show the feasibility of organizing the educational process in accordance with the level of mental development based on the individual physiological qualities of students, i.e. based on the "anthropocentric" principle in the formation of comprehensively developed students in the process of school education.

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甘草酸对小麦 (*Triticum aestivum* L.) 生长发育的影响
**ACTION OF GLYCYRRHIZIC ACID ON GROWTH AND
DEVELOPMENT OF WHEAT (*TRITICUM AESTIVUM* L.)**

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抽象。研究了不同浓度甘草酸锌 (ZnGA) 种植前种子处理对小麦种子萌发, 幼苗光合能力, 叶绿素 (Chl) 含量, 根系活力的影响。结果表明, 随着叶绿素含量, 光合速率 (Pn) 和气孔导度 (Gs) 的增加, 幼苗长度得到改善。总之, 用甘草酸锌处理可以通过生理和生化过程中的改变来改善小麦的生长和发育。

关键词: 甘草酸; *Triticum aestivum* L.; 叶绿素; 光合速率。

Abstract. *The effect of seed treatment before planting in different concentrations of zinc glycyrrhizin acid (ZnGA) was studied on seed germination, seedling photosynthetic capacity, chlorophyll (Chl) contents, root activity of wheat (*Triticum aestivum* L.). The result has indicated that the seedling length was improved with increase in chlorophyll content, photosynthesis rate (Pn) and stomatal conductance (Gs). In conclusion, treating with zinc glycyrrhizin acid can be used to improve wheat growth and development via modification in physiological and biochemical process.*

Keywords: *glycyrrhizin acid; *Triticum aestivum* L.; chlorophyll; photosynthesis rate.*

Various exogenous compounds are applied to promote plants growth and induce abiotic resistance [Yasmeen et al., 2013]. Biologically active compounds of steroids as signal molecules are one of exogenous compounds, which can exert plant growth and regulate gene expression to enhance defense reactions. For example monoammonium salt of Glycyrrhizin acid could promote cotton seed germination [Akhunov et al., 2004] and (ZnGA) reported to regulate growth and development of wheat [Kushiev, et al., 2013].

It is reported that the compounds of glycyrrhizin acid possesses multifunctional properties. Some components of glycyrrhizin acid inhibiting the growth and development of wheat rust disease, exhibits fungicidal activity [Khashimova et al., 2015]. It is also reported to regulate plant growth and development [Lin et al., 2005] herefore, ZnGA has a strong potential application value in agriculture.

The present study evaluated the effect of different concentrations of some compounds of glycyrrhizin acid on wheat seed germination and seedling physiological responses.

Material and methods. Wheat (*Triticum aestivum* L.) seeds were surface sterilized in sodium hypochlorite solution (2%) for 10 min and rinsed with distilled water. Subsequently, rinsed seeds were soaked in 1, 0.5, 0.25, 0.125, 0.0625 and 0.03125% glycyrrhizin acid compounds solution (supplied by Bioorganic chemistry institute of Academy Sciences of Uzbekistan) for 5 h. Seeds soaked in distilled water were taken as control. Germinated seeds were cultivated in a 500 ml beaker containing full Hoagland's nutrient solution and seedlings were grown in a controlled chamber. The average day/night temperature was kept at +25°C, respectively, with a mean photoperiod of 12 h, relative humidity 80%. The Hoagland's nutrient solution was renewed every third day. Daily counts of germinated seed were made. At 3-leaf stage, seedling height, root length and seedling fresh weight was recorded. Plant dry weight was obtained by oven-dried at +80°C until a constant weight. Root activity was measured by triphenyltetrazolium chloride (TTC) method [Steponkus, et al., 1967].

Root samples of 0.5 g were fully immersed in solution containing 5 mL of 4% 2, 3, 5-TTC and 5 mL phosphate buffer. The mixtures were kept at +37°C under dark conditions. After 2 h, 2 mL of 1 M H₂SO₄ was immediately added to mixtures to terminate the reaction. Roots were taken out and blotted with the filter paper, then fully grinded with 3–4 mL ethyl acetate. Red extract was exhaustively collected in test tube. The residue was washed 2 to 3 times with a small amount of ethyl acetate and graduated into test tube. Finally, a total of 10 mL was made with ethyl acetate. Color intensity measured at 485 nm. The reduction of TTC content was calculated according to standard curve. Characters Fresh leaves 0.1 g were collected and extracted with 80% acetone and ethanol (v/v=1:1) for 24 h in the dark. Chlorophyll content followed spectrophotometrically as described by [Lichtenthaler et al., 1987].

The photosynthetic rate (Pn) and stomatal conductance (Gs) were measured with a portable photosynthesis system (LI-6400, Lincoln, NE, USA).

The results were statistically processed by a special software package Origin-Pro v. 8.5 SR1 (EULA, USA). The results of experiments processed mathematically—statistically using standard biometric methods [Lakin, 1990].

Result and discussion. Plant growth and biomass accumulation of compounds glycyrrhizin acid promoted wheat growth in terms of increased germination capacity, seedling fresh and dry weight and enhanced root length and seedling height. Except for seeds treated by 1% ZnGA germination capacity reached above 95% than control with germination of 84%. There was apparent increase in seedling height when ZnGA concentrations varied from 1×10^{-6} micromol/L to 1×10^{-5} micromol/L.

Seedling height treated by 1×10^{-6} micromol/L ZnGA increased by 1×10^{-5} % of the control. Root length with 1×10^{-6} micromol/L or 1×10^{-5} micromol/L ZnGA application was significantly longer than control. Seedling fresh and dry weight treated by 1×10^{-6} micromol/L ZnGA increased by 22 and 14% of the control, respectively. Chlorophyll content of plants treated with ZnGA increased.

Chlorophyll content showed a significant difference ($p < 0.05$; $n = 3-4$) in comparison to control when ZnGA concentration varied from 1×10^{-7} micromol/L to 0.25%. Chlorophyll content of 1×10^{-6} % ZnGA was the highest with increase of 112% of the control. Chlorophyll content gradually decreased with ZnGA concentration varying from 1×10^{-6} micromol/L to 1%. Positive correlation was found between seedlings and chlorophyll content ($r = 0.83$). ZnGA induced a remarkably increase in photosynthetic rate (Pn). Significant differences were noted in Pn from 1×10^{-7} micromol/L to 0.24% ($p < 0.05$; $n = 3-4$). Photosynthetic rate with 1×10^{-6} % ZnGA reached the highest to $14.6 \text{ micromol m}^{-2} \text{ s}^{-1}$. Stomatal conductance (Gs) response tendency to ZnGA were consistent with Pn. A linear positive correlation existed between seedlings and Pn ($r = 0.83$) and Gs ($r = 0.85$), respectively.

Conclusion. In conclusion, ZnGA effected growth and development, defense and other interactions of wheat plants with the environment via changing physiological and biochemical process. The most suitable ZnGA concentration was 1×10^{-6} micromol/L when wheat (*Triticum aestivum* L.) seeds were pre-soaked with different ZnGA levels. In conclusion, treating with zinc glycyrrhizin acid can be used to improve wheat growth and development via modification in physiological and biochemical process.

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乌兹别克斯坦费尔干纳山谷地理气候区蜻蜓（昆虫纲：蜻蜓目）动物群的结构
**THE STRUCTURE OF DRAGONFLY (INSECTA: ODONATA)
FAUNAS IN THE GEOGRAPHICAL CLIMATE ZONES OF
FERGANA VALLEY OF UZBEKISTAN**

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Abstract. *In the research work the structure of dragonfly in the geographical climate zones of Fergana valley of Uzbekistan are described. Dragonfly (Insecta: Odonata) structure are discovered, collection (166) is made in the hill zone the structure's share is 78%, in the mountain zone is 21.69% are discovered/the lava in the hill zone the formation of lava's share is 31.9 %, in mountain zone 2.41% are discovered. *Sympecma fucsa* (Lestidae), *Ischnura elegans* (Coenagrionidae), *Colopteryx splendens* (Colopterygidae). *Colopteryx virgo* (Colopterygidae) types spread only in hill zones, *Orthetrum brunneum* (Libellulidae), *Anax parthehope* (Aeshnidae) types in the mountain zones, *Ischnura graellsii* (*Ischnura hastate* (Coenagrionidae), *Ischnura aurora* (Coenagrionidae) *Orthetrum cancellatum* (Libellulidae) types are discovered in the both zone.*

Keywords: *Insecta, Odonata, The geographical climate zone; Fergana valley of Uzbekistan.*

In addition to the important role of dragonflies (*Insecta: Odonata*) as objects of various areas of basic research the study of these insects is also of significant practical importance, since they are disseminators of helminth infections of wild and domestic birds [Kukashev et al., 1989] as well as some parts of agriculture and forestry. Dragonflies in the water of ecosystem in the food chain in the changing of energy in taking part through bio-ecology balance keeps insects zoo physiology studying are considered the object of learning and mentioned in the research [May 2019]. The aim of this investigation is describing the dragonflies structure in the geographical climate zone in Fergana valley of Uzbekistan.

Material and methods. The investigations are carried out during (2017–2019) (in spring, summer) in different geographical climate zones (hill, mountain zones) in Andijon region of Uzbekistan. In the investigation studying the types of dragon-

flies (*Onsecta*; *Odonata*) the methods of expedition route types is used [Zalihanov, 2005]. Gathering different collections, analyzing their structure, classifying in the help of standard method are carried out. [Zalihanov, 2005; Keller et.al., 2007]. Received successes Origin Pro v 8,5 SRI(EULA, USA) are re-carried out again by the help of special program system. Received results re-carried out in the standard mathematic statistic field.

Result and discussion. In the research work which is carried out in Andijon region of Uzbekistan of Fergana Valley which is situated in the banks of Qoradaryo (796 m. high from sea Level) the temperature +25°C) in the hillways of horizontal pasture Landscape coverer *Ischnura elegans* Vander Linden 1820 (*Coenagrionidae*) and *Sympecma fusca* Vander Linden 1820 (*Lestidae* types of imago stage in the individ are discovered. In the above mentioned Qoradaryo's water pools where the water gathered places *Calopterygidae* and *Calopteryx splendens* Harns 1782 (*Calopterygidae*) of tavras 12.05.2018 are discovered. The kamish roots growing in the banks of Tentaksoy in andijon region (*Phragmites australis*) in the stem *Crocothemis erythaea* Brulle, 1832 (*Libellulidae*), 1758 (*Calopterygidae*) and *Calopteryx splendens* Harns 1782 (*Calopterygidae*) and *Calopteryx splendens* Harns 1872 structure's lara stage examples. (16.05.2019) are discovered. In the territory of Ho'jaobod district (08.04.2019) 680 m high above solelevel, temperature +25°C) *Orthetrum cancellatum* Linnaeus 1758 (*Libellulidae*) types are mentioned. In the territory of Honobod town in andijon region district in the banks of Qoradaryo river (21.04.2019) Honobod town water reservoir (24.05.2019) *Ischnura graellsii* *Ischnura aurora* Brauer, 1865 structures lara stages individuals are discovered.

In the territory where investigations are carried out *Sympecma fusca* Vander Linden, 1820 (*Odonata: Lestidae*), *Ischnura elegans* Vander Linden, 1820 (*Odonata: Coenagrionidae*) *Calopteryx splendens* Harris, 1782 (*Odonata: Calopterygidae*); *Calopteryx virgo* Linnaeus, 1758 (*Odonata: Calopterygidae*); *Ischnura graellsii*/*Ischnura hastata* Rambur, 1842 (*Odonata: Coenagrionidae*); *Ischnura aurora* Brauer, 1865 (*Odonata: Coenagrionidae*); *Anax imperator* Leach, 1815 (*Odonata: Aeshnidae*); *Orthetrum brunneum* Fonscolombe, 1837 (*Odonata: Libellulidae*); *Orthetrum coerulescens* Fabricius, 1798 (*Odonata: Libellulidae*); *Orthetrum cancellatum* Linnaeus, 1758 (*Odonata: Libellulidae*); *Sympetrum meridionale* Selys, 1841 (*Odonata: Libellulidae*); *Anax parthenope* Selys, 1839 (*Odonata: Aeshnidae*); *Ophiogomphus cecilia* Fourcroy, 1785 (*Odonata: Gomphidae*); *Crocothemis erythraea* Brulle, 1832 (*Odonata: Libellulidae*) type of dragonflies are discovered.

Conclusion. So in the carried out investigation in the different climate-geographical zones of Andijon region of Fergana valley during 2017–2019 generally 166 types of dragonflies examples are gathered. The hill zones share 78.3% in the mountain zones share 21.69 are discovered. In the period of population the lara's

general share in hills is 39.16%, in mountain zones share 2.4% are discovered. So, *Sympecma fusca* Vander Linden, 1820 (*Coenargrionidae*, *Calopteryx virgo* Linnaeus, 1758 (*Calopterygidae*) types can be met only in hill zones, *Orthetrum brunneum* Fonscolombe, 1837; *Anax parthenope* Selys, 1839 (*Aeshnidae* types can be met. in mountain zone. Other types – *Ischnura graellsii*), *Ischnura hastate* Rambur, 1842 (*Coenargrionidae*), *Orthetrum cahcellatum* Linnaeus, 1758 (*Libellulidae*) can be met in the both climate–geographical zones and they are discovered. Received successes shows that. Dragonfly (*Insecta: Odonata*) territorial spreading marking, keeping various types of habitats and taking to the territorial kadastr documents can be used in fulfilling the structure of "Uzbekistan Red Book".

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2,4-二甲基苯酚氯化的电化学方法
**ELECTROCHEMICAL METHOD OF CHLORINATION
OF 2,4-DIMETHYLPHENOL**

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摘要。 电化学方法氯化2,4 - 二甲基苯酚

Muradov M.M., Huseynova I.G., Nazarova M.K., Hatamov M.M., Prosochkina T.R., Agayev A.A.

实验表明, 盐酸浓度, 亚硫酸钠的量, 电解质温度, 电流密度和反应介质影响2,4-二甲基苯酚氯化过程中的产物收率。 在氯化硫存在下, 反应不太快且易于控制。 通过减少烷基的取代氯化产物的形成, 使用CCl₄溶剂可以使目标产物的产率有一定的提高。

电化学氯化方法与化学方法的不同之处在于, 在电化学方法中, 氯化剂Cl₂和SO₂在该方法本身中获得。 通过显着减少进入大气的物质排放, 确保了该过程的环境安全。

Summary. CHLORINATION OF 2,4 - DIMETHYLPHENOL BY THE ELECTROCHEMICAL METHOD

Muradov M.M., Huseynova I.G., Nazarova M.K., Hatamov M.M., Prosochkina T.R., Agayev A.A.

Experiments have shown that the concentration of hydrochloric acid, the amount of sodium sulphite, the electrolyte temperature, the current density and the reaction medium affect the product yield during the chlorination of 2,4-dimethylphenol. In the presence of sulphur chloride, the reaction is less rapid and easy to control. The use of CCl₄ solvent gives a certain increase in the yield of the target product by reducing the formation of replacement chlorination products for the alkyl group.

The electrochemical chlorination method differs from the chemical one in that, in the electrochemical method, the chlorinating agent Cl₂ and SO₂ is obtained in the process itself. Environmental safety of the process is ensured with a significant reduction in emissions of substances into the atmosphere.

Derivatives of phenolic compounds can be obtained not only by the OH-group, but also by the reaction of electrophilic substitution of the hydrogen atoms of the aromatic nucleus.

In such reactions, phenols especially easily enter with halogens in aqueous solutions, since water, as a solvent, facilitates the reaction, polarizing halogen molecules and generating electrophilic particles [1].

Under normal conditions in water, phenol, aniline and their substituted interact with halogens [2]. In addition, the introduction of halogen atoms into an organic compound molecule significantly increases its hydrophobicity.

The halogenation reaction of methylphenols due to the + M - effect of the OH group (an increase in the mobility of hydrogen atoms in the ortho- and para-positions of the aromatic nucleus) is characterized by a high rate, and the halogen atoms replace 2,4 and 6 positions, if they are not occupied by CH₃ - groups [2,3].

The aromatic nucleus of methylphenols contains two types of substituents - OH and CH₃ - groups that interact in the same way with its π - electron cloud.

Thus, the OH group is a first-order substituent, characterized by a negative inductive ($-I$) and a positive mesomeric (+ M) effect. The methyl group also belongs to the substituents of the first kind and has a positive inductive ($+I$) effect [4].

In electrophilic substitution reactions, a hydroxyl group facilitates the occurrence of substituents in the aromatic core, orienting them to the ortho- and para-positions.

The interaction of methyl groups with an aromatic system also contributes to the concentration of excess electron density in ortho- and para- positions.

The number of methyl groups in methylphenol determines its chemical activity and the number of chlorine atoms entering the molecule during substitution, therefore the rate of chlorination of mono-, di- and trimethyl- substituted will be different. Theoretically, it is easiest to chlorinate 2,3,6-trimethylphenol and 2,4-2,6-dimethylphenols, in which one chlorine atom is introduced.

Recently, alkyl chlorophenols are used as intermediates for the synthesis of fungicides, herbicides and water-soluble drugs.

Chlorophenols, especially their alkyl derivatives, are important disinfectants and antiseptics.

As a result of the great work done, especially in the last two or three decades, many methods of halogenation with halogen-containing compounds have been created and many interesting halogenating agents have been proposed. As such, many organic and inorganic halide-containing compounds have been used.

Sulfuryl chloride is one of the most commonly used agents for the chlorination of aromatic, and more recently, aliphatic compounds. The boundaries of its application are unusually broad, just as the conditions of experience are varied in which it can be used. Chlorination with sulfuryl chloride can be carried out without a solvent in a wide temperature range from 0° to $30-45^{\circ}\text{C}$ (most often the reaction is carried out at the boiling point of the substance being chlorinated). Sulfuryl chloride is more often used in solutions (carbon tetrachloride, chloroform, ether) at temperatures from -20°C to the boiling point of the solvent.

The mechanism of chlorination with sulfuryl chloride varies depending on the conditions. In the absence of catalysts, sulfuryl chloride, due to the ease of dissociation of $\text{SO}_2\text{Cl}_2 \rightarrow \text{SO}_2 + \text{Cl}_2$ is a source of molecular chlorine. The decomposition proceeds more or less easily depending on the reaction conditions, the nature of the substance being chlorinated and the presence of certain additives that facilitate the chlorine release.

Sulfuryl chloride is one of the most common reagents for the chlorination of phenols and their derivatives. The products obtained in this way do not generally differ from those prepared by the action of elemental chlorine, however, the reaction proceeds less rapidly and can be easily controlled. Phenol forms 4- and 2-chlorophenols during chlorination, and 4-bromophenol-2,4-dichloro-4-bromo-

phenol. The reaction is used in the technique to produce 4-chlorophenol. O-, m- and p- cresols, xylenols, thymol, etc. readily chlorinate [5-6].

Analysis of numerous literature and patent sources have shown that the process of chlorination of alkylphenols with obtaining mono- and disubstituted chlorinated products in the benzene ring in the electrochemical system has not been carried out [7-10].

In the presented work for the first time we carried out this process. The purpose of this work is to obtain and study the process of electrochemical chlorination of aromatic hydrocarbons, that is, 2,4-dimethylphenol using hydrochloric acid and sulfur dioxide, obtained in the electrochemical system itself. As a result, in the presence of an activated carbon catalyst by this reaction; $\text{SO}_2 + \text{Cl}_2 = \text{SO}_2\text{Cl}_2$ sulfuryl chloride is formed, which participates in the process as a chlorinating agent. The process is carried out in an electrochemical system.

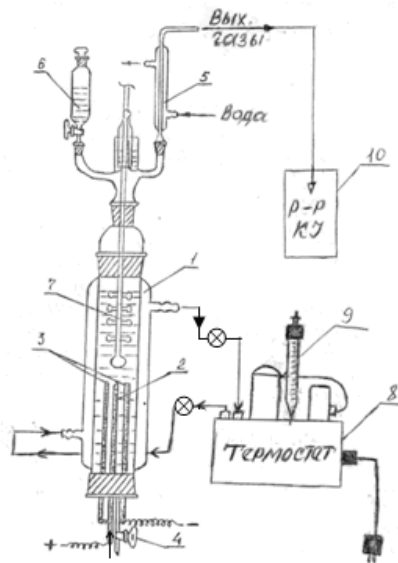


Fig.1. Installation for the chlorination of 2,4-dimethylphenol
 1 — shirt, 2 — anode, 3 — cathode, 4—tap, 5 — refrigerator; 6 — funnel,
 7 — mixer; 8 — thermostat, 9 — contact thermometer;
 10 — dishes for KJ solution

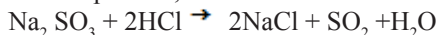
EXPERIMENTAL PART

The chlorination reaction was carried out by an electrochemical method in a glass cylindrical electrolyzer equipped with a thermostat, a DC power source, graphite electrodes, a reflux condenser, a stirrer, a thermometer, a separating funnel and a vessel with KJ solution.

A solution of sodium sulfite, hydrochloric acid, 2,4-dimethylphenol and CCl_4 , as the solvent, activated carbon was used as the initial reagents.

I. In the first stage, the calculated amount of sodium sulfite solution and 30% hydrochloric acid in an equimolar ratio of 1: 2 was loaded into the reaction unit, respectively.

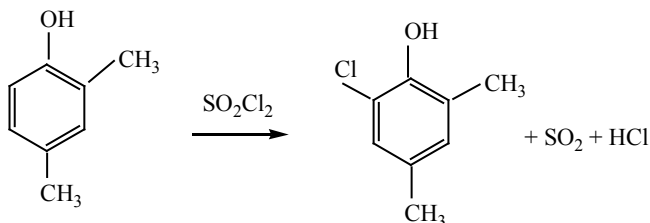
The reaction mixture was thermostated to the required temperature, i.e. 40-50 °C, turned on the stirrer, where we observed the progress of the proceeding reaction. In the process, the next reaction occurs first with the production of SO_2 .



After the supply of current, as a result of the HCl electrolysis process, molecular chlorine is obtained, which, primarily in the presence of a catalyst of activated carbon, reacts with SO_2 and SO_2Cl_2 is formed. However, we note that as a result of this reaction, the obtained NaCl undergoes current electrolysis, as a result of which the medium becomes basic (pH7), which is very important for maintaining the process environment that will ensure the chlorination of 2,4-dimethylphenol in the monosubstituted direction.

II. After obtaining of SO_2Cl_2 in the electrochemical system, in the second stage, we add 2,4-dimethylphenol and solvent CCl_4 .

The obtained SO_2Cl_2 in the electrochemical system enters with 2,4-dimethylphenol according to the following scheme, to obtain 4-chloro, 2,4-dimethylphenol and with a yield of ~ 65%



RESULTS OF EXPERIMENTS

The course of the substitution reaction in the benzene ring mainly depends on the amount of chlorine, sulfur dioxide and on the reaction conditions. We studied the effect of hydrochloric acid concentration, temperature, current density, reaction time, the ratio of reagents, especially with SO_2Cl_2 .

In the conducted chlorination of 2,4-dimethylphenol using low-concentration hydrochloric acid, part of the current is spent on the formation of chlorates, and is the reason for reducing the current yield of chlorine derivatives -2,4 dimethylphenol. The dependence of current output (1) and substance (2) of chlorination products on the concentration of hydrochloric acid is presented in Fig. 2. As follows from fig. 2 when the concentration of hydrochloric acid is below 15%, the current output and substance of the chlorination product of 2,4-dimethylphenol decreases, because along with the release of chlorine, oxygen is generated according to the scheme:

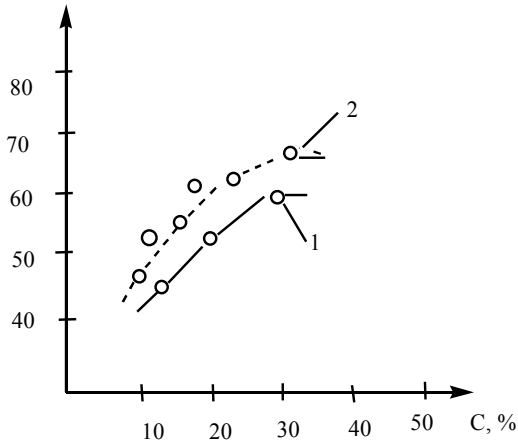
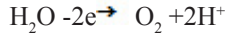
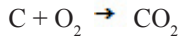


Fig.2. The dependence of current output (1) and substance (2) of the chlorination product of 2,4-dimethylphenol on the concentration of hydrochloric acid. Anode graphite; current density 10-15 A / dm²; temperature 60-70 °C

At very low concentrations of hydrochloric acid, the reaction of formation of oxygen predominates, which is partially spent on the oxidation of the graphite anode



Electrolyte temperature has a significant effect on the electrochemical chlorination of 2,4-dimethylphenol. The effect of temperature on the chlorinating current of 2,4-dimethylphenol was studied in 15–30% hydrochloric acid at a current density of 10–15 A/dm². The results of the experiments are presented in Fig.3.

The optimal temperature range for this chlorination process is 60-70°C.

In order to determine the maximum performance of the electrolyzer, the influence of the current density on the current output of the chlorination product of 2,4-dimethylphenol on a graphite electrode was studied; 2,4-dimethylphenol was taken in a 10% excess against stoichiometry; the temperature of the solution was 70 °C, and the concentration of hydrochloric acid was 15-30%

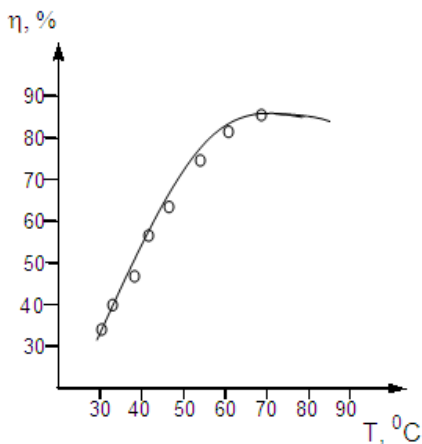


Fig.3 Dependence of the current output of the chlorination product of 2,4-dimethylphenol on temperature. Anode graphite; current density 10-15 A/dm²

The dependences of the current outputs of the products of the chlorination of 2,4-dimethylphenol are shown in fig. 4.

Thus, it was found that the current efficiency and selectivity of the chlorination of 2,4-dimethylphenol in an electrochemical system depends mainly on the concentration of hydrochloric acid, electrolyte temperature, and current density.

Lowering the temperature leads to a decrease in the chlorine content that reacts with SO₂. Also essential is the solubility of chlorine and sulfur in CCl₄, which decreases with increasing temperature.

RESULTS AND DISCUSSION

The experiments showed that the chlorination of 2,4-dimethylphenol to obtain monochlorine derivatives on the product yield is influenced by the following parameters: the concentration of hydrochloric acid, the electrolyte temperature, current density and the environment of the reaction. The required concentrations of 15-30% hydrogen chloride facilitate the release of active chlorine, the presence of a catalyst causes the formation of SO₂Cl₂ under mild conditions, and the presence of a solvent CCl₄ affects the product yield. In order to avoid by-products, the conditions for carrying out the reaction are strictly controlled, especially carrying out the process in an alkaline medium pH>7.

Getting the maximum yield of the finished product ~ 85% mainly depends on the supplied current, i.e. from current density 10-15 A/dm².

The electrochemical chlorination process of 2,4-dimethylphenol is environmentally friendly, as the amount of harmful by-products is significantly reduced.

For this process, the optimum is: the concentration of hydrochloric acid is 15-30%, the reaction temperature is 60-70°C, the presence of activated carbon catalyst, solvent CCl_4 , a favorable $\text{pH} > 7$, environment, a current density of 10-15 A/dm^2 , and the product yield is about 85%.

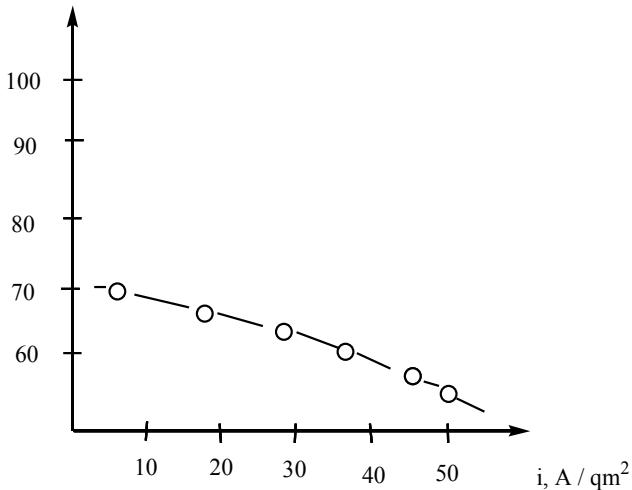


Fig.4 Dependence of the current output of the chlorination product of 2,4-dimethylphenol on the current density; Anode-graphite, temperature 60-70 °C, HCl concentration 15-30%.

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有效稳定粉红葡萄酒的方法
**EFFICIENT METHODS OF STABILIZATION
OF PINK GRAPE WINES**

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注解。 本文介绍了使用基于聚乙烯聚吡咯烷酮 (PVPP) 的新一代产品加工粉红葡萄酒的效率研究结果, 以去除氧化形式的多酚。 获得的数据通过数学统计方法处理。 对于三种研究药物 (Polyclar 10, Polyclar W, Polyclar B) 中的每一种, 获得了将产品中酚类物质的含量与注入的时间, 温度和剂量相关联的方程。 药物。 从构建的回归模型的角度建立了推荐的剂量方案和所研究药物在12°C的温度下的暴露时间。

关键词: 粉红葡萄酒; 氧化褐变; 缩合形式的酚类化合物; 聚乙烯吡咯烷酮

Annotation. *The article presents the results of studies of the efficiency of processing pink grape wines with new generation products based on polyvinylpyrrolidone (PVPP) in order to remove oxidized forms of polyphenols. The data obtained were processed by the methods of mathematical statistics For each of the three studied drugs (Polyclar 10, Polyclar VT, Polyclar V) equations were obtained that relate the content of phenolic substances in the product with time, temperature, and doses of injected drugs. The dosage regimens and the exposure time of the studied drugs at a temperature of 12 °C recommended from the point of view of the constructed regression models have been established.*

Keywords: *pink grape wines; oxidative browning; condensed forms of phenolic compounds; polyvinylpyrrolidone*

Grape wine is a complex system, the violation of which can lead to turbidity and loss of presentation. Of great importance in the formation of typical properties, including taste and color of wine, are phenolic substances. They are among the most easily oxidized components of grapes and wine. Condensable phenolic compounds are actively involved in the redox processes of wine maturation. During polymerization, they precipitate, and interacting with proteins, give unstable colloidal complexes - tannin-protein compounds that cause turbidity. The most important property of phenolic substances is their ability to enzymatic oxidation under the influence of various oxidases or under aerobic conditions - under the action of sunlight, which leads to browning of wine. The role of phenolic compounds in the formation of turbidity of wines is extremely high [1].

Currently, the wine industry pays great attention to drugs that are aimed to prevent the occurrence of turbidity or to combat it [2, 3]. In order to prevent excessive oxidation of table wines, various physical, chemical and biochemical methods are used. Among the preparations used for treating wines, high-molecular compounds based on N-vinylpyrrolidone are widely used [4, 5].

In this paper, we investigated the effectiveness of the treatment of pink grape wines with the preparations of a new generation based on polyvinylpyrrolidone (PVPP): Polyclar 10, Polyclar V, Polyclar VT. The preparations are made on the basis of polyvinylpyrrolidone (PVPP), their main difference lies in the size of the particles, which, depending on the type of raw materials, the purpose of processing and production conditions, determines the advantage of using one drug over others at different stages of wine preparation.

The scheme of the experiment was developed by the method of mathematical statistics [6]. For each drug, in accordance with the recommendations of the manufacturer, the following were selected; three doses for treating the wine (minimum, maximum and average); processing temperature - 0; 12.5; 25 °C; processing time - 5; 27.5 and 50 min.

In the control and prototypes of pink grape wine, the following were determined: the total content of phenolic substances (Figure 1) and the relative optical density at 420 and 520 nm (Table 1), and the intensity of color (I) and shade (T) were calculated.

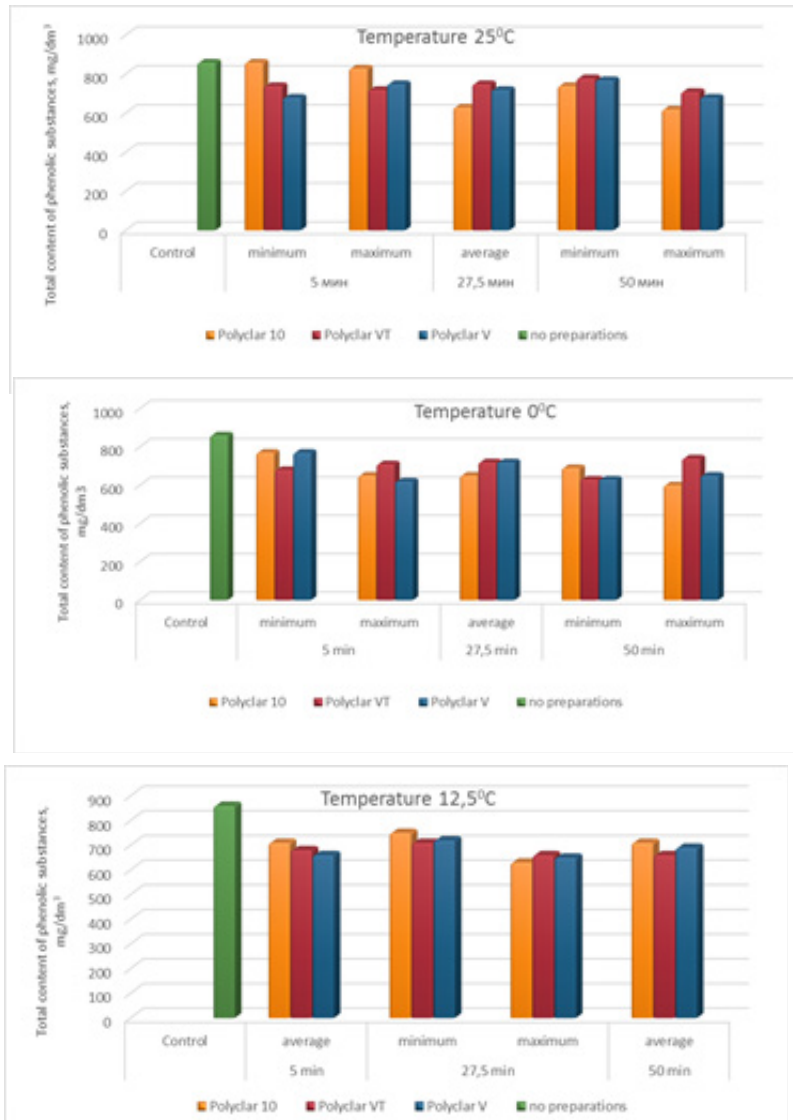


Fig. 1 - Changes in the total content of phenolic compounds of pink grape wine as a result of treatment with PVPP preparations

Table 1 - Changes in the optical density of pink grape wine as a result of treatment with preparations based on PVPP

Temperature, °C	Time, min	Dose of the drug	D ₄₂₀			D ₅₂₀		
			Polyclar 10	Polyclar VT	Polyclar V	Polyclar 10	Polyclar VT	Polyclar V
25	5	min.	0,53	0,50	0,52	0,44	0,45	0,49
		max.	0,31	0,40	0,33	0,30	0,38	0,30
	27,5	average	0,40	0,43	0,43	0,36	0,39	0,39
	50	min.	0,52	0,52	0,54	0,47	0,47	0,49
		max.	0,30	0,42	0,36	0,28	0,39	0,33
12,5	5	average	0,44	0,44	0,43	0,41	0,41	0,39
	27,5	min.	0,48	0,52	0,50	0,44	0,47	0,45
		max.	0,27	0,38	0,33	0,25	0,35	0,31
	50	average	0,40	0,44	0,44	0,36	0,39	0,40
	0	5	min.	0,52	0,50	0,50	0,47	0,45
max.			0,40	0,43	0,42	0,36	0,40	0,39
27,5		average	0,36	0,43	0,40	0,34	0,40	0,37
50		min.	0,46	0,50	0,48	0,39	0,45	0,43
		max.	0,27	0,43	0,34	0,29	0,39	0,31

From the presented data it is clear that the total content of phenolic substances in all experimental samples decreased as a result of treatment with preparations based on PVPP. The largest decrease in the value of this indicator was observed in samples processed at a temperature of 12.5 and 0 °C, the smallest - at a temperature of 25 °C.

In all prototypes of rosé wine, a decrease in the relative optical density values at a wavelength of 420 and 520 nm was noted. The treatment temperature had no significant effect on these indicators. The data obtained indicate that the treatment of oxidized rosé wines with PVPP preparations allows to obtain a positive effect, which consists in reducing the content of condensed forms of polyphenols. At the same time, a decrease in the content of anthocyanins occurs.

It was established that as a result of the treatment of rosé wines with preparations, the intensity of their color naturally decreased as compared to the control. The maximum level of color intensity was recorded in a sample treated with Polyclar V at a temperature of 25°C, the minimum level when treated with Polyclar 10 at a temperature of 12,5 °C.

In the characteristic of the quality of the color of rosé wines, which depends on the ratio of brown condensation products of phenolic substances and anthocyanins, the indicator T is of interest, since it characterizes the degree of oxidation of wine. Pink wines treated with Polyclar 10 and Polyclar VT at 25 °C, and Polyclar VT and Polyclar V at 0 °C in maximum dosages and with minimum contact time are characterized by the lowest levels of T. Also, the maximum decrease in the hue value was obtained when all three studied drugs were processed at a temperature

of 12,5 °C, but in this case the processing time was 27.5 minutes. The obtained values of the indicator T may indicate that the treatment of rosé wines with preparations based on PVPP helps to reduce the content of condensed forms of phenolic substances and makes it possible to obtain wine materials with an elegant color. The results of the organoleptic evaluation showed that the treatment of rosé wine with the drugs under study contributes to the elimination of oxidized tones in the taste and the correction of the color of the test samples. To eliminate the effects of oxidative browning as much as possible, the treatment with Polyclar 10 at a temperature of 0 °C, which completely removed the onion tones in coloring, allowed. The sample obtained as a result of processing the maximum dose of this drug with a minimum contact time received a score of 81 points, while the control sample was characterized by a score of 71 points.

In order to study the effect of drugs on wine materials, a three-factor quadratic regression model of dependence of the content of phenolic substances on the dose of the drug, temperature and time of exposure for rosé wines was constructed using the data obtained for Polyclar 10, Polyclar VT and Polyclar V.

As a result of the regression analysis, the following equations were obtained:

$$f_{\text{pol10}}(d, t, T) = 697,21 - 36,62d + 5,21d^2 + 2,77t - 1,59dt + 0,13t^2 + 10,11T - 0,29dT - 0,49tT + 0,05dtT - 0,02T^2;$$

$$f_{\text{polVT}}(d, t, T) = 680,67 + 5,08d - 0,41d^2 + 0,27t + 0,32dt - 0,04t^2 - 5,25T - 0,26dT + 0,11tT - 0,02dtT + 0,3T^2;$$

$$f_{\text{polV}}(d, t, T) = 805,97 - 25,98d - 1,3d^2 - 1,66t + 0,76dt - 0,04t^2 - 11,39T + 2,05dT + 0,26tT - 0,06dtT + 0,17T^2$$

where d – drug dosage (g/dm³), t – time(min), T – temperature(°C).

The functions correspond to the results for Polyclar 10, Polyclar VT and Polyclar V, respectively. A visual interpretation of the resulting dependencies is shown in Fig. 2

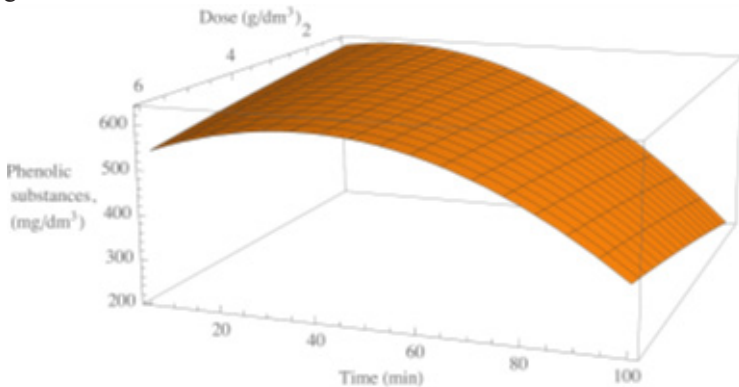


Fig. 2. The projection of the regression equations on the hyperplane with a fixed temperature parameter ($T = 12^{\circ}\text{C}$) for rosé wines (Polyclar 10).

Recommended in terms of regression models built, dosage regimens and exposure time at a temperature of 12 °C for all drugs: Polyclar 10 - a dose of 3.2 g/dm³, time 70 min; Polyclar VT - dose of 4.6 g/dm³, time 25 min; Polyclar B - dose of 4.6 g/dm³, time 25 min. The order and factors of influence can be varied depending on production needs, using the data of the obtained equations.

These studies have shown that the treatment of oxidized pink grape wines with new-generation products based on PVPP is effective for eliminating oxidative browning, as it reduces the content of condensed forms of phenolic substances and eliminates oxidation tones in taste. Processing of experimental data using mathematical statistics allows you to choose the optimal modes of wine processing, depending on the physical and chemical indicators of a particular wine, as well as the capabilities and needs of a particular production.

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UDC 663.2

用于识别葡萄酒饮料的现代工具分析方法
**MODERN TOOL ANALYSIS METHODS
FOR IDENTIFYING WINE DRINKS**

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注解。 迄今为止,葡萄酒饮料的配给物理化学指标符合现行法规和技术文件的要求并不能完全保证产品的真实性。 该文章描述了用于鉴定酒精饮料的现代仪器分析方法。 作者提出在葡萄酒饮料鉴定中使用额外的指标,这将有效地识别假冒产品。

关键词: 葡萄酒饮料, 鉴定, 同位素质谱, 仪器分析。

Annotation. *To date, the compliance of the rationed physico-chemical indicators of wine drinks with the requirements of the current regulatory and technical documentation cannot fully guarantee the authenticity of products. The article describes the modern methods of instrumental analysis for the identification of alcoholic beverages. The authors have proposed the use of additional indicators in the identification of wine beverages, which will effectively identify counterfeit products.*

Keywords: *wine drinks, identification, isotopic mass spectrometry, instrumental analysis.*

Despite the complex chemical composition of wine products and a large variety of its types, recently, both wine and wine beverages are increasingly becoming an object of falsification. The increased number of counterfeit wine products in Russia is partly due to the lack of speed in the development and updating of domestic regulatory documents governing the production and quality of products. A number of studies in recent years aimed at developing scientifically based criteria for the

authenticity of wines, sparkling and fruit wines contributed to the identification of substandard products, and, as a result, to the reduction of its sales [1-3]. Nevertheless, some unscrupulous producers reoriented to the production of wine beverages. In accordance with Federal Law № 171 “On State Regulation of the Production and Turning of Ethyl Alcohol, Alcohol and Alcohol-Containing Products and on Limiting Consumption (Drinking) of Alcohol Products”, wine beverages are divided into two excisable groups: wine beverages prepared without the addition of ethyl alcohol and wine drinks prepared with the addition of ethyl alcohol. In some cases, products that do not contain wine in their composition, which should be categorized as low alcohol, are positioned by unscrupulous manufacturers as “wine drinks”. This is explained by the fact that wine beverages prepared without the addition of ethyl alcohol, unlike low-alcohol beverages, have a low excise rate, which benefits producers to the detriment of the state.

To date, in accordance with GOST 31729-2015 "Wine drinks. General technical conditions "are normalized such physico-chemical indicators as the volume fraction of ethyl alcohol, the mass concentration of sugars, the mass concentration of titrated acids, the mass concentration of the residual extract, etc. In most cases, the physicochemical indicators of the wine beverages studied fully comply with the requirements of GOST. However, even with full compliance with standardized indicators, the experts in identifying wine beverages may have questions about their authenticity and belonging to the claimed categories [4].

To address these issues, the FSBI VNIIPBiVP developed a number of techniques aimed at expanding the list of identification indicators of alcoholic beverages, including wine beverages, using modern instrumental methods of analysis. Table 1 presents additional criteria for the authentication of wine beverages with an indication of methods of determination.

Table 1 - Additional criteria for authenticity of wine beverages

Name of the indicator	Value	Method for determination
1	2	3
Determination of the presence of non-grape alcohols (for wine beverages prepared without the addition of ethyl alcohol)	$(- 29,2 \text{ ‰}) < \delta^{13}\text{C} < (- 25,8 \text{ ‰})$	«“Methods of measuring the ratio of $^{13}\text{C}/^{12}\text{C}$ isotopes of alcohols in wines using isotope mass spectrometry”. № FR.1.31.2013.14592.
Mass concentration of glycerin (for wine beverages prepared with added water)	no less than 2 g/dm^3 and no less than 10 g/dm^3	"Methods for measuring mass concentrations of glucose, fructose, glycerin and sucrose in wines by chromatographic method ", № FR.1.31.2009.05408

Name of the indicator	Value	Method for determination
Determination of the presence of water of exogenous origin (for wine beverages prepared without using water)	0,5‰ < $\delta^{18}\text{O}$ < 15‰	"Methods of measuring the ratio of oxygen isotopes $^{18}\text{O}/^{16}\text{O}$ exogenous and endogenous water in wines and wort by isotope mass spectrometry" № FR.1.31.2013.15529
Determination of the nature of carbon dioxide (for wine beverages prepared by secondary fermentation)	$(- 28,0 \text{ ‰}) < \delta^{13}\text{C} < (- 8,0 \text{ ‰})$	GOST R 55460-2013 "Alcohol products. Identification. Method for determination of $^{13}\text{C}/^{12}\text{C}$ isotope ratio of carbon dioxide in sparkling wines and fermented beverages
Mass concentration of ash - for wine beverages prepared without added water; - for wine beverages prepared with added water	no less than 1,2 g/dm ³ no less than 0,6 g/dm ³	GOST R 53954-2010 "Wine production. Identification. Method for determination of mass concentration of ash and alkalinity of ash "
Ash alkalinity - for wine beverages prepared without added water; - for wine beverages prepared with added water	no less than 20 mg-eq/dm ³ no less than 10 mg-eq/dm ³	GOST R 53954-2010 "Wine production. Identification. Method for determination of mass concentration of ash and alkalinity of ash "
Mass concentration of tartaric acid - for wine beverages prepared without added water; - for wine beverages prepared with added water	1,0-5,0 g/dm ³ no less than 0,5 g/dm ³	GOST R 52841-007 "Wine production. Determination of organic acids by capillary electrophoresis". "Methods for measuring the mass concentration of organic acids in wine products using high-performance liquid chromatography", № FR. 1.31.2009.06524

In wine beverages made from grape wine materials, the ratios of carbon isotopes of ethanol should be in the range established for wines and wine materials from grapes, namely from minus 25,8 ‰ to minus 29,2‰. The addition of wine, water, sugar and other alcohol-free ingredients to the blend does not result in the fractionation of the isotopes of the native alcohol and, accordingly, does not change its isotopic characteristics. This conclusion is confirmed by the numerous results of scientific research conducted in FSBI VNIIPBiVP. In addition, in most cases, when using alcohol flavors, the isotope characteristics of ethanol are shifted towards an increase in the proportion of the heavy ^{13}C isotope and are not within the established range.

In wines and wine materials glycerin is present in a mandatory manner and is one of the main components of the residual extract. In Table 1, the indicator "mass concentration of glycerol" is given for wine beverages prepared using water. When preparing a blend of a wine drink using water, wine is diluted and the glycerin content decreases. However, in wine beverages prepared with the requirements of the standard, the minimum mass concentration of glycerin must be at least 2 g / dm^3 .

Wine beverages prepared without adding water are beverages whose blend, as a rule, includes only table wines or wine materials and food flavors. To identify this product category, a method is proposed for exogenous and endogenous water determination by isotope mass spectrometry. Research results allow us to conclude that in wine beverages prepared without adding water $\delta^{18}\text{O}$ should be in the range established for table wine materials and wines listed in Table 1.

Some manufacturers produce wine drinks saturated with carbon dioxide through the process of secondary fermentation. To establish the authenticity of such drinks is important indicator that determines the nature of carbon dioxide. According to the requirements of the standard, for sparkling wines and beverages obtained by secondary fermentation, the value of $\delta^{13}\text{C}_{\text{CO}_2}$ should be in the range of minus 28‰ to minus 8‰. At the same time, the introduction of water and food flavors into the blend of such wine drinks does not change the isotopic characteristics of native carbon dioxide, and the numerical value of the $\delta^{13}\text{C}_{\text{CO}_2}$ index does not change.

The numerical values of the indicators "mass concentration of ash" and "alkalinity of ash" can serve as additional controlled indicators during the identification tests of wine beverages. If the ash concentration is less than $0,6 \text{ g/dm}^3$ and the alkalinity of the ash is less than 10 mEq/dm^3 a preliminary conclusion can be made that water should be included in the blend of wine beverages in quantities exceeding the permissible norms. And, on the contrary, unreasonably high values of these indicators show their artificial increase by adding mineral salts.

Tartaric acid is an organic compound characteristic of grapes and its products. Its content may vary depending on the grape variety, climatic conditions of growth, technology of processing of grapes and wine production. But at the same time, tartaric acid should be present in wines and, accordingly, in drinks based on them. Therefore, this chemical compound can be recommended as an additional criterion for identifying wine beverages produced from table wines and wine materials. Table 1 presents the numerical ranges of the mass concentration of tartaric acid for wine beverages with and without added water.

The identification of the presence of non-grape alcohols loses its meaning when identifying alcoholic products positioned as "wine beverages with the addition of ethyl alcohol". Meanwhile, all other additional indicators presented in Table 1 relate to them to the same extent as to wine beverages without the addition of ethyl alcohol.

Thus, the described identification methods allow you to select the necessary test complex of wine beverages in order to identify counterfeit products, depending on the declared production technology.

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用于制备午餐菜肴的干混合配方具有很高的生物学价值
**FORMULATION OF DRY MIXES FOR THE PREPARATION
OF LUNCH DISHES HIGH BIOLOGICAL VALUE**

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注解。 为了提高现代条件下的食物质量,有必要提高食物的生物价值,包括快餐。 该研究的目的是使用大豆组分开发具有增加的营养和生物价值的食品浓缩物制剂(干混合物)。 作为研究的结果,改进了晚餐菜肴“Borsch”和“甜菜根”的著名食品浓缩物的配方。

关键词: 配方,干混,食品浓缩,氨基酸,生物学价值。

Annotation. *To improve the quality of food in modern conditions it is necessary to increase the biological value of food, including fast food. The purpose of this research is to develop a food concentrate formulation (dry mix) of increased nutritional and biological value using the soy component. As a result of the research, the recipes of the famous food concentrates of the dinner dishes “Borsch” and “Beetroot” were improved.*

Keywords: *recipe, dry mix, food concentrate, amino acids, biological value.*

The life of a modern person proceeds quite rapidly and is associated with high mobility, which inevitably affects his diet. Introduction to the diet of various semi-finished products and food concentrates for fast cooking, not only in field conditions, but also in everyday food has become commonplace today. In this connection, there is a need to develop new and improve existing formulations, to create new types of food products that do not require long-term processing. Improving the nutritional and biological value of food concentrates of dinner dishes helps to improve the quality of nutrition.

The recipe of food concentrates for dinner dishes includes cereals, dried vegetables and potatoes, as well as food additives. Our nutritional assessment of the composition of food concentrates suggests that the products of this type contain insignificant amounts of protein, with the exception of soups and cereals with meat, they contain almost no vitamins C and E, with a high content of fat and carbohydrates, while the amount of dietary fiber quite low.

Therefore, to enrich the chemical composition of food concentrates we propose to use protein-vitamin concentrates (PVC), obtained by the joint processing of soybean grain and vegetables (carrots and beets). PVC production consists in soaking soybean grain, cleaning and cutting fresh carrots or beets, mixing prepared vegeta-

bles and soybeans, their joint disintegration and extraction of soluble substances, separation into liquid and solid (insoluble) parts, followed by coagulation of protein substances in the liquid part with an solution of ascorbic acid , separation of the formed coagulum, its formation and drying by the convective method [1, 2].

To enrich the chemical composition of food concentrates, model formulations have been developed and a comparative assessment of their chemical composition and the degree of satisfaction of the daily need for nutrients in comparison with the analogue has been carried out.

To optimize the recipe, food concentrates of the first dinner dishes were chosen: “Beetroot”, which does not include dried meat, the prescription composition is presented exclusively from plant-based ingredients, and “Borsch” is similar to the recipe of the “Home borsch” concentrate, which contains dried ground beef; when optimized, the minced meat was replaced by soy beet PVC and soy carrot PVC (table 1) [3].

Table 1 - Food concentrate recipes, %

Component Name	Beetroot soup (equivalent)	Beetroot soup with soy-beet protein-vitamin concentrate (product)	Homemade borsch (equivalent)	Borsch with soy-beet and soy-carrot protein-vitamin concentrates (product)
White cabbage dried	-	-	27,0	25,6
Dried beets	42,3	12,3	10,0	-
Soy beet protein-vitamin concentrate	-	30,0	-	10,0
Soy carrot protein-vitamin concentrate	-	-	-	10,0
Dried potatoes	23,5	23,5	17,55	17,55
Fat	10,0	10,0	10,0	10,0
Food table salt	7,0	7,0	10,7	10,7
Dried onion	5,0	5,0	4,2	4,2
Dried carrots	5,5	5,5	3,0	-
Dried white root	-	-	0,5	0,5
Dried greens	-	-	0,5	0,5
Dried beef mince	-	-	5,0	-
Unsalted Tomato Paste	-	-	5,0	5,0
Bay leaf	-	-	0,08	0,08
Ground red pepper	-	-	0,52	0,52
Sodium glutamine	-	-	0,5	0,5
Citric acid	0,6	0,6	0,6	-
Ground black pepper	0,1	0,1	0,05	0,05
Wheat flour	6,0	6,0	4,8	4,8
Total	100	100	100	100

In the recipe of a model sample of a mixture of food concentrate “Beetroot”, 30% of dried beets were replaced with soy-beet protein-vitamin concentrate. The model recipe of the “Borshch” food concentrate mixture to increase the nutritional value, reduce the cost and exclude products of animal origin contains 10% of soy beet and soy carrot PVC instead of dried beets and part of dried cabbage [4, 5].

Such a replacement contributes to the nutritional and biological value of the finished concentrate mixture. The amount of PVC introduced into the concentrate is also due to its effect on the organoleptic characteristics of the finished dish, in particular, on the taste and color of the product. The introduction of more PVC in the concentrate or the complete replacement of dried beets leads to a deterioration in the color of the product, the appearance of the bean flavor that is not typical of the culinary dish of the same name.

Protein-vitamin concentrate is introduced into the mixture in granular form, as when cooking a lunch dish from a food-concentrate mixture, it swells, but does not dissolve, retains its shape well, as well as dried vegetables, resembles minced meat in appearance.

The technology of cooking food concentrates of the first lunch dishes is as follows. Dried vegetables, potatoes, protein-vitamin concentrates and dried greens are inspected, removing impurities and non-standard particles.

The confectionery fat is freed from the container and melted, heating to a temperature of not more than 55 °C, then filtered through a metal-woven sieve.

Wheat flour is dried, cooled, sieved and passed through magnets.

Citric acid, salt cooking sieve and pass through magnets. Bay leaves are inspected, removing the damaged specimens, washed in running water, dried to a moisture content of not more than 10%, and crushed. Ground spices passed through magnets, inspect and sift.

The prepared components are metered and mixed in accordance with the recipe. The mixer is first loaded with components consisting of large particles - potatoes and dried vegetables, protein-vitamin concentrates and dried greens, then salt, flour, spices and other components. Then stirring the mixture, add fat, tomato paste and mix the mass for 2-4 minutes. The mass should be homogeneous without large lumps.

Food concentrates are packaged in laminated cellophane bags, weighing from 50 to 120 g, sealed in containers, packed in cardboard boxes and sent for sale. Food concentrates are stored at a temperature not exceeding 20 ° C and a relative air humidity not higher than 75% for 12 months [6].

After obtaining food concentrates according to the developed recipes and technologies, their chemical composition was studied and a comparative assessment of the nutritional and biological value of the developed products and analogues was given. The results are presented in table 2.

Table 2 - Chemical composition and degree of satisfaction of the daily need for nutrients of food concentrates “Beetroot” and “Borsch”

Indicator Name	Beetroot soup		Beetroot soup with PVC		Borsch		Borsch with PVC	
	Content	Degree of satisfaction, %	Content	Degree of satisfaction, %	Content	Degree of satisfaction, %	Content	Degree of satisfaction, %
Water, g	12,0	-	12,0	-	12,0	-	12,0	-
Proteins, g	9,1	12	13,1	17	9,2	12	11,2	15
Fat, g	13,0	16	13,8	17	11,5	14	12,3	15
Carbohydrates, g	51,1	14	45,5	12	49,4	14	45,1	12
Dietary fiber, g	4,3	14	4,2	14	5,3	18	5,9	20
Vitamin E, mg	0	0	2,0	20	0,2	2	2,0	20
Vitamin C, mg	7,0	10	49,0	70	29,0	41	43,0	61
Mineral substances, g, including:	10,5	-	11,4	-	12,6	-	13,5	-
Potassium, mg	1313	38	1651	47	980	28	1237	35
Phosphorus, mg	201	20	533	53	145	15	265	27
Calcium, mg	144	14	255	26	182	18	237	24
Magnesium, mg	85	21	221	55	68	17	123	31
Energy value, kcal	375,0	-	375,4	-	359,1	-	359,5	-

Analysis of table 2 shows that the introduction of 30% PVC in the “Beetroot” recipe provides an increase in protein content by 4%, vegetable fat by 1.8%, vitamin C by 42%, and the presence of vitamin E in an amount of 2.0 mg per 100 g, minerals: potassium at 338 mg, phosphorus at 332 mg, calcium at 111 mg, and magnesium at 136 mg. When this occurs, the total carbohydrate content decreases by 5.6 g per 100 g of product.

Introduction of 10% soy-beet and 10% soy-carrot PVC to the “Borsch” food concentrate recipe provides an increase in protein content by 3%, vegetable fat by 1.0% with full replacement of animal fats with vegetable, vitamin C by 20%,

vitamin E by 1.8%, minerals: potassium at 257 mg, phosphorus at 120 mg, calcium and magnesium at 55 mg. When this occurs, the total carbohydrate content decreases by 4.3 g per 100 g of product.

Research has shown that food concentrates of the first dining dishes, obtained according to the developed recipes, by the degree of satisfaction of the daily need of the human body for nutrients significantly exceed the concentrates obtained according to the traditional recipe. Consumption of 100 g of food concentrates “Beetroot with PVC” and “Borsch with PVC” will provide a daily consumption rate for protein and fat by 15-17%, by vitamin C by 61-70%, vitamin E by 20%, and also by mineral substances: potassium, calcium, phosphorus, magnesium from 24 to 55% [4, 5].

According to modern concepts of the physiology of nutrition, it is not enough to talk about the content in the human diet of only total protein. Of particular importance is the quality of the protein, i.e. full content of essential amino acids, ensuring the normal course of processes associated with the development and functioning of the body as a socio-biological system.

When taking into account the biological value of protein components in scientific research, the most widely used criteria developed by academicians N.N. Lipatov (Jun.) And I.A. Rogov based on the development of the Mitchell-Block principle. Using this principle, a number of indicators have been formulated that allow to evaluate the amino acid composition and its balance in the simulated product [7].

A qualitative assessment of the compared proteins using formalized indicators is that the higher the KSAS value or the smaller the value of KRAC and KOAS (ideally, KSAS = 1; KRAC = 0, KOAC = 0), the better the essential amino acids are balanced and the more rational they can be used by the body. We evaluated the balance of the amino acid composition of model samples of food concentrates. The evaluation results are presented in tables 3 and 4.

Table 3 - Comparative characteristics of the balance of amino acid composition of food concentrate "Beetroot" with the composition of the reference protein

Indicator	Reference		Beetroot soup (equivalent)			Beetroot (product)		
	Amino acid	Speed	Amino acid	Speed	KUNA	Amino acid	Speed	KUNA
Valin	5,0	1,0	4,49	0,90	0,84	5,18	1,04	0,77
Isoleucine	4,0	1,0	4,36	1,09	0,69	4,69	1,17	0,68
Leucine	7,0	1,0	5,54	0,79	0,95	6,48	0,93	0,86
Lysine	5,5	1,0	5,13	0,93	0,80	5,35	0,97	0,82
Threonine	4,0	1,0	4,01	1,00	0,75	4,01	1,00	0,80
Methionine + Cystine	3,5	1,0	2,63	0,75	1,00	2,81	0,80	1,00
Phenylalanine + Tyrosine	6,0	1,0	7,63	1,27	0,59	7,71	1,29	0,62
Tryptophan	1,0	1,0	1,13	1,00	0,75	1,16	1,00	0,80
Total amount of amino acids	36,0	-	34,92	-	-	37,39	-	-
Indicators of balance of amino acid composition								
C min	1,0		0,75			0,80		
KSAS	1,0		0,77			0,77		
KRAS	0		0,23			0,23		
PSI	→min		10,56			10,74		
INAK	→1,0		0,95			1,00		
KOAS	0		0,13			0,36		

Note: C_{\min} – amino acid speed, the proportion of units; KUNA - the utilization rate of essential amino acids, the proportion of units; KSAS - the ratio of the balance of amino acid composition, the proportion of units; KRAS - coefficient of amino acid imbalance, the proportion of units; PSI - an indicator of “comparable redundancy”, g / 100 g of protein; INAK - an index of essential amino acids; KOAS - the coefficient of deviation of the values of amino acid composition from the reference.

Table 4 - Comparative characteristics of the balance of amino acid composition of food concentrate "Borsch" with the composition of the reference protein

Indicator	Reference		Borsch (equivalent)			Borsch (product)		
	Amino acid	Speed	Amino acid	Speed	KUNA	Amino acid	Speed	KUNA
1	5,0	3	5,0	5	6	5,0	8	9
Valin	5,0	1,0	4,70	0,94	0,83	4,91	0,98	0,86
Isoleucine	4,0	1,0	4,18	1,05	0,75	4,33	1,08	0,78
Leucine	7,0	1,0	5,48	0,78	1,00	5,85	0,84	1,01
Lysine	5,5	1,0	4,52	0,82	0,95	4,71	0,86	0,98
Threonine	4,0	1,0	3,81	0,95	0,82	3,82	0,96	0,88
Methionine + Cystine	3,5	1,0	2,87	0,82	0,95	2,92	0,83	1,01
Phenylalanine + Tyrosine	6,0	1,0	7,99	1,33	0,59	7,98	1,33	0,63
Tryptophan	1,0	1,0	1,00	1,00	0,78	1,02	1,02	0,82
Total amount of amino acids	36,0	-	34,55	-	-	35,54	-	-
Indicators of balance of amino acid composition								
C min	1,0		0,78			0,84		
KSAS	1,0		0,81			0,85		
KRAS	0		0,19			0,15		
PSI	→min		8,29			6,31		
INAK	→1,0		0,94			0,97		
KOAS	0		0,31			0,10		

The results of the comparative assessment ($KSAC = 0,70-0,85 \rightarrow 1$; $KRAC = 0,23-0,15 \rightarrow 0$) indicate the balance of essential amino acids of the protein in the developed product relative to the protein standard, high efficiency of metabolism and utilization of the protein by the human body .

Thus, the results of the comparison of the amino acid composition of the developed food concentrates of the first dining dishes with the optimal composition of the reference protein, according to the FAO / WHO scale, give reason to consider them as biologically valuable products.

As a result of the research conducted, formulations of food concentrates for lunch dishes of two kinds of high biological value were developed, their chemical composition was investigated. The use of the obtained results in the production will allow to obtain high-protein products using vegetable raw materials that can be considered healthy food.

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使用神经网络识别任意位置的细节和产品

**RECOGNITION OF DETAILS AND PRODUCTS
AT AN ARBITRARY LOCATION USING A NEURAL NETWORK**

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注解。 本文介绍了识别系统视野中物体识别算法研究的实验结果。 在目前的工作中, 实现了神经网络识别算法。 描述了形成训练样本的过程, 以及基于凸壳的对象特征的计算。 给出了物体识别的实验研究结果。

关键词: 识别; 凸壳; 神经网络; 扁平部件

Annotation. *The article presents the results of experiments on the study of the identification algorithm of objects in the field of view of the recognition system. In present work, the neural network recognition algorithm is implemented. The procedure for the formation of the training sample, as well as the calculation of the features of objects on the basis of convex hulls, is described. The results of experimental studies on the identification of objects are given.*

Keywords: *recognition; convex hull; neural network; flat parts*

In order to automate and increase the productivity of assembly procedures, it is necessary that the assembly complex be able to determine the type of the arriving element, as well as its location in order to be captured by the manipulator, regardless of its orientation and position. It is possible to find a solution to this problem using a recognition system, the result of which will be the determination of the type of element and the location of its center. It is possible to establish the appearance of the element when it is randomly positioned and oriented in the input of the FCZ, if the recognition method applies signs invariant to displacement, rotation and some change in the image scale of the object. [1,2]

A significant proportion of the product range used in assembly procedures is flat elements. Under the flat in this task refers to the subject, which has only two stable positions that have the same image.

The tasks of recognizing individual flat objects by classical methods based on identification algorithms by the nearest neighbor method [3], discriminant analysis methods [4], and also k-means [5] has been solved. This paper shows the development of a recognition algorithm based on neural networks.

Algorithm for the formation of the training sample

For the test sample, 10 flat objects were taken, shown in Figure 1. The size of an image with an object is of 1024x1024 pixels. In the first step, each of the images was translated into a halftone format.

Then, for each image of each object, 360 rotated images were formed in 1 degree increments. Accordingly, 360 images were obtained for each object. Then, from a set of 360 rotated images, one was randomly selected and the object was shifted by a certain amount. The operation was repeated until a set of 2000 implementations was obtained for each object. Thus, for a test sample, 20,000 images were formed with objects of different displacements and different angles of rotation. Each of the 2,000 images was binarized (Fig. 2).

Then for each of the obtained images it is necessary to calculate the convex hull (Fig. 3). After that, a series of primary and secondary signs are successively established.

The convex hull was calculated by the QuickHull algorithm. Then, based on it, a vector of primary features was formed. The list of primary features is given below:

Leq – the length of the major axis of the ellipse, which has the same moments of inertia as the object.

Weq – the length of the minor axis of an ellipse having the same moments of inertia as the object.

Rmin – the minimum distance from the center of mass to the segments that approximate the boundary of the object.

Rmax - the maximum distance from the center of mass to the segments that approximate the boundary of the object.

Deq – diameter of a circle with area S.

Req – radius of a circle with area S.

$$R_{eq} = \sqrt{\frac{S}{\pi}}$$

Lr – characterizes the size of the larger side of the rectangle, in which one side is much larger than the other.

$$L_r = \frac{P + \sqrt{P^2 - 16S}}{4}.$$

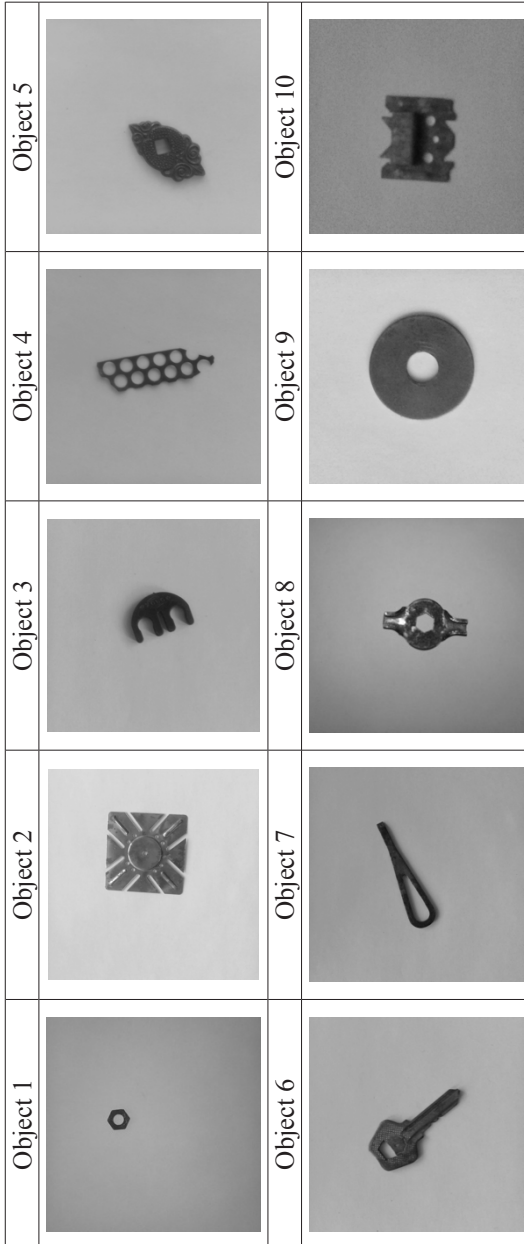


Fig.1 - Set of objects











Object 1		Object 2		Object 3		Object 4		Object 5	
Object 6		Object 7		Object 8		Object 9		Object 10	

Fig.2 - Binary images of objects

W_r - characterizes the size of the smaller side of the rectangle, in which one side is much larger than the other.

K_{r1} – the ratio of the perimeter of the object to the perimeter of the circle with the same area.

$$K_{r1} = \frac{P}{2\sqrt{\pi S}}.$$

K_e – the ratio of the area of an object to the area of an ellipse having the same moments of inertia as the object.

$$K_e = \frac{4S}{\pi L_{eq} W_{eq}}.$$

M_x – the length of the horizontal chord of the object, dividing the object into 2 parts of equal area.

M_y - the length of the vertical chord of the object, dividing the object into 2 parts of equal area.

FeretMax – Feret diameter maximum.

FeretX – Feret diameter on X axis.

FeretY – Feret diameter on Y axis.

Based on the obtained set of primary features, a vector of dimensionless features is formed that will be used for clustering. As a result, a set of training samples represents 20,000 vectors of dimensionless features.

Training a neural network based on a prepared samples

Matlab Neural Network Toolbox language tool was used to simulate and train the neural network. Neural Network Toolbox provides functions and applications for modeling complex non-linear systems that are difficult to describe by equations.

For testing, a two-layer unidirectional network with a sigmoidal neuron activation function of the hidden neuronal layer and a linear activation function of the neurons of the output layer was chosen. Such a network allows arbitrarily accurately solving multidimensional approximation problems, provided that the data are consistent and there are a sufficient number of neurons in the hidden layer. This type of neural network is suitable for the classification of objects in the case when the input data is represented as a vector of numbers. The network will be trained in the back propagation method using the Levenberg-Marquardt algorithm.

After training, the network was tested in two stages. Initially, it was tested on its own training sample (2000 implementations of each of the ten objects). The results are presented in Figure 3.

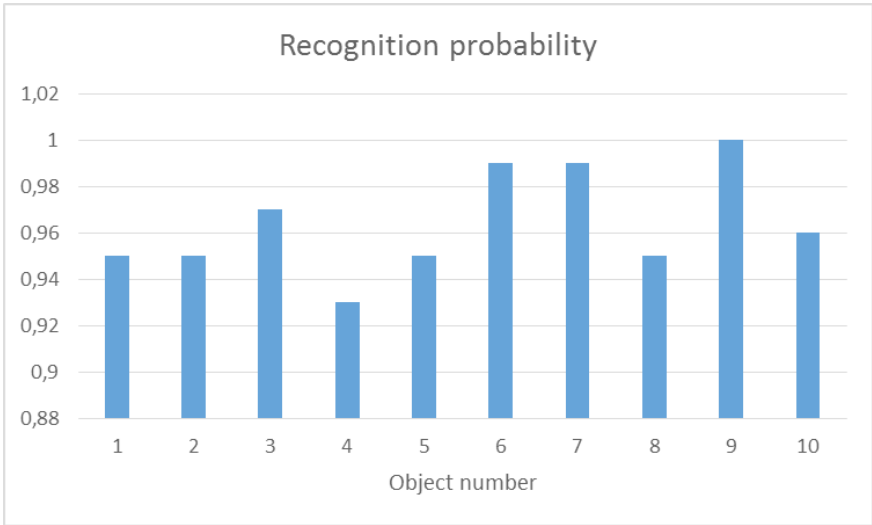


Fig. 3. Network test on a training set

As can be seen from the graph (Fig. 3), only one of the test objects is classified correctly within 2000 of its implementations from the test sample (object No. 9). Two more objects (# 6 and # 7) have less than five errors in the test on the test sample. Object No. 4 is the worst classified. The probability of an error is 7% (143 errors from 2000 experiments). This is probably due to the fact that the fourth object in shape of the convex hull is similar to objects 6 and 7 and the classification often resulted in errors in favor of these objects.

At the second stage of testing, 10 snapshots of each object were taken (Fig. 4).

This was done in order to check how the neural network will behave by getting new vectors of features that did not participate in the training sample as input. The results of testing the network with these snapshots are presented in Figure 5.

The graph on the Y axis represents the probability of recognition (Fig. 5). Four out of ten objects have an extremely low probability of recognition (objects No. 3, 4, 5, and 9). The best recognition probability was shown by objects No. 2, 7 and 8 (85%). It can be assumed that one of the reasons for the low recognition results is the “similarity” of the input vectors in the training sample. The entire training sample was generated programmatically, based on only one initial sample for each object. In the future, you can check whether the recognition quality will increase, depending on increase of the number of initial images when generating a training sample (For example, instead of 1 image for each class from which 2000 realizations are generated, take 10 images for each class with two hundred realizations of each of them). With this approach, the training sample may be more informative, without increasing in volume. Similarly, the results could be affected by the similarity of the convex hulls of some objects.

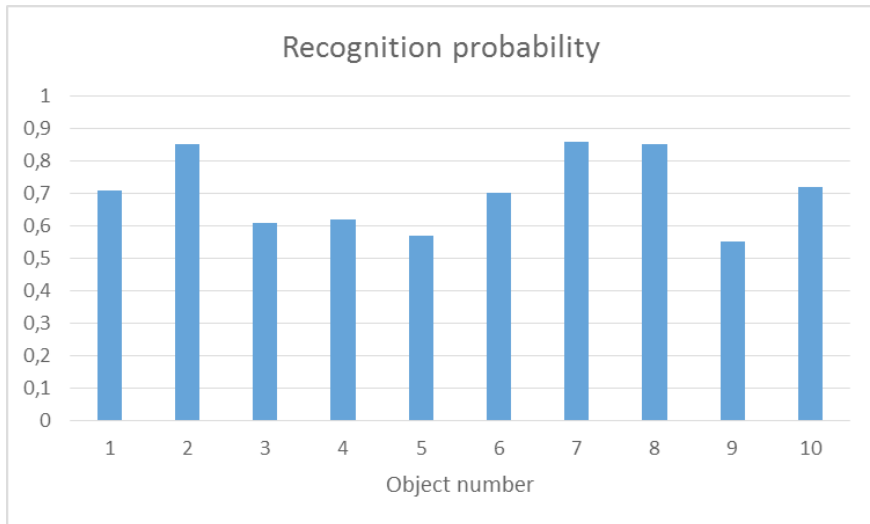


Fig. 5. Testing the network on new images

At the moment, from the obtained results it can be concluded that the neural network is not optimal for solving the problem of recognizing flat objects, since other algorithms (nearest neighbor algorithm, FOREL-2) showed higher classification results.

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作为产品质量管理体系反馈的飞机飞行性能认证
**CERTIFICATION OF THE AIRCRAFT FLIGHT PERFORMANCE
AS A FEEDBACK
IN THE PRODUCT QUALITY MANAGEMENT SYSTEM**

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抽象。现代飞机的质量保证技术是通过迭代过程形成的,通过在投影,构造和制造过程中评估其性质来连续转换信息。使用在产品生命周期的所有阶段可被视为质量管理体系中的“反馈”的测试来执行对所达到的质量水平的评估。验证检查是认证的主要内容。质量管理功能的分解基于物理上存在于评估飞机性质的任务中的“从属”原则。

关键词: 认证, 飞行试验, 台架试验, 验证, 飞行性能。

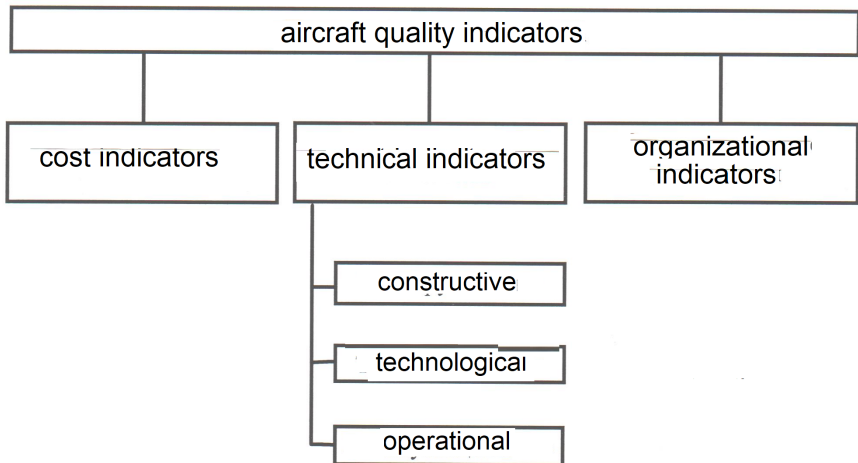
Abstract. *The technology of quality ensuring of a modern aircraft is formed as a result of an iterative process, the successive transformation of information by the evaluation of its properties in the process of projecting, constructing and manufacturing. Assessment of the achieved quality level is carried out using tests that at all stages of the product life cycle can be considered as a kind of "feedback" in the quality management system. Verification check is the main content of certification. The decomposition of the quality management function is based on the principle of "subordination" that physically exists in the tasks of evaluating the properties of an aircraft.*

Keywords: *certification, flight tests, bench tests, verification, flight performance.*

Up to date information technologies of data processing at various stages of aircraft quality formation are based on the concept of a systematic approach to the problem, the need for which is due to numerous factors, the multiplicity of tasks arising at all stages of the product life cycle from the moment an idea emerges to its description.

The total flow of measurements in the study of aircraft dynamics contains from 500 to 2000 parameters [1]. Their estimates, direct or indirect, are integral components of the product quality vector, sequentially formed as a combination of the properties of the aircraft. The classification and structure of quality indicators is shown in Fig. one. The proposed classification of quality indicators complements the set of product characteristics (quantitative and qualitative) regulated by the relevant regulatory documents by introducing the subsystem “Organizational Indicators” (Fig. 1), evaluating the quality of ergonomics.

The indicators of this subsystem characterize the level of reliability and safety achieved, more precisely that part of it, which is determined by the failures of aircraft associated with maintenance and operation, as well as the consumer quality of the aircraft. The traditional set of aircrafts cost indicators is expanded.



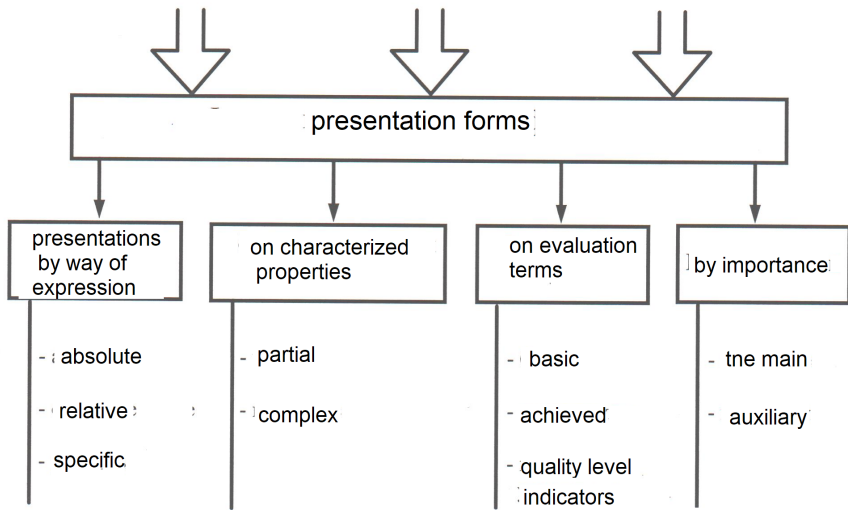


Fig. 1. - Classification structure of quality indicators

The structure of the indicators includes an assessment of the quality of the outer surface of the aircraft, affecting both the economic indicators of the cost of manufacturing the structure and the indicators of the fuel efficiency of the vehicle.

Recall that the deviation of the surface from the aerodynamically smooth contributes to an increase in the profile resistance due to the growth of its harmful component. For example, on the park of vehicles TU - 154M in 500 vehicles, with an annual flight of 2500 hours, each loses more than 300 thousand tons of fuel.

The required level of aircraft quality is formed in the process of projecting and designing an aircraft; largely depends on the manufacturing process and is maintained at a given level during the entire period of operation.

Assessment of the achieved quality level is carried out using tests, which at all stages of the product life cycle can be considered as a kind of feedback in the quality management system (Fig. 2). It is organized in order to assess the conformity of the product with the requirements for it, identify the causes of possible nonconformity and develop measures to eliminate this discrepancy. The control check of the aircraft characteristics compliance with the applicable standards and technical design is the main content of certification.

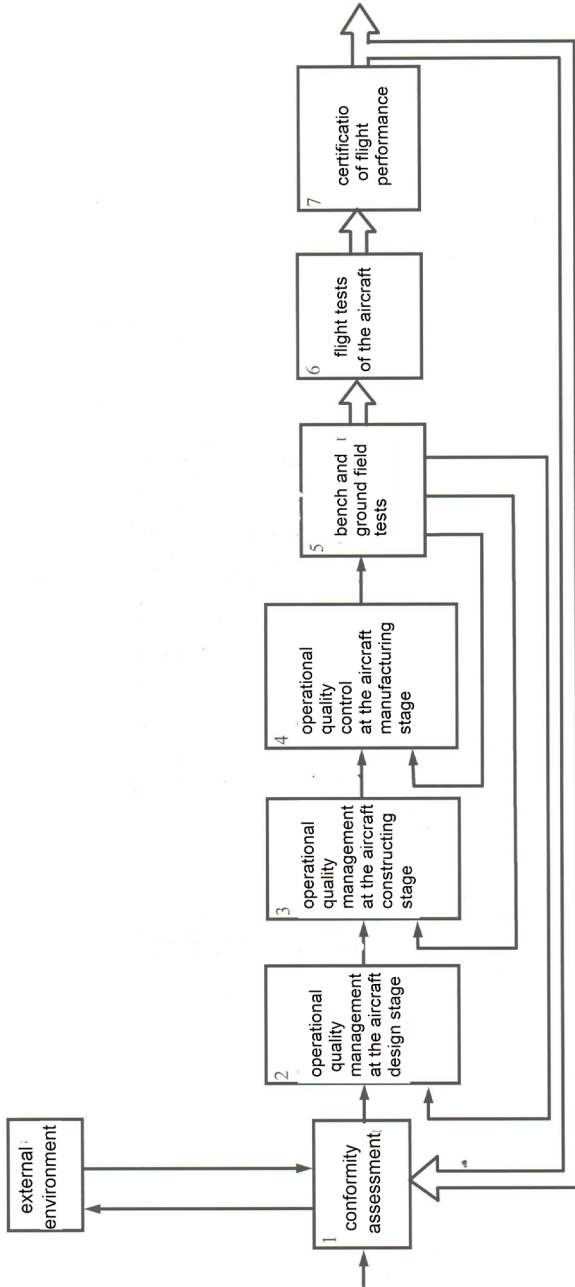
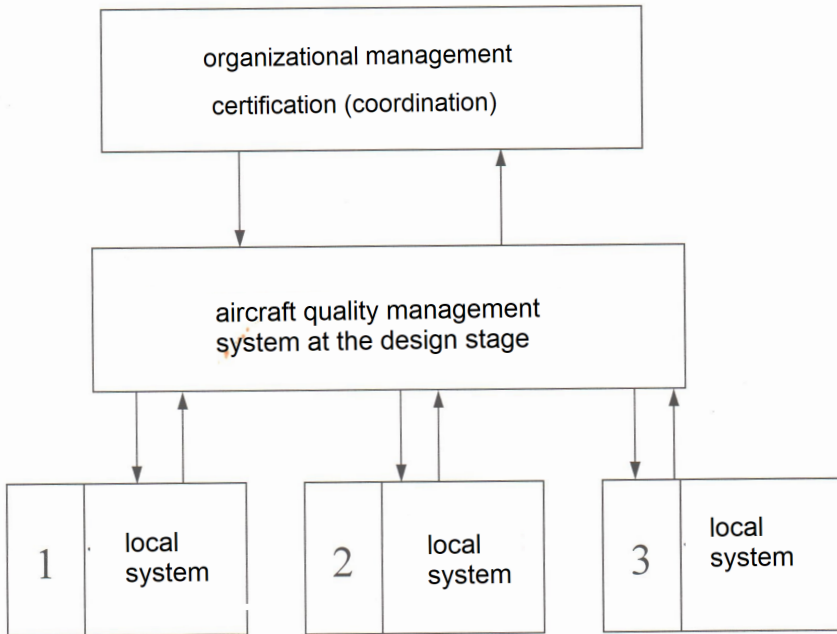


Fig.2. - Block diagram of the aircraft quality management system



- 1 – technological quality management at the project stage
- 2 - technological quality management at the construction stage
- 3 - technological quality management at the production stage

Fig.3. - Hierarchical feedback structure in the aircraft quality management system

The quality management system (Fig. 2) consists of interconnected local systems for controlling the components of the quality vector at the stages of projecting, designing and manufacturing a product (blocks 2, 3, 4); bench tests perform the role of local feedbacks.

The implementation of the “end-to-end” certification principle includes (in addition to flight tests) considerable amounts of modeling ground-based laboratory and bench tests for the effects of a wide range of conditions and factors of their life cycle, which contributes to a significant time reduction needed to refine the created objects. In this case, even at the early stages of the complex equipment objects creation, disadvantages can be revealed, including non-compliance with the requirements of «airworthiness standards», « tactical technical requirements» and other regulatory documents, which are easier to eliminate before or during the

creation of an experimental product than during its full-scale flight tests. It is appropriate to recall the statement of Academician A.N. Tupolev: "The further from the designer's board, the unreliability is revealed, the more expensive it is.

It is also well-known rule: "tenfold increase in costs", in accordance with which the cost of the detected failure (defect) of the product with its transition to the next stage of the life cycle increases 10 times

Management in each local contour combines a set of functions for analyzing, forecasting, and planning an event for adjusting previously made decisions to allow for acceptable additional costs.

Collecting, systematizing and processing information on aircraft quality, assessing the level of technical excellence achieved before commissioning are performed in block 1. A comprehensive plan of measures is being developed to improve the quality of the future product, taking into account the global experience in operating aircraft equipment of leading companies in the field of aircraft and rocket production.

Ground tests (block 5) form the actual vector of the quality indicator, which is confirmed as part of certification (block 7). Thus, flight performance certification is the main feedback in the product quality management system. Attention should be paid to the hierarchical structure of control measures in the proposed system (Fig. 3).

The decomposition of the control function is based on the principle of "subordination" that physically exists in the problems of estimating of the aircraft property. The quality management task at the flight performance certification stage can be formulated as follows: the methodological basis of the tests should manage the local systems 1, 2, 3 (Fig. 1) so that they function consistently and are subordinated to the overall objective function.

A reasonably organized algorithm for the functioning of the coordinator (block 7, Fig. 2) allows streamlining the cost indicators of the test technology and increasing their efficiency.

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