



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

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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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数字技术确保业务连续性和经济发展
**DIGITAL TECHNOLOGIES TO ENSURE BUSINESS CONTINUITY
AND ECONOMIC DEVELOPMENT**

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摘要。在全球化和数字化转型的背景下，信息通信技术正在成为经济增长、社会发展和提高生活质量的关键因素。投资发展信息通信技术基础设施是确保21世纪社会可持续和包容性发展的先决条件。本文考察了吉尔吉斯共和国的信息通信技术、数字化、人工智能的实施水平及其发展的基础设施基础。分析了吉尔吉斯共和国个人电脑数量、互联网接入点、报告年度购买的个人电脑数量和局域网的动态。

关键词：信息通信技术、数字化、数字基础设施、人工智能、个人电脑、互联网接入点、网站、局域网。

Abstract. *In the context of globalization and digital transformation, information communication technologies are becoming a key factor in economic growth, social development and improving the quality of life. Investment in the development of information communication technologies infrastructure is a prerequisite for ensuring sustainable and inclusive development of society in*

the 21st century. The article examines the level of information communication technologies, digitalization, implementation of artificial intelligence and the infrastructure base for their development in the Kyrgyz Republic. An analysis was made of the dynamics of the number of PCs, Internet access points, the number of PCs personal computers purchased in the reporting year and local area networks in the Kyrgyz Republic.

Keywords: *information communication technologies, digitalization, digital infrastructure, Artificial intelligence, personal computers, Internet access points, Web site, local area networks.*

Introduction

In recent years, digitalization has become one of the key factors determining the success and sustainability of business and economic development in each country. Technological innovations such as artificial intelligence, big data, cloud computing and the Internet of Things are radically changing the way we do business, opening up new opportunities to optimize processes, improve service quality and create added value. In the context of global competition, companies are forced to adapt to rapidly changing technologies in order to maintain their competitiveness and improve operational performance. Digitalization provides businesses with tools to automate routine tasks, improve analytics and forecasting, increase flexibility and speed of response to changes in market conditions [1,2,3].

In addition, the COVID-19 pandemic has shown how important digital technologies are for ensuring the continuity of business processes in the context of restrictions and remote work. Companies that have already implemented digital solutions were able to quickly adapt to new conditions and continue their activities with minimal losses [4,5,6]. Thus, studying the impact of digitalization on business is relevant and necessary for understanding how modern technologies can help improve the efficiency and competitiveness of organizations in various sectors of the economy.

Results

The rapid advancement of information and communication technologies (ICT) has significantly influenced the development of various sectors worldwide. In the Kyrgyz Republic, the dynamics of the number of personal computers (PCs) and internet access points over the past decade reflect the country's commitment to embracing digital transformation. The study analyzed the change in the number of PCs and Internet access points in Kyrgyzstan from 2012 to 2022 and examined the growth rates over this period.

The growth in internet access points was not linear. There was a notable decline in 2014, followed by a recovery and consistent growth until 2021. In 2012, their number was 16,756 units, in 2013 it increased to 16,855 units. However, in 2014, there was a significant decrease to 13,752 units. In 2015, there was an

increase to 15,375 units, which continued in the following years: 18,383 units in 2016, 22,160 units in 2017, 24,263 units in 2018, and 27,883 units in 2019. In 2020, the number of access points was 29,400 units, and in 2021 it reached a maximum of 31,528 units. In 2022, there was a slight decrease to 30,057 units. Despite these fluctuations, the overall growth rate for the decade was 179.4%.

At the same time, the number of personal computers in the Kyrgyz Republic showed a steady growth from 2012 to 2022. In 2012, their number was 136,894 units, in 2013 it increased to 153,679 units. In 2014, the number of computers reached 166,801 units, and in 2015 it increased to 175,320 units. In 2016, 178,167 units were registered, in 2017 - 190,300 units, and in 2018 - 203,315 units. In 2019, the number of computers increased to 221,548 units, and in 2020 it was 222,589 units. In 2021, the number of personal computers reached 247,090 units, and in 2022 - 255,315 units [8] (Figure 1).

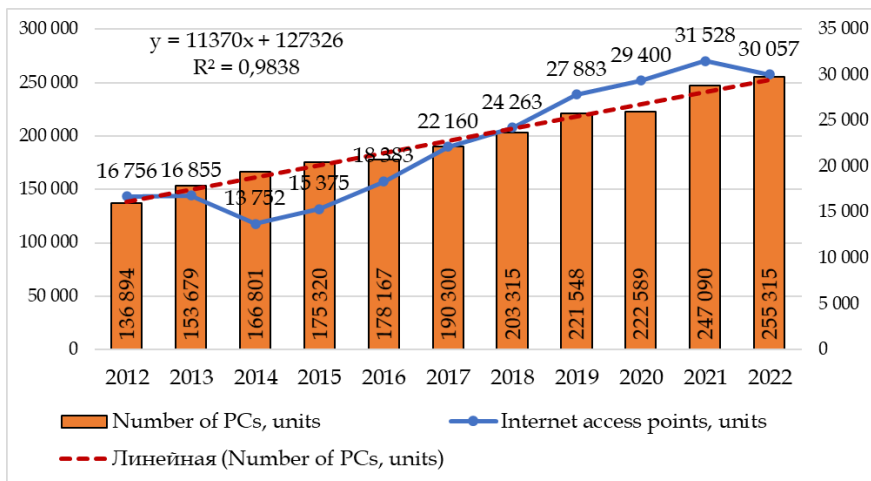


Figure 1. Dynamics of the number of PCs and Internet access points in the Kyrgyz Republic for 2012-2022, units

Source: compiled according to data from the National Statistics Committee of the Kyrgyz Republic [8]

The trend line of the dynamics of the number of PCs is expressed by the equation $y = 11370x + 127326$, while the approximation reliability value is $R^2 = 0.9838$.

The growth rates for both internet access points and PCs indicate a significant expansion in ICT infrastructure in the Kyrgyz Republic over the ten-year period. The overall growth rate for internet access points was 179.4%, while the growth rate for PCs was slightly higher at 186.5%. These figures highlight the increasing ac-

cessibility and adoption of digital technologies in the country, contributing to the digital economy and enabling better connectivity for businesses and individuals.

Local area networks (LANs) provide reliable and efficient communication between computers and other devices within a limited geographic area, such as an office, building, or campus. LANs allow employees to easily share information and resources such as files, applications, and devices such as printers, greatly improving internal communication and collaboration, which in turn increases productivity and efficiency. Network administrators can easily control access to important data and applications, ensuring a high level of data security and protection. It also simplifies the process of backing up and restoring data in the event of a system failure. The number of local area networks (LANs) in the Kyrgyz Republic has fluctuated over a ten-year period. In 2012, their number was 5,734 units. In 2013, it increased significantly to 7,805 units. In 2014, the number of LANs reached 8,883 units, which was the peak during this period. In 2015, there was a decrease to 7,553 units, but in 2016, the number of LANs increased again to 7,682 units. In 2017, their number increased to 7,927 units, and in 2018, it reached 8,290 units. In 2019, the number of LANs continued to grow and amounted to 9,079 units. In 2020, there was a decrease to 8,627 units, which continued in 2021 to 8,509 units. However, in 2022, the number of LANs increased slightly to 8,554 units [8] (Figure 2).

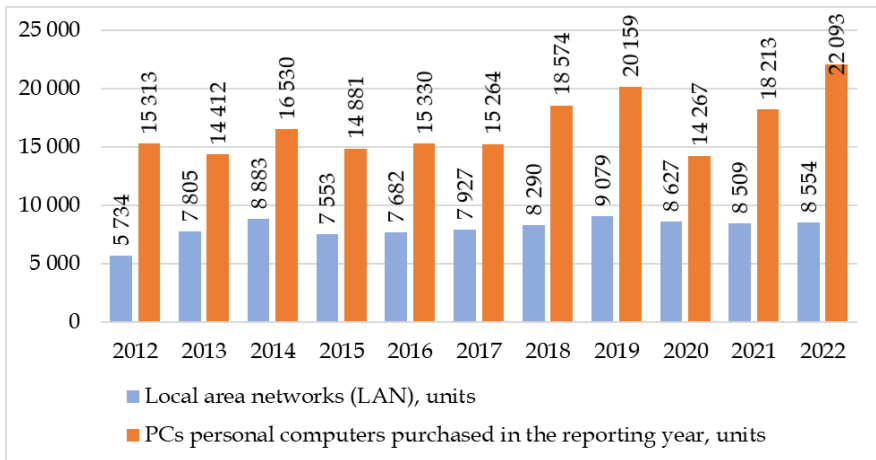


Figure 2. Dynamics of the number of PCs personal computers purchased in the reporting year and local area networks (LAN), in the Kyrgyz Republic for 2012-2022, units

Source: compiled according to data from the National Statistics Committee of the Kyrgyz Republic [8]

The number of personal computers (PCs) purchased annually also showed variability during this period. In 2012, 15,313 units were purchased. In 2013, the number of PCs purchased decreased to 14,412 units. In 2014, there was a significant increase to 16,530 units. In 2015, the number of PCs purchased decreased again to 14,881 units, but increased to 15,330 units in 2016. In 2017, the number of PCs purchased was 15,264 units. In 2018, it increased to 18,574 units, and in 2019, it reached 20,159 units, which was the peak for this period. In 2020, the number of PC purchases dropped to 14,267 units, likely due to the COVID-19 pandemic. In 2021, there was a significant increase to 18,213 units, and in 2022, the number of PC purchases reached 22,093 units, a new peak in a decade.

The growth rates for both LANs and PCs purchased highlight the development trends in ICT infrastructure in the Kyrgyz Republic. The number of LANs grew by 149.2% over the ten-year period, while the number of PCs purchased increased by 144.3%. These figures underscore the steady investment in and expansion of digital infrastructure in the country.

Conclusion

The data from 2012 to 2022 demonstrates a substantial increase in both internet access points and the number of PCs in the Kyrgyz Republic. Despite some fluctuations in the number of internet access points, the overall trend shows a positive growth trajectory, underscoring the country's efforts towards digital transformation. The steady rise in the number of PCs reflects the growing importance of digital tools in everyday life and business operations. Moving forward, continued investment in ICT infrastructure will be crucial for sustaining this growth and further enhancing digital connectivity in the Kyrgyz Republic.

The data from 2012 to 2022 indicates a significant expansion in both the number of LANs and PCs purchased annually in the Kyrgyz Republic. While there were fluctuations in both categories, the overall trend was positive, reflecting a growing emphasis on digitalization and ICT infrastructure. Continued investment in these areas is essential for furthering the country's digital transformation and ensuring that businesses and individuals have access to the necessary technological resources.

In the contemporary world, digital technologies have become pivotal in ensuring business continuity and fostering economic development. The rapid advancement and integration of information and communication technologies have transformed how businesses operate, enabling them to remain resilient and competitive in a rapidly changing environment.

Digital tools such as cloud computing, artificial intelligence, big data analytics, and the Internet of Things (IoT) provide businesses with the ability to automate processes, enhance decision-making, and improve customer experiences. These technologies facilitate seamless remote work, ensuring that businesses can con-

tinue operations despite disruptions such as the COVID-19 pandemic. The ability to maintain operations and adapt quickly to changing circumstances is crucial for business continuity and stability.

Moreover, digital technologies play a significant role in economic development by creating new opportunities for innovation and growth. They enable businesses to expand their reach, access new markets, and offer innovative products and services. By leveraging digital platforms, businesses can increase efficiency, reduce costs, and improve productivity, which are essential drivers of economic growth.

Investments in digital infrastructure are vital for supporting these technologies. High-speed internet, robust cybersecurity measures, and digital literacy are foundational elements that enable businesses to harness the full potential of digital tools. Governments and private sectors must collaborate to build and maintain this infrastructure, ensuring that businesses of all sizes can benefit from digital transformation [7,9,10].

In conclusion, digital technologies are indispensable for ensuring business continuity and promoting economic development. They provide businesses with the agility and tools needed to navigate uncertainties and capitalize on new opportunities. By embracing and investing in digital technologies, businesses and economies can achieve sustainable growth and resilience in an increasingly digital world.

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中华人民共和国与国际信息安全领域的解决方案：脱钩是建立新世界秩序的推动力

**THE PEOPLE'S REPUBLIC OF CHINA AND SOLUTIONS IN
THE FIELD OF INTERNATIONAL INFORMATION SECURITY:
DECOUPLING AS A DRIVER OF BUILDING A NEW WORLD
ORDER**

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注释。作者从结合公私合作选项和天朝创新纳米集群的角度，考虑了中华人民共和国在信息安全和地缘环境控制领域创造优先项目的历史步骤，在正在进行的脱钩中击败了美国。

关键词：中国、俄罗斯、美国、地缘环境、数字化、北约、AUCUS、ICT、工业 4.0、脱钩、纳米集群、独角兽、瞪羚、技术主权、网络安全、网络武器、数字游牧民。

Annotation. *The authors consider the historical steps of the PRC in creating priorities in the field of information security and control of the geoenvironment from the standpoint of combining options for public-private partnerships and innovative nanoclusters of the Celestial Empire, beating the United States in the ongoing decoupling.*

Keywords: *China, Russia, USA, geoenvironment, digitalization, NATO, AUCUS, ICT, Industry 4.0., decoupling, nanoclusters, unicorns, gazelles, technological sovereignty, cybersecurity, cyberweapons, digital nomads.*

The ongoing American-Chinese decoupling has shown all the imperfections and intricacies of global supply chains, their vulnerability and dependence on geopolitics and the fixation on investments and critical technologies that build a global digital infrastructure, which determines the very sovereign security of the state and the guaranteed share of its actors in dominating the world markets. ICT products.

Unlike the Big Five American businesses, which determine the mainstream of all geophysical transformations in Silicon Valley and other business oases, interaction between the state and business in China plays a key role in the implementation of government policy in the field of digitalization, development of innovation and ensuring information security. Each segment of the ICT industry has its own public-private partnership alliance, the leader of which is a leading commercial manufacturing company in this area, a research center or an innovation industry within a specialized nanocluster. Their main function is self-regulation at the level of industry standards and rules of conduct among participants in the ICT market and actors in global high-tech markets. For example, the Chinese Internet Users Society, created in 2001, has developed a large and detailed set of rules of action for network users, regulating their capabilities, explaining the ethics of use and “red lines” [1].

To help improve the level of security of the national information infrastructure, and to promote high-quality Chinese products while ensuring information security, 200 Chinese companies decided in 2015 to join the Cybersecurity Industry Alliance (CCIA). It cooperates with government agencies in the development and implementation of relevant laws and regulations, contributes to the rapid growth of the national information security market, and participates in international cooperation with various countries and international organizations in the geophysical environment. In December 2022, CCIA issued a Guide to Social Responsibility in Ensuring Data Security and Protecting Personal Information, which specifies and complements the provisions of relevant laws for the ICT industry, and also increases the market attractiveness of digital products and virtual and real services. At the same time, the Alliance protects the geopolitical and geo-economic interests of the country. Thus, in April 2023, CCIA published an analysis of the use of malicious software and a list of computer attacks on Chinese information resources and networks carried out by US intelligence agencies and NATO special structures (including AUCUS). The report links these actions to the most significant threats to the global community - attacks on key nodes and routers of digital infrastructure, impact on supply chains, development of “cyber weapons”, systems of cascading downloadable disinformation and deep fakes [2].

The National Center for Countering Cyber Threats (CNCERT/CC) initiated the creation of the China Network Virus Alliance (ANVA), the China Cyber Threat Management Alliance (CCTGA) and the “CNCERT/CC Partnership for International Cooperation” with 274 teams in 81 countries and territories, and also memorandums of cooperation in the field of cybersecurity with 33 of them [3].

Currently, the country’s position on all key issues by Russian cybersecurity professionals is clearly verified and aimed at achieving the digital future of the country’s sovereignty. China consistently defends the thesis of maintaining

a peaceful, safe and open cyberspace, the activities of states in which should be carried out for the benefit of development and consistent prosperity on the basis of international law and agreed rules of conduct for all global actors in the geo-environment. Every year, Beijing's influence in this area is growing thanks to the development and strengthening of state policy in the field of digitalization and innovation, the use of government support mechanisms, and the involvement of science and business in common tasks carried out within the state or with the involvement of "digital nomads" of a hacker level of development.

The issue of forming a system of sovereign digital state is one of the priorities of China's foreign policy, therefore coordination of national activities in this area is carried out at the highest level - it is supervised by the Deputy Prime Minister of the State Council of the People's Republic of China, general management is carried out by the Steering Group for Coordination in the Field of Cybersecurity and ICT -development, the main participant in international negotiations is the Department of Arms Control and Disarmament of the Ministry of Foreign Affairs of the People's Republic of China [4].

Since the first convening of the Group of Governmental Experts on Advances in the Field of Information and Telecommunications in the Context of International Security (GE on International Information Security) in 2004, the representative of China, as a permanent member of the UN Security Council, took part in its work, had the right of veto and attracted a wide range of circle of experts to update the annual agenda in the field of ICT development. Beijing annually co-sponsored Russian resolutions on including the issue of informatization achievements in the context of information security of sovereign states on the agenda of the UN General Assembly, actively contributed to the development of rules for responsible behavior of states in the ICT environment, based on the principles of equal sovereignty of all countries, peaceful resolution of disputes, non-use of force and non-interference in the internal affairs of other states, despite opposition from corporatocrats and global TNCs.

China is now developing this agenda within the framework of the UN Open Working Group on Security in the Use of ICTs and ICTs Themselves 2021-2025 (OWG). Thus, in 2021, the Ministry of Foreign Affairs of the People's Republic of China made a substantive contribution to the OEWG, presenting China's Position on International Rules in Cyberspace, which formulated a call to develop generally accepted norms, rules and principles for regulating cyberspace at the UN in order to jointly confront risks and challenges, defend peace, security and prosperity. Rules in cyberspace can be developed through the creation of a comprehensive and sustainable deliberative process with broad participation of all states, with an additive summation of the views of each of the representatives of the digital community. China is only giving its view of the general principles and believes that it

is necessary to discuss how international law applies to the use of ICT resources by states, taking into account the unique properties of the ICT environment, and further develop a common understanding on this issue, especially in the post-Covid recessionary recovery and in the growing geopolitical instability in the Middle East and the situation around the island. Taiwan [5;15].

In 2011, the PRC, together with Russia, Tajikistan and Uzbekistan, officially submitted to the UN General Assembly the “Rules of Conduct of States in the Field of Ensuring IIS (International Information Security)” developed by the SCO.

China not only supported the creation of an Ad Hoc Open-ended Intergovernmental Committee of Experts in the UN Third Committee to develop a comprehensive international convention on combating the use of information and communication technologies for criminal purposes, but also called on the world community to quickly develop a binding and universal convention in this area and expose shadow structures and criminalization in bureaucratic circles of INGOs, eroding the agenda of unity of all countries in the face of growing AI threats [6].

At the same time, until recently, Beijing refrained from making independent steps in the international arena, trying not to enter into direct confrontation with the hegemonic US cyber strategy in the field of counteraction in decoupling and in sanctions wars for components and software. Even the initiative to create a global transport and information infrastructure “One Belt, One Road,” which de facto aims to spread China’s technological and innovative influence to Asia and Africa, was promoted as a purely economic project that contributes to the development of the UN SDGs. Only after a sharp tightening of US tactics towards China due to Washington’s awareness of the threat to national security due to China’s superiority in AI (artificial intelligence) technologies, Beijing’s foreign policy steps became offensive and attacked Anglo-Saxon vulnerabilities in global trade and technology transfer. [7]

In 2017, the Ministry of Foreign Affairs of the People’s Republic of China published the first Strategy for International Cooperation in Cyberspace, which presents Beijing’s views on national and international problems in this area, setting out the basic principles, strategic goals and key actions of China in working with other countries. In the area of formation of the international information security system, these include:

- protecting national interests, digital sovereignty and security;
- formation of a system of international rules in cyberspace;
- promoting fairness in Internet governance;
- protection of the legal rights and interests of citizens;
- promoting global cooperation in the digital economy;
- creating a platform for sharing culture online.

The strategy also sets out a plan of action to achieve these goals. First of all, this is maintaining peace and stability in cyberspace, resolving controversial issues in the global Internet space exclusively peacefully, ensuring order based on generally accepted rules; reforming the global Internet governance system into a multilateral, democratic and transparent platform for mutually beneficial cooperation of all states. It is equally important to develop international cooperation and expanded partnerships in the fight against cyber terrorism and computer crimes, to protect the rights and interests of citizens, including their privacy, and to prevent the loss of personal data in the networks of corporations and government agencies. Other goals are to strengthen and benefit from the digital economy; development and protection of global information infrastructure; expanding cultural exchange in cyberspace. [8]

To achieve these goals, back in 2014, China created its own platform for discussing the formation of an international information system: the World Internet Governance Conference (held in Wuzhen, Zhejiang Province, sometimes referred to as the “Zhejiang Forum”). Since 2020, it has been promoting the Chinese initiative “Jointly building a community of shared destiny in cyberspace,” which in November 2022 acquired the status of a national strategy. The main principles of creating such a community are: respect for the established and proven cyber sovereignty of all states, maintaining peace and security between countries, promoting openness and cooperation among all actors, maintaining proper order despite growing competition and competitiveness, creating a fair and transparent management system for all regulators Internet, ensuring the stability and security of its key resources through a unified protection system [9].

The international transfer of China’s regulatory practices regarding information security regulation was also launched, which indicates that it seeks to transfer its developments in this area to foreign markets and create a joint security loop with partners, identifying common capabilities, developing unique competencies and improving labor resources. In September 2020, the Global Data Security Initiative was proposed, aimed at respecting the sovereignty of all states, promoting the development of the digital economy, countering the monopoly of global ICT companies, including by maintaining the integrity of supply chains for digital products and services, combating data theft, illegal cross-border access to information, use of “bookmarks” in products or back doors and windows - “backdoors”. China also called on states to resist mass surveillance in cyberspace and prevent data collected by ICT companies from doing business in other countries from being transferred to their territory as a commercial bonus from their transactions.

In response, the United States immediately launched the Clean Network initiative aimed at discrediting the security of Chinese ICT technologies, however, Beijing continued to promote its ideas among partners in the Belt and Road Initia-

tive. Thus, in March 2021, China led the cooperation of the League of Arab States to achieve data security, and in 2022 it has already formalized a similar initiative with five Central Asian states (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan). In addition, the Chinese side plans to propose its approach as the basis of global agreements in the form of a draft resolution of the First Committee of the UN General Assembly “Promoting global data security” with the aim of unifying existing technical protocols and solutions for all actors in the geoenvironment [10].

The development of integration platforms and a business club similar to BRICS in February 2023 made it possible for the Chinese government to declare: “We will expand the space for international cooperation in the Pyrrhic sphere, actively participate in platforms for encryption cooperation within multilateral structures such as the UN, WTO, G20, APEC, BRICS and SCO, and build a new platform for open cooperation in the digital sphere with high quality.”

Achieving leadership in advanced technologies by 2035 will not give China the desired effect if control of the global Internet remains in the hands of the United States, because no one has ever been able to win on foreign platforms according to unknown rules and with the possibility of systemic theft and leaks of transferred information flows. Changing this dependent position is a key goal of Beijing’s foreign policy. In support of this thesis, the State Information Bureau of the State Council of the People’s Republic of China published in March 2023 the concept of Chinese cyberspace management in a new era. The document demonstrates the legal approaches implemented by Beijing to ensure innovative development, the actions it has taken to create open international mechanisms for discussing the experience and practices of other states in order to develop mutually acceptable solutions to protect justice and legality in cyberspace [11].

In this context, China’s active support for interaction within the BRICS on the issue of global governance is an important, but intermediate link to achieving the main goal, the unity of common technological cyber foundations for all countries of the integration platform. In addition, complete unity in the BRICS on Internet governance is unlikely to be achieved: India and Brazil do not support the leading position of states in this process, having their own operating systems, hacking capabilities and software similar in level and quality to China.

The strengthening of China’s international position as a candidate for global leadership is served by the scientific and technical cooperation of the BRICS and the gradual involvement of all member states in common protocols and specific knowledge in the development of digital structures. China has a huge resource for the transfer of its advanced technologies, which is confirmed by its initiatives - the BRICS Partnership for the New Industrial Revolution (PartNIR) and the PartNIR Innovation Center in Fujian Province, the BRICS Network University and

its BRICS Institute for the Study of Future Networks “BRICS Future” in China. Shenzhen, organization of the BRICS Forum on the New Industrial Revolution and other projects. Their implementation creates conditions for the formation in the participating countries of common methodological approaches to the digitalization of the economy and for the recognition (gradual updating) of China’s technological standards as de facto international. However, here too there are pitfalls, for example, intense competition with India, which by 2030 could become the second or third economy in the world with its own leadership ambitions.[12]

The results of the analysis of the declarations of the BRICS summits show that the task of suppressing illegal activities in cyberspace, including the use of the Internet for terrorist purposes, is a matter of mutually beneficial interest. China is paying increased attention to this topic as it ranks lower in global cybersecurity rankings than Brazil, India and Russia. This is confirmed by the Fuzhou Initiative, developed in the framework of the preparations for the 9th BRICS summit in Xiamen, which recommends “...in the fight against terrorism, expanding the exchange of intelligence and experience, as well as building capacity. BRICS countries should also expand cooperation in the field of cybersecurity and promote the development of Internet technologies and cyberspace governance around the world.” At the moment, practical cooperation on issues of combating cybercrime is being developed by the PRC only with the Russian Federation (within the framework of the SCO and a bilateral agreement on international information security). Although Brazil is a party to the Budapest Convention on Cybercrime, there is potential for strengthening the BRICS, especially in terms of sharing information on threats and malicious activities, and China can play an important role in this. [13]

It is the synergy of solutions and the skillful borrowing of technologies and principles of organization of science and business from the Celestial Empire in our field that can help us become sovereign in the ICT sector and gain our leverage on the ongoing digital transformation and on the formation of centers for the development of fragmentation and glocalization, which have become the main trends alterglobalization. [14] Having time to set our priorities before decoupling pronounces judgment on all players in the field of international information security is our sacred duty to future generations of Russia and a challenge that we must adequately cope with and hedge all potential threats to our development from sanctions. [15]

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教师的多专业能力作为继续教育的基础
**MULTI-PROFESSIONAL COMPETENCIES OF TEACHERS AS A
BASIS FOR CONTINUING EDUCATION**

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摘要。今天，在我们这个瞬息万变的世界里，曾经在职业教育专业教育机构获得的知识和专业技能已经不足以引起熟人和周围人的兴趣，在专业圈子里受到欢迎，受到同事和朋友的尊重。有必要致力于不断的教育，不仅在专业领域，而且在个人发展方面，发展自己的多专业能力。在本文中，我们将揭示这一概念的特征，分析其他同义词，并讨论最相关的多专业能力。

关键词：专业和个人发展、通用专业技能、多专业能力、软技能、实践、性格的个人特征。

Abstract. Today, in our rapidly changing world, the knowledge and professional skills acquired once in specialized educational institutions of vocational education are no longer enough to be interesting for acquaintances and surroundings, to be in demand in professional circles and to be respected by colleagues and friends. It is necessary to devote themselves to constant education and not only in the professional sphere, but also to develop themselves as a person, to develop their multi-professional competencies. In our article, we will reveal the features of this notion, analyse other synonymic terms and discuss the most relevant multi-professional competencies.

Keywords: professional and personal development, universal professional skills, multi-professional competencies, soft skills, practice, personal features of character.

The modern world is characterized by the dynamics of changes in different spheres of a human activity, which confirms the need for continuous training and development of every specialist in order to be competitively capable and in demand in the professional field. The availability of high-quality education received earlier, without systematic updating of knowledge, skills and abilities, does not

guarantee stable professional success. Deviation from this principle can lead to a loss of relevance and relevance in professional activities and low results that do not meet the requirements imposed on specialists by the legislation of modern society.

The same principle applies to the field of education, in which the essence of a teacher's success lies in constant self-improvement and self-development not only in the field of professional competencies, but also in their personal development: the ability to establish productive communication with all subjects of the educational process, and to show their creative, extraordinary abilities in finding effective solutions in non-standard and extraordinary situations, the ability to quickly adapt to current circumstances, use a variety of resources for self-development, studying the best teaching experience of colleagues etc. These qualities, in our opinion, are universal or multi-professional, inherent to specialists in almost all professional fields.

Analyzing the priority of professional or multi-professional competencies, we conducted a survey among students of 3-4 courses (282 respondents took part in the survey) studying in the specialty "Education and Pedagogical Sciences" in Russian universities, who answered the open question of what qualities and features a contemporary teacher should have. The results are shown in diagram No. 1.

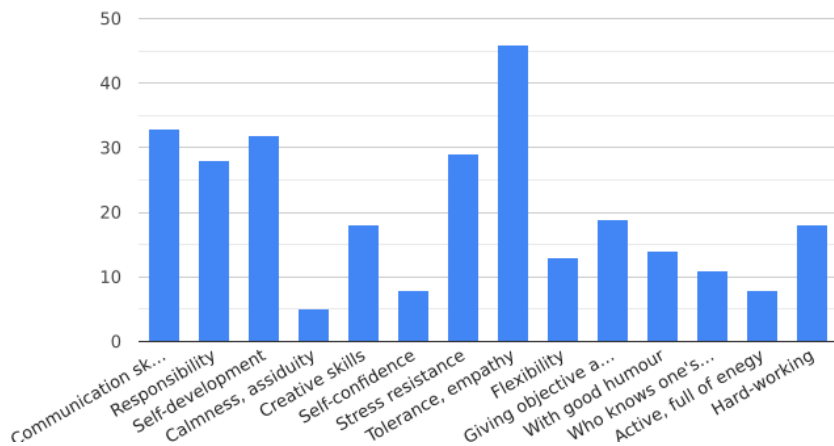


Diagram 1. *The qualities that a modern teacher should possess (according to the respondents)*

According to the respondents, the most valuable qualities of a contemporary teacher are tolerance towards individual characteristics of students: 46% of the respondents noted the obligatory possession of such traits as kindness, empathy,

tolerance and sensitivity. An important characteristic, according to 33 respondents, is the ability to organize effective interaction of all participants in the educational process. The third place in the priority was given to the teacher's desire for self-education and self-development, noted by 32 respondents. Stress control and responsibility for the results of their work were identified by 29 and 28 respondents, respectively. In the context of the qualities considered, only 11 respondents spoke about the importance of knowledge, skills and professional competences as key characteristics of a modern teacher. These results prove the importance of multi-competences for teachers in the modern society.

Not only teachers identify the necessity of universal or multi-professional competencies, but also scientists have the same opinion.

For example, A.V. Morozov and D.V. Chernilevsky identified the following qualities which are extremely necessary for a teacher for their professional and personal development: *professional and social skills* (personal charm, self-control, steadfastness, perseverance and hard-work), *organizational and administrative skills* (demanding to themselves and to others, being able to take responsibility, the ability to coordinate work, positively motivate colleagues and employees), *internal personal qualities* (honesty, decency, kindness, reliability, conscientiousness), *professional pride and duty, creativity, intellectual abilities* [1]. Obviously, these qualities are universal, it means that they are inherent in in any professional field, and by developing them, the teacher develops both professionally and personally.

However, since 2016, when soft skills of the future were first formulated at the World Economic Forum in Davos, there has been no consensus in scientific circles on the universal definition of the concept we are studying: “multi-professional competencies”, “soft skills” or “skills of the XXI century”.

First of all, we suggest comparing two key notions: “a skill” and “a competence, and we will choose the most appropriate one for our study.

- In the Philosophical dictionary, “a skill” is described as “the ability to perform purposeful actions brought to automatism as a result of conscious repeated repetition of the same movements or procedures (algorithms)” [2].

- According to the interpretation proposed by S.I. Ozhegov in his dictionary, a skill is “an ability developed by exercises, a habit” [3].

- In the Psychological dictionary “a skill” is interpreted as “an action brought to automatism by repeated repetitions” [4].

As for the concept of “competence”, K. Gorslin considers it as “a combination of skills, knowledge and experience necessary for the effective performance of tasks” [5]; E. A. Konyaeva and L. N. Pavlova define “a competence” as a kind of “set of knowledge, skills and abilities necessary for a person to perform task set” [6]; O.M. Bobienko and Z.N. Safina emphasize that a competence is a “conscious activity, as opposed to automated execution” [7].

Having analyzed the definitions given above, we propose to define the concept of “competence” as a certain set of professional, specialized and “soft” skills inherent in a representative of any specialty, and within the framework of our research to use the concept of “multi-professional competencies”.

We agree with T.N. Anufrieva, who presented the following characteristics of such competencies:

- *system*: it includes aspects such as high productivity, competitiveness, development of professional skills and realization of potential in work. All these elements are interconnected and reinforce each other, which together contributes to improving the overall efficiency and productivity of work;

- *multifunctionality*: this aspect proves its versatility and the absence of any links with a specific professional field of human activity;

- *competence*: the ability of a person to apply previously acquired knowledge, skills and abilities to solve various practical problems in both standard and non-standard situations;

- *significant personal qualities* (for example, dedication, initiative, independence, organization, self-control, sociability, etc.,) [8].

As it was mentioned above initially there were top 10 soft skills. Then the number of them was decreased to 4 in Russian education: critical and creative thinking, communication and collaboration. We think it is worth mentioning more competences, at least, ten. Let us regard at the following list:

- Comprehensive multi-level solution of problems. This competence provides for the independent identification of the problem and the entire complex of its causes and sources; identification and elimination of the cause of the situation, rather than its consequences; a systematic interdisciplinary approach to solving problems. The teacher should be able to determine the range of tasks within the framework of the set goal and choose the best ways to solve them, based on current legal norms, available resources and limitations.

- Critical thinking as a professionally oriented type of thinking that contributes to the productivity of pedagogical activity. Competence involves questioning the reliability of all incoming information, existing rules and ideas about the world; choosing facts rather than information as the basis for decisions and actions. According to the Federal State Educational Standard, a teacher should be able to search, critically analyze and synthesize information, and apply a systematic approach to solving tasks.

- Creativity as the ability to creatively search, non-standard solution of pedagogical tasks, characterized by criteria: speed (productivity) and flexibility of thought, originality, curiosity, precision and courage. It means the skill in creating a situation of doubt about the reliability of all incoming information, existing rules, and even one’s own ideas about the world; choosing facts as the basis for decisions and actions, and not just the information received.

- Management. This competence presupposes the skill of creating conditions for the disclosure of creative potential and maximum achievements among people around; a combination of having a “vision” of solving a situation and organizing people to embody this “vision”.

- Collaboration and communication (colleagues, parents, students, external partners). This competence presupposes the ability to build interaction with participants in the educational process at various levels from information exchange to the exchange of meanings; the creation of a common field of activity for solving educational problems.

- Emotional intelligence. This implies the presence of skills: recognizing emotions and understanding the intentions of other people; managing your own emotions and states; influencing the emotions and emotional state of others.

- Decision-making and leadership. Competence involves the skills of forming their own opinion and the courage to make independent decisions and their consequences, take the responsibility for their actions and take risks to do something new and extraordinary.

- Flexibility. It involves quickly switching from one thought to another, as well as thinking about several ideas and tasks at the same time. Besides this competence means to be had by people who manage to adapt to the current conditions in the staff or in the entire world.

- Self-management. Competence involves a multi-level process of self-organization, self-realization and time-management.

- Self-education and self-development. This competence is necessary for a modern person in order to avoid the abyss in the depths of a rapidly changing world, in order to always be aware of current trends, in particular in the field of education.

In the course of experimental work within the framework of our scientific research, we aimed to clarify there would be any dependence of problematic multi-professional competencies on work experience. We asked 53 teachers with no or little work experience (from 0 to 3 years of working at school) and 55 well-experienced teachers (from 4 to 15 years of working at school) to evaluate the level of development of these ten multi-professional competences (give 5 points if the competence is of the highest level and 1 point if it is of the lowest one). Here are the diagrams with the results.

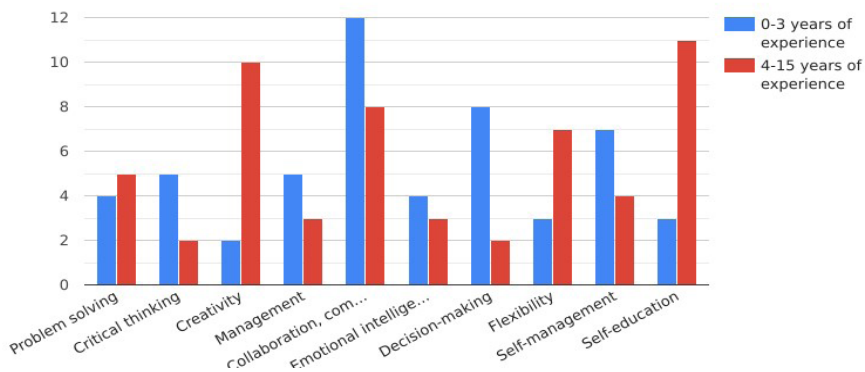


Diagram 2. *The most problematic multi-professional competences (according to the respondents)*

As we can regard from the diagram #2 teachers with no or little work experience named communication, decision-making and self-management as least well-developed competences (12, 8 and 7 respondents respectively). The reason for their choice can be the following: they do not have enough experience in communicating with different people – children and their parents, colleagues, administration and they need to be more disciplined and obedient. However, they evaluated creativity, flexibility and self-education on a high level (2 and 3 respondents respectively). It can be explained that they have another way of living and different viewpoint on common things, for example they do not have any problems to look at them from different sometimes original angle; they are able to create new things and new educational products.

As for well-experienced teachers, the most difficult competences to develop are self-education and creativity (11 and 10 interviewees respectively). It is rather hard for them to change something that unchangeable for some period of time, for example, find new ways of educating, start learning by themselves, to create something new etc. However, they gave maximum points for themselves in thinking critically and decision making: these competences are thought to be connected to having quite enough experience.

In conclusion, we have to admit that multi-professional competencies are such skills and abilities that need to be constantly developed and updated, otherwise, it will be difficult for a person to live in a modern fast-changing and highly demanded society.

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澳大利亚报纸表达句法的一些特点
**SOME PECULIARITIES OF EXPRESSIVE SYNTAX IN
AUSTRALIAN NEWSPAPERS**

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摘要。本文致力于研究现代大众媒体中的表达句法。研究基于对澳大利亚报纸（悉尼先驱晨报、爱丽丝泉新闻报、凯瑟琳时报、新日报）在线版文本的分析，得出关于其中表达句法手段使用特点和频率的结论。括号、重复、疑问句、省略和分割结构被称为句法层面上最常见的具有表达潜力的现象。给出了它们的一般特征。关注的是单个句子中各种表达句法手段相互作用的常见情况，这提高了它们的使用效果。最后，总结了研究的主要结果，并得出了关于表达句法手段在现代大众媒体中的重要作用的结论。

关键词：表达句法、大众媒体、澳大利亚报纸、英语。

Abstract. *The article is devoted to the study of expressive syntax in modern mass media. The research is based on the analysis of the texts taken from online versions of Australian newspapers (The Sydney Morning Herald, The Alice Springs News, Katherine Times, The New Daily), the conclusions are drawn about the peculiarities and frequency of the use of expressive syntactic means in them. Parentheses, repetitions, interrogative sentences, elliptical and parcelled constructions are called the most common phenomena with expressive potential at the syntax level. Their general characteristics are given. Attention is focused on frequent cases of interaction of various means of expressive syntax within a single sentence, which enhances the effectiveness of their use. In conclusion, the main results of the study are summarized and conclusions are drawn about the important role of expressive syntactic means in modern mass media.*

Keywords: *expressive syntax, mass media, Australian newspapers, the English language.*

A lot of attention is paid to the study of the features of expressive syntax in modern linguistics. The study of the expressive function of language belongs to the fundamental problems of linguistics and allows us to expand the theoretical understanding of expressivity as a syntactic category [11, p. 2171]. A significant

number of scientific papers have been published in this field; they are devoted to the characteristics of expressive syntactic means and the peculiarities of their functioning in various types of texts.

It is believed that it is the category of expressivity that helps to attract and retain the reader's attention, increase the pragmatic potential of an utterance. It plays a special role in creating a certain emotional effect. At the syntactic level, expressiveness is achieved through the use of various constructions and syntactic figures, a certain rhythm, thematic division, punctuation [6, p. 17]. Expressive syntax give emotionality to the text, help to focus on important details, in some cases contribute to the imitation of spoken language. Such an effect is undoubtedly important for the creators of media texts and is widely used by them. It is interesting to study the main features of expressive syntactic means in media texts of various types and from various sources.

The material of this article is taken from online versions of Australian newspapers (The Sydney Morning Herald, The Alice Springs News, Katherine Times, The New Daily).

Various methods were used in the course of the study, in particular, the method of stylistic and linguistic analysis of the text, the method of quantitative analysis, the descriptive and analytical method, and the comparative method. The texts of the articles that served as the material of this work were studied, the means of expressive syntax used in them were identified and analyzed from the point of view of frequency, the most common of them were considered, their features were determined, and the conclusion was made about the role they play in media texts.

The analysis of the material allows us to conclude that parentheses are the most frequently used means of expressive syntax in these texts (they were included in 22% of the sentences in the research material). In the studied texts, various types of parentheses were identified from the point of view of the position taken (at the beginning, in the middle and at the end of the utterance), for example:

Additionally, the top five most-watched programs for the year, so far, have all been on Seven [3]

She ably suggests, too, the animality of the swan. [5]

He wasn't, of course. [2]

From the point of view of the structure [1], one-word insertions, combinations of words, and whole sentences used as parentheses were found in the research material, for example:

However, if you listen carefully, you will hear my heart beating. [8]

...but any art that was ever created was, at some stage, new." [2]

But what's more fascinating than thinking about what he could do with Ballymena's Freedom of the Borough (does it mean an extra garbage collection every week? The right to keep a pet without a licence?) is Neeson's late career speciality. [9]

Repetition takes the second place in terms of prevalence among expressive syntactic means in the studied texts. It is used in 6% of the sentences in the research material. Various types of repetitions can be distinguished, in particular, lexical repetitions, repetitions of homogeneous sentence members and repetitions of syntactic constructions.

Here are some examples:

But what I do have are a very particular set of skills, skills I have acquired over a very long career. Skills that make me a nightmare for people like you. [9]

The aptly named 12-year-old Corelli-Tapia started dance classes when he was four and studies tap, ballet, hip hop and contemporary, as well as drama, singing and musical theatre. [10]

My home is the desert with its wide country, growing tall; and its ancient, ruined castles, the mountains and hills. My country is the desert with its flora and fauna like an ancient Persian rug with its beautiful colours, like a tapestry art. My home is the desert: harsh, hard and unbearable. I am the desert. Some call me the dead heart of Australia. However, if you listen carefully, you will hear my heart beating. Thank you. [8]

The next frequently used expressive syntactic means in media texts is ellipsis (identified in 4.2% of sentences). As it is known, an elliptical construction is a predicative construction, in the implementation of which the predicativity is fully or partially implicit [7]. Various types of elliptical sentences were found in the research material, for example, elliptical constructions with the omitted subject (1), the predicate (2), the part of the predicate (3), the subject and the predicate (4), the subject and the part of the predicate (5):

- 1) Have a say on what's going to be built. [2]
- 2) Big applause from the audience but, sorry, wrong question. [4]
- 3) He wasn't, of course. [2]
- 4) In town. [4]
- 5) Coming soon to a plane near you. [9]

Inversion also occupies an important place in the research material. The most common cases in the considered texts were cases of the subordinate clauses, adverbial modifiers or predicatives being put in the first place, for example:

Because hiring him guarantees a movie will get made, he has been travelling the world shooting them between more ambitious projects by better-known filmmakers. [9]

Also on the bill are Orlando Corelli-Tapia and Luca Dahan. [10]

For a while now, he has dominated an under-appreciated genre: the plane movie. [9]

At 71, he is still ruggedly handsome. [9]

Inverted word order occurs in 4% of sentences, being one of the most frequent means of expressiveness in the research material.

Interrogative sentences also belong to important means of expressive syntax that contribute to the creation of emotional texts. 3% of all sentences in the research material are interrogative, for example:

Is this not the final design? According to the official time line, construction will start in April or May next year and “gallery construction complete March 2027”. But this is a “forecast project schedule subject to change”. [4]

From Schindler’s List to plane movie guy: What happened to Liam Neeson? [9]

Parcellation is considered to be one of the most effective means of expressive syntax, too. Parcelled constructions in the research material are rare – they are used in only 1.5% of the sentences – but they make a valuable contribution to the creation of media texts: they make the statements brief, emotional, highlight the main information for the reader, imitate colloquial speech:

We have all gathered to farewell beautiful country. To thank the ancestors for the awesome spiritual weekend, and to embrace happiness. [8]

“Why can’t we have one Desert Mob at Araluen and one over there. In town.” [9]

“Inside this building we get to have what we want. Let’s make our own businesses. Art studios. A bit of culture. A place for ceremonies. People from overseas can see what we’ve got. A showcase of our culture, in beautiful Alice Springs.” [4]

The last example proves the well-known fact that various expressive syntactic means are often used together. In the fragment above, we observe a combination of parcellation with nominative and elliptical constructions, repetitions, and inversion. It is believed that such interaction has a special effect, allows the author to create an emotional, attention-grabbing and convincing media text.

In general, the analysis of the research material allows us to draw certain conclusions. Expressive syntax means play an important role in modern media texts. The most common of them are parentheses, repetitions, interrogative sentences, elliptical and parcelled constructions. In the studied texts, various types of these expressive syntactic means were identified and their main functions were formulated: in most cases, they allow the author to highlight certain information, make statements emotional, effective, help to express the necessary thoughts in the best way, attract and hold the recipient’s attention, arouse their trust and necessary reaction.

Thus, expressivity at the syntactic level is realized through a variety of means that make an important contribution to the creation of an interesting, convincing and emotional texts in modern Australian newspapers.

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现代澳大利亚大众媒体中的标点符号
PUNCTUATION IN MODERN AUSTRALIAN MASS MEDIA

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摘要。本文致力于研究现代澳大利亚大众媒体中的标点符号。研究基于对澳大利亚报纸（《悉尼先驱晨报》、《爱丽丝泉新闻报》、《凯瑟琳时报》、《新日报》）在线版文本的分析。指出了研究材料中标点符号的表达可能性，研究了其中最常见标点符号（即引号、破折号、冒号、括号、分号、省略号），并分析了它们的潜在影响。最后，总结了研究的主要结果，并得出了标点符号在现代澳大利亚大众媒体中的重要作用的结论。

关键词：标点符号、表达语法、澳大利亚大众媒体、英语。

Abstract. *The article is devoted to the study of punctuation in modern Australian mass media. The research is based on the analysis of the texts taken from online versions of Australian newspapers (The Sydney Morning Herald, The Alice Springs News, Katherine Times, The New Daily). The expressive possibilities of punctuation marks in the research material are indicated, the most frequent of them (namely, quotation marks, dashes, colons, brackets, semicolons, ellipses) are studied, their potential effect is analyzed. In conclusion, the main results of the study are summarized and conclusions are drawn about the important role of punctuation in modern Australian mass media.*

Keywords: *punctuation, expressive syntax, Australian mass media, the English language.*

Punctuation marks belong to the field of expressive syntax and play a special role in the organization of the text. The analysis of the research material taken from online versions of Australian newspapers The Sydney Morning Herald, The Alice Springs News, Katherine Times, The New Daily allows us to conclude that quotation marks (used in 8% of the studied sentences), dashes (6%), colons (6%), parentheses (5%) predominate in the expressive function.

Dashes, parentheses (brackets) and commas are used in most cases to mark the borders of parenthetical insertions, for example:

Instead, she suggests a structure of mediation and accountability. [9]

Sculptor Dan Murphy leapt to his feet, asking if the gallery’s planners had spoken with senior women custodians (apmerekke artweyes and their kwerterngerles) after the controversial choice to plonk the gallery next to Untyeyetwelye / Anzac Hill – their sacred site.[2]

Picking up the story from his early breakthrough in the 1950s and then to global stardom, Tasmanian Rob Mallett plays the adult Presley – who he describes as the punk rock star of his time. [6]

If it’s the kind of action thriller than Neeson specialises in, there will be a clearly defined hero (worn down by life but with a good heart) who faces a villain (desperate, ruthless) played by an obscure actor. [5]

Quotation marks show both quotes and words (or phrases) in a figurative or humorous meaning, for example:

“Unfortunately, we can’t share the image ... as it is an architectural drawing not for public distribution.” [2]

The work was owned by art patron and collector Emily Fisher Landau and it depicts Picasso’s “golden muse” Marie-Therese Walter, a woman who formed the subject of many of Picasso’s portraits and who was known to have had an affair with the painter. [8]

Sera Bray, senior director of the project, addressing a poorly advertised “public” meeting of about 60 people on Tuesday, mentioned Lhere Artepe about half a dozen times when people in the audience raised issues of inadequate consultation with Aboriginal people. [2]

Colons help to include explanations and additional data, highlight information that is important from the point of view of the author of the article:

Those unable to afford five star priced meals need not worry: Mall market style food vans will be “encouraged” to operate on the grounds. [2]

There can be no doubt about the enduring glamour of Swan Lake, which is not just a ballet but a whole type of entertainment: a fairytale distraction, guiltless indulgence and an affirmation of the essentially romantic spirit of the art form. [9]

Playing the King of Rock’n’Roll at any age seems a big call, but it’s pure joy for tween Daniel Lim, one of four Melbourne actors to play the up-and-coming superstar in *Elvis: A Musical Revolution*. [6]

In addition to the punctuation marks mentioned above, the use of semicolons and ellipses in the research material also deserves attention.

A semicolon (used in 1.5% of sentences) is a sign that functionally occupies an intermediate position between a point that forms individual sentences and a comma used between parts of a single utterance. It is believed that semicolons occur at the boundary of the components of complex sentences, emphasizing at the same time the relative independence of these parts and a fairly close connection with the rest of the sentence. In addition, the semicolon allows the author to make a

long sentence with an abundance of other punctuation marks more structured and understandable for the reader. Here are some examples:

Boxall's suggestions for bookers, beyond helping acts to get home safe, is to find a venue that is as accessible as possible; pay comedians in food instead of drinks; and to circulate people's pronouns ahead of time, which indicates that the space is safe for queer people. [9]

Teaching that task fell to Jenny Kent and Charmian Gradwell; the latter also coached Austin Butler for his role as Elvis in Baz Luhrmann's film last year. [6]

This eastern-most camping area was dusty, treeless, and furthest from the stages and festival stall; however, it boasted more Red-Tailed Black Cockatoo action than I've ever seen in my life, and stunning views of the ranges on all sides. [4]

Ellipsis (three dots) refers to separating signs (as well as a dot, question mark, exclamation mark, comma, semicolon, dash), i.e. it is used to divide the text into semantically and grammatically significant parts [3, p. 66]. In addition, an ellipsis is considered a "horizontal" punctuation mark that delimits parts of a sentence [1, p. 115]. Ellipsis is used, as a rule, to create emotional pauses, attract the recipient's attention to certain words and phrases, sets a certain pace of reading the message, in the texts of interviews it indicates real pauses in speech. Here are some examples from the research material:

"Once I got into Joseph my entire life changed and I got to meet so many amazing people... You keep getting energy from the audience." [6]

Working on initial scoping reports, initial strategies, gross regional product, visitation, can the gallery attract people to stay longer. Crunching data. Economic boost ... and so on without any lucid detail. [2]

It should be noted that in the studied texts not only "traditional" methods of punctuation are used, but also modern symbols, in particular the "/" sign (slash), which is classified as "non-letter signs". The slash is currently used in scientific and business writing in a function close to conjunctions "and" and "or", as a sign of the alternativeness of concepts or the designation of a single complex concept [7, pp. 113 - 114]. Similar functioning of this sign is also observed in the research material:

His character will invariably care deeply about his family, even if his wife has married someone else/is divorcing him and his children are busy with their own lives/being abducted. [5]

Sacred sites issues in relation to the gallery's Untyeyetwelye / Anzac Hill location were in the hands of the Aboriginal Areas Protection Authority (AAPA) – also mentioned by Ms Bray several times. [2]

As an ambient synth / electronic music fan, I was particularly enjoyed Slumberkitty's live looping of the electric guitar, adding distortion to an increasingly complex, shoe-gazey melody. [4]

In general, the analysis of the research material allows us to draw the following conclusions. Punctuation is an important means of expressive syntax which plays a significant role in the organization of texts. Punctuation marks bring an additional effect to the studied texts by participating in the punctuation design of expressive syntactic structures, as well as influencing the pace of reading, highlighting individual components of an utterance, and imitating real speech. In this way, they make an important contribution to the creation of articles in modern Australian mass media.

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伽达默尔哲学中的日常隐性知识现象
**THE PHENOMENON OF EVERYDAY IMPLICIT KNOWLEDGE IN
THE PHILOSOPHY OF H.-G. GADAMER¹**

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摘要。本文作者表明，伽达默尔将解释学与辩证法结合到他的哲学体系中，并创造了一种理解方法论。他认为，社会认知的基础是由日常实践决定的“初步理解”。这意味着，一切“隐含的”事物实际上都是由日常的过去决定的，因为理解是日常社会生活的一种存在形式。伽达默尔认为，这一切不仅对个体之间的交流、对普通的、日常的人类意识很重要，而且对理解和领悟整个文化空间也很重要。

关键词：日常、隐含、知识、认知、解释学、理解、文化、对象、方法。

Abstract. *In the article, the author shows that H.-G. Gadamer combined hermeneutics and dialectics in his philosophical system and created a methodology of understanding. In his opinion, the basis of social cognition is “preliminary understanding” determined by everyday practices. This means that everything “implicit” is in fact determined by the everyday past, since understanding is a form of existence of everyday social life. Gadamer considers all this important not only for communication between individuals, for ordinary, everyday human consciousness, but also for understanding and comprehending the space of culture as a whole.*

Keywords: *everyday, implicit, knowledge, cognition, hermeneutics, understanding, culture, object, method.*

The problem of verification of scientific knowledge and, in general, of any other method serving as a test and criterion of scientificity, ultimately aims to discover true knowledge capable of existing within the framework of science and being cognized by means of science, knowledge that most fully reflects, as far as possible within the framework of the existing level of development of science, the objective laws of the world being studied. The above-mentioned problems acquire a peculiar sound within the framework of the social and humanitarian sciences,

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which can be explained, among other things, by the fact that in these sciences the cognizing subject himself is a component of the object being studied. The special knowledge of the world, carried out within the framework of the social and humanitarian sciences, required and requires a special approach to its study.

The formation of hermeneutics as a philosophical concept was largely caused by the peculiarities of the development and functioning of social and humanitarian knowledge. Philosophical hermeneutics, having provided a progressive vision of cognitive processes in social and humanitarian knowledge, brought the problem of knowledge verification, and as a consequence the problem of true knowledge in social and humanitarian knowledge to a new level located in the existential area.

The problem of unverifiable and non-rational knowledge in philosophical hermeneutics clearly reveals itself in the theoretical constructions of H.-G. Gadamer. The starting point that gives us the right to speak about the presence of the problem of unverifiable and non-rational knowledge in Gadamer's philosophical hermeneutics is the starting point of philosophical hermeneutics itself, namely the phenomenon of understanding. The phenomenon of understanding, according to Gadamer, should not be personified with any method of scientific knowledge; it exists outside the framework of science; rather, science exists within the framework of the phenomenon of understanding. [2, p. 39] However, this extra-scientific existence of the phenomenon of understanding, according to Gadamer, is capable of producing true knowledge, which nevertheless is not subject to "verification by the methodological means of science." [2, p. 39]

Thus, the phenomenon of understanding in philosophical hermeneutics, which is a way of knowing, exists outside of scientific ways of knowing, which in turn gives rise to the need for recognition, "philosophical legitimization," of knowledge obtained as a result of understanding, especially since this knowledge claims to be true. How is it possible to achieve this "philosophical legitimization"? According to Gadamer, recognition of such knowledge is possible through "deepening into the phenomenon of understanding." [2, p. 39]

"Deepening into the phenomenon of understanding" brings to the forefront the concept of experience, formed as a result of the interaction of the interpreter and the intellectual heritage expressed in the text. At the same time, the experience gained as a result of comprehending the ideas of the classics of philosophical thought is equivalent to the experience gained as a result of comprehending works of art. "The experience of philosophy" and "the experience of art" are acquired outside the framework of scientific knowledge and outside the framework of specific scientific disciplines, so according to Gadamer, the very fact of the possibility of achieving knowledge through understanding and experience is "the most urgent call to scientific consciousness to recognize its own boundaries." [2, p. 40]

Within the framework of Gadamer's philosophical hermeneutics, a clear opposition is thus formed between the scientific method of knowledge oriented toward

strict methods of knowledge and the ideals of rationalism originating in European scientific thought of the 17th century, and philosophical hermeneutics, which combines the aspirations to identify and explain other, non-rational, everyday in the classical sense and non-methodological ways of understanding the surrounding reality, which most clearly manifest themselves within the framework of the “sciences of the spirit”.

The source that formed the above opposition and, as a consequence, the emergence of unverifiable, everyday and non-rational knowledge in Gadamer’s philosophical hermeneutics can be seen in the ideas about the relationship between myth and reason. According to Gadamer, the attitude towards myth was determined by the history of the development of European thought, which concluded “that the scientific picture of the world overcomes the mythological picture of the world.” [1, p. 93] At the same time, Gadamer points out that this desire for rationalization is not a “universal law of development” and is only a fact of history. [1, p. 93] It follows from this that the desire for the rational is not an objective law, an objective regularity. The fight against mythological thinking was largely based on the desire of Christianity to destroy beliefs in pagan gods personifying “images of this world itself,” while Christianity spoke of the world as “an untrue being.” [1, p. 94] As a result of the above circumstances, a rather paradoxical situation occurs, which consists of the following: the desire for rationalization in understanding the world and, as a consequence, the desire for rationalization in science, had as its basis the recognition of the world as “untrue being”, thus rationalism turned out to be even further from the world it studied than myth, which recognized its source as the world surrounding it as true being. The further development of rationalism in its struggle against myth has already led to a struggle against the dogmas of Christianity itself. [1, p. 94] If the rejection of myth and mythological thinking is not, according to Gadamer, a natural and objective law of the development of human thought, but only a fact of history, then there probably exists another way of perceiving myth in all its fullness and interconnection with the world. Gadamer sees such a different way of perceiving the world in the history of antiquity, namely in the Greek religion, which, unlike Christianity, was not based on orthodox religious teaching, as a result of which “the criticism of myth carried out by the Greek Enlightenment was not in fact the opposite of religious tradition.” [1, p. 96] As a result of the absence of contradictions between myth, religion and philosophy, a special knowledge or even a way of thinking was formed that does not exist today. As a result of understanding the specified patterns, Gadamer writes: “Plato’s philosophical myths show how old truth and new understanding can be combined.” [1, p. 96] These ideas of Gadamer form a slightly different idea regarding many fundamental issues, such as understanding progress in history and science, understanding objectivity as a criterion of scientificity and others, but the most im-

portant is a different, non-classical view of reason, of a person's awareness of his own capabilities and methods of cognition and, as a consequence, of the limits of scientific knowledge. In the formed contradiction of the rational and the mythical, it is probably necessary to look for the sources of the formation of pre-reflexive, everyday and non-rational knowledge, while it is necessary to understand that, in this case, non-rationality and pre-reflexivity are not equivalent to indeterminism, agnosticism, chaos and lack of system. Non-rationality in Gadamer's philosophical constructions is quite reasonable. This reasonableness, however, going beyond the framework of traditional science cannot be fully understood, cannot be verified, but is this a problem for Gadamer's philosophical constructions?

To understand this current situation, the ideas expressed by M. Heidegger in his "Letter on Humanism" can serve, speaking about the status of thought in modern society, the philosopher points out the following: "Names like "logic", "ethics", "physics" also arise only since the end of original thinking. The Greeks in their great era thought without such cliches. They did not even call their thought "philosophy". "Thought comes to an end when it deviates from its element" and then "ethics" first appears, alongside "logic" and "physics", in the school of Plato. These disciplines arose in an era that allowed thought to become "philosophy", philosophy - into episthmh (science), and science - into the business of school and school teaching. Passing through philosophy understood in this way, science rises, thought departs. Thinkers before that era do not know a separate "logic", nor a separate "ethics" or "physics". Nevertheless, their thought is neither illogical nor immoral. And "physis" is thought out by them with such depth and breadth that later "physics" was never able to achieve." [4, pp. 192-220]

Thus, the non-rationality of philosophical hermeneutics is capable of achieving truth, but this achievement occurs in other ways that have nothing in common with the ways of a rational nature that denies myth and strives to overcome it, and in this other way, the criteria of method and classical rationalism are not decisive for true thought. Being a syncretic process that includes the existence of all other "worlds" known to man, everyday life is a single multiverse with its own internal laws and characteristics. Everyday life acts as a reality that arises and is formed only in communication, in constantly renewed contact between people. Its leading constituent "objects" and "processes" do not exist in themselves, but as human meanings. Everyday reality is entirely woven from the meanings we attach to things and relationships, moreover, social "objects" and their boundaries are directly dependent on how they are understood by society as a whole, as well as by its individual groups and individuals. Everyday life, created in communication, is subject to constant interpretations and reinterpretations. Countless variants of understanding reality arise, meanings grow and diminish. Therefore, the main problem of interpersonal communication, unfolding in the structure of everyday life, is

the problem of understanding. The variable nature of everyday life creates its complex internal logic, gives rise to many different-scale realities that complement each other. Philosophy plays a special role in the study of everyday reality. Unlike social and humanitarian disciplines, it does not claim maximum objectivity, does not strive to completely break out of the framework of everyday consciousness, philosophy creates its own version, or rather, its own various versions, models of the everyday world in which we live. These models coexist with each other, complement each other, enter into contradictions, form a synthesis. The field of creative search of philosophy is the entire history of culture and civilization. In this field of human meanings, the most diverse analogies, incredible comparisons, free movement from the depths of human history and theoretical thought to the space of real everyday life and back are possible. The picture of the world of everyday life and common sense is an interpretation of external influences through the senses and our knowledge contained in everyday language. Usually we identify this picture with the external world itself and believe that tables, chairs, trees, mountains, rivers, clouds with all their sensory properties exist in reality - outside and independently of man and even humanity. But it is not the objects of our ontology themselves that are real, but only the effects of the surrounding world on us - those effects that we fill with meaning and interpret as objects. What seems to common sense to be a solid and stable object - a table, a house in the ontological picture of the microworld will be a blurry cloud of elementary particles. Such ideas will be correct - these are different interpretations of external influences of objective reality.

K. Popper expressed approximately this idea: "... All these worlds, including our ordinary world, we must consider equally real worlds, or, perhaps, better to say, equally real aspects or levels of the real world. These pictures create an image of reality that allows us to live and act in the world. In the process of its historical development, humanity has formed, constructed a certain interpretation of the influences of the external world, which is represented by the world of common sense. And this interpretation is adequate to those influences of the external world that are essential for the existence and development of humanity." [3, p. 441].

Philosophical research of the late 19th - early 20th centuries showed that even perfect and strict logical-theoretical constructions do not express the essence of the world "as it is", but only our cognitive tool, the most important features of which are formed in the everyday life of people, in the area of ideas and experiences, the state and attitudes of everyday consciousness. The "world of theories" is only a part of our everyday life, growing out of it and becoming its own integral structure. The everyday is the source and receptacle of other structures and versions of reality.

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俄罗斯精神现象学

THE PHENOMENOLOGY OF THE RUSSIAN SPIRIT

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摘要。本文提出了俄罗斯精神的定义。指出俄罗斯精神是俄罗斯人渴望成为世界性的，团结东西方、南北，调和各国人民，使人类在世界上的存在和谐一致。指出俄罗斯精神在信奉东正教的 A.S. 普希金身上得到了最完整的表达。

本文强调了俄罗斯精神在当今社会存在的三个重要方面：1) 这种存在的重要性，2) 需要巩固那些提倡俄罗斯精神在世界上存在的人们的努力，3) 寻求加强俄罗斯精神在世界上的人们的合作前景（为了通报这种合作，建议合并俄罗斯艺术史研究所出版的期刊《Vremennik Zubovsky Institute》）。

关键词：俄罗斯、俄罗斯性、俄罗斯精神、A.S. 普希金、东正教。

Abstract. *The article proposes a definition of the Russian spirit. It is stated that the Russian spirit is the desire of Russianness to become universal, to unite East and West, North and South, to reconcile peoples, to harmonize Human Existence in the world. It is indicated that the Russian spirit was expressed with the greatest completeness by A.S. Pushkin, who had an Orthodox faith.*

Attention is drawn to three important points of the existence of the Russian spirit in our days: 1) the importance of this existence, 2) the need to consolidate the efforts of people who advocate the existence of the Russian spirit in the world, 3) the prospects for cooperation of people seeking to strengthen the Russian spirit in the world (in order to inform about such cooperation, it is proposed to consolidate the journal “Vremennik Zubovsky Institute” published at the Russian Institute of Art History).

Keywords: *Russia, Russianness, Russian spirit, A.S. Pushkin, Orthodoxy.*

What is the Russian spirit? The question is extremely serious. There are many answers to it – from those that point to a very specific smell of Russianness, to those in which we are talking about a certain mythopoetic area embodying the exorbitant creative power of Russianness. Let’s try to offer our own answer to this question.

We believe that the Russian spirit is *the desire of Russianness to become universal, to unite East and West, North and South, to reconcile peoples, to harmonize Human Existence in the world.*

Pushkin was an unprecedented expression of the Russian spirit, as N.V. Gogol was one of the first to write: “Pushkin is an extraordinary phenomenon and, perhaps, the only phenomenon of the Russian spirit” [2, p. 570].

Gogol’s idea was perfectly confirmed in the works of many outstanding Russian writers and philosophers. Especially, perhaps, in the article by I.A. Ilyin “The Prophetic Calling of Pushkin”, which is his published speech delivered on February 9, 1937 in Riga on the occasion of the 100th anniversary of the death of A.S. Pushkin.

In this article I.A. Ilyin writes that Pushkin’s Russian spirit manifested itself in the poet’s desire to reunite “with the whole universe. And with the world of angels, and with the world of demons, then ‘tempting Providence’ ‘inexhaustible slander’, now whirling in the ‘muddy moon game’ ‘among unknown plains’, then for the first time vaguely cognizing the ‘heat of involuntary emotion’ at the sight of a drooping angel shining ‘at the gates of Eden’. This power of artistic identification further connects the poet with all nature: with the night stars, and with the fallen snow, and with the sea, and with a landslide, and with the soul of an alarmed horse, and with a forest beast, and with thundering thunder, and with the anchor of the desert, in a word – with the whole outside world. And of course, first of all and most of all – with all the positive, creatively created and accumulated treasures of the spirit of their own people” [3, p. 8]. As Ilyin believes, in this desire of Pushkin, *the Orthodox worldview of the Russian genius was embodied*: “Here Russian ancient paganism (myth) and Russian secular culture (poetry) met with the blessed breath of Russian Orthodoxy (prayer) and learned sobriety and wisdom from him”. And then an extremely important addition: “Pushkin taught Russia to see God and with this vision to assert and strengthen its innermost, God-given national and spiritual forces. From his mouth, a hymn of joy through all suffering, a hymn of evidence through all frightening earthly fears, a hymn of victory over chaos was sung to God on behalf of Russia. For the first time, this pure and mighty ‘Hosanna’ was spoken on behalf of Russia and to Russia, the hosanna of sincere, Russian Orthodoxy-nurtured acceptance of the world and theology of God, the hosanna of the poet and the prophet, the sage and the child, which Heraclitus, Schiller and Dostoevsky dreamed of” [3, p. 29] (1).

Let’s pay attention to three important points concerning the existence of the Russian spirit in our days:

1. The significance of this existence, which acts as a bulwark of friendship and solidarity of the peoples of the world.

2. The need to consolidate the efforts of people who advocate the existence of the Russian spirit in the world (especially in the context of the intensified struggle

with the Russian spirit, which revealed the presence of a huge number of enemies, sometimes quite aggressive).

3. The prospects for cooperation of people seeking to strengthen the Russian spirit in the world, which can be expressed in holding scientific conferences (of various kinds level), dedicated to the Russian spirit, publication of materials on this topic in the form of collections of articles, collective monographs, etc. (I think it would be very useful to consolidate some kind of scientific journal that would become a platform for reflecting the designated work, for example, such a journal could be published at the Russian Institute of Art History “Vremennik Zubovsky Institute”, in which the author of this article is a member of the editorial board.) (2).

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(1) *Ilyin speaks about Pushkin's Russian Orthodoxy, but at the same time Russian Orthodoxy is the clearest expression of Universal Orthodoxy. This was recently in his report “Russian Church as the basis of the Russian World, the Russian World as the basis of the Universal Church” at the Round table “The Russian people, the Russian world and Russian civilization: history and modernity” noted Bishop Euthymius (Moiseev) [1].*

(2) *In addition to the topic of the proposed article, see our works: [4; 5; 6]. The work can be especially useful [4]. Among other things, it clarifies what Orthodoxy is for a Russian person: “Firstly, Orthodoxy for a Russian person is the Power of God (the Christian God in the unity of His three Hypostases: God the*

Father, God the Son and God the Holy Spirit), which surpasses the power of the earth (nature) which, in particular, is expressed in God's ability to cast death ("... death is corrected by death"). Secondly, at the same time, the Glory of God. It is significant that in prayer 'Our Father' is the main prayer not only of Christians, but also of Jews (among Jews it is called 'Avinu Malkenu'), and Muslims (Muslims call it 'Al-Fatiha'), it is in its Orthodox version that the prayer ends with the words: '[For] Thine is the kingdom, and the power, // and the glory forever and ever. Amen to that'. Finally, for the Russian man, the Power and Glory of God are contained in the Light of God (the uncreated Tabor Light that appeared to the apostles on Mount Tabor). Thus, Orthodoxy for a Russian person is the Radiance of God" [4, pp. 78-79].

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中国古代诗剧进入现代戏曲的历史条件
ANCIENT CHINESE SHI DRAMA EMERGED INTO MODERN
OPERA'S HISTORICAL CONDITION

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摘要：虽然戏曲艺术在中国处于发展阶段，但必须认识到自古流传下来的“什叶派戏剧”作为民族戏曲和音乐的开端的历史意义。在360多部咏叹调戏剧中，自古流传下来的五大戏曲被认为是一种古老的传统戏曲形式。它们是京剧、徽剧、高迁戏、河北梆子戏和杭州戏。据说其他的声音都是在这些优美的歌曲的基础上发展起来的。后来，许多著名的戏曲都是在这些情节剧的基础上发展起来的。这些包括昆剧、傣剧、越剧、秦腔、晋剧等。其中最著名的是京剧。

古老的什叶派戏剧以其独特的歌唱、演唱、行唱、吟诵、读谱和说唱的融合，深刻地影响了中国民族戏曲艺术的发展。这些戏剧融合了歌唱、说唱、朗诵、表演、舞蹈、武术、马戏表演、踩高跷、喷火和面具等元素，留下了不可磨灭的印记。男扮女装的传统和使用各种民族乐器也是这种影响的一部分，凸显了什叶派戏剧的鲜明特征，并影响了现代歌剧和音乐的发展。

关键词：中国古代歌剧、类型和差异。

Abstract. *Although the art of Chinese opera is developing in China, it is crucial to recognize the historical significance of the 'Shii drama,' handed down since ancient times, as the beginning of national opera and music. Among the more than 360 psalm plays, five major operas handed down since ancient times are considered an ancient form of traditional opera. These include Peking Opera, Anhui Opera, Gaoqian Opera, Hebei Banz Opera, and Hangzhou Opera. It is said that other sounds were developed based on these melodious songs. Many famous operas were later developed based on these melodramas. These include Kun opera, Yi opera, Shaoxing opera, Qin opera, Jin opera, etc. The most famous of them is Peking Opera.*

The ancient Shii dramas, with their unique blend of song, singing, traveling, moaning, reciting, musical reading, and narrative singing, have profoundly shaped the development of Chinese national opera art. These plays, which incorporated singing, speaking, reading, acting, dancing, martial arts, circus performances, stilt walking, fire breathing, and masks, have left an indelible mark. The tradition

of men singing as women and the use of various national musical instruments are also part of this influence, highlighting the distinct features of Shii dramas that have influenced the development of modern opera and music.

Keywords: ancient Chinese singing drama, types and differences.

It is said that the conditions for developing national opera art in China originate from very ancient traditional Shii dramas. Those Shii dramas have become today's major national operas. In addition to the singing art that reflects the national characteristics, these Shia performances include circus performances, masking, magic performances, fire in the mouth, walking on wooden legs, troupe performances, pantomimes, spoken dramas, singing forms, acting musicals, circuses, and dances. There are many varieties of Chinese Shii drama, each with different names and styles depending on the region. The most developed are called the Five Great Ancient Chinese Operas. This (in Chinese:中国五大剧种) or the five great Chinese operas. "By species, they are:

1. **Beijing shii**(traditional Chinese:京劇, in pinyin: jīngjù, jingju), Henan drama (traditional Chinese:豫劇, in pinyin: yùjù, yù jù), Huangmei drama (traditional Chinese:黃梅戲, Chinese黄梅戏, pinyin: huángméixì, huángmeishi), Shaoxing drama (traditional Chinese:越劇, Chinese越剧, in pinyin yuèjù, yue jiu), Pingju drama (traditional Chinese:評劇, ChineseComment, píngjù-pínjù in pinyin²) classified into five genres: drama."
2. **The first opera**(黃梅戲huángméixì huángmeishi) etc. are classified into six main species. However, the prominent Shia dramas are classified into 13 genres according to their style. It includes:
3. **Gaochiyan/Gaoqiang/** is a southern style of drama. Here, the song is accompanied by percussion and a choir. Strings and brass instruments are used only for scene transitions between sung parts. The chorus continues at the end of the melody. By the end of the 12th century, the singers had developed a composition genre for the pantomime parts of the actors and the musicians accompanying the singers.' /Shuanghuang/ is the modern form of the last type/.
4. **Hebei Ban zi bol**: One of the most essential dramas in northern China, the music is a style of drama that emerged as a significant genre related to the «Banziqian» music system.
5. **Hangzhou Opera**(漢劇) has three subtypes. It includes:
 - ✓ Originating from Hubei Province, Hubei (湖北húběi) style.
 - ✓ Kejia (客家kèjiā) style: A minority Hakka style that sings in Mandarin but with a strong Hakka accent.
 - ✓ Shannan (陝南shǎnnán) style etc.

² <https://ru.wikipedia.org/wiki/>

However, in the course of historical development, the beginnings of these operas were Shii dramas and dialectal dramas. In different provinces of China, Shii dramas developed in various styles and later became known as operas and operas. The variety of ancient Chinese Shi'i dramas has become increasingly traditional and established.

Among them are: «Kun Opera,» «Beijing Shii,» «Yu Opera,» «Yue Drama,» «Qin Dialect Drama,» «Jin Song Drama,» «Yue Song Drama,» «Diamond Drum Shii Drama,» «Chuan Drama» “Gozaï Drama,» “Huangmei Drama,» “Hebei Banz Drama,» “Pin Drama,» “Hu Drama,» “Nuo Drama,» “Southern Kun,» “Northern Yi,» “Eastern Liu,» “Western «Banzi drama,» «Huabu», «Yabu» drama³Various traditional plays such as /2022,734/ have developed in different styles, which has influenced the singing style of modern Chinese national opera.

Form of acting

The above Shii dramas: in terms of visual content, the stage was adjusted and ready, had a specific time, and the content was usually characterized by soldiers performing in the outer square of big cities during the festival to honor the god, with costumes, scenery, and singing and acting in the unique dialect of the local dialect. A few of the larger churches also had two-story buildings with permanent staircases, which served as stages for performers. But in big cities, there were places with special stages where performances such as operas were performed. These places still exist today; they are called «Grand Monde,» and Shanghai is a prime example of them. Commercial theaters existed from the late 11th to the early 15th century. Wealthy families used soldiers for private performances. Some families had regular shows in the park, and the imperial palace had its own theater. In all those places, the theater consisted of only one stage. The first buildings closed as theaters became teahouses at the end of the 17th century, which provided the basis for a theater with its stage and audience as it staged full-scale theatrical performances. Dances, acrobatics, and action scenes, which are an integral part of opera, were reduced so as not to disturb the audience, and unique tables and chairs were decorated in the 18th century. For example, two tables opposite each other



represent reception, and two opposite tables represent darkness. When performing the play, one person is specially assigned to arrange tables and chairs during the performance.⁴Su Wang-Ngai and Peter Lovrick, 1997, 17/.

Picture 1. From a part of a traditional melodic play.

³ Dictionary of Chinese Cultural Knowledge, (2022). UB., 2022, 734, rep: M. Chimedtsee.

⁴ Su Wang-Ngai, Peter Lovric, (1997) Chinese Opera, Image and Narrative, UBC Press/Vancouver, University of Washington Press, 17. /Seattle.

The variety of ancient Shi'i dramas in China has created many dramas in different areas and different regional dialects, reflecting the customs, actions, and dialects of ethnic groups. For example: "The names of ancient Chinese Shi'i dramas are not only named after the region's water, but also after the era, the state's name, and so on. For example: "Hebei Banzi," "Hunan Banzi," "Chuan Drama," "Yue Drama," "Huanmei Drama," etc. There are a total of 348 types of dramas in China, such as "Peking Opera," "Yue Opera," and "Huangmei Drama," which are well-known among the general public and have become famous at home and abroad."/2022,736/.

THE DAY IS IMITATION

The drama sung in the ancient "Kunshan" dialect was called "Kun opera." This opera is one of the ancient Shia dramas; the melody is lyrical, the rhythm is slow, the rhythm is slow, the words are elaborate, the acting is expressive, and it contains the meaning and aesthetic sense of the ancient art of the Asian people. "Kun Opera" developed over several thousand years, becoming rich themes and chants of Shi'i drama, forming a system such as complete musical melody and performance theory, which profoundly influenced many types of drama in China. The ancient Chinese "Kun Opera" is known as the "ancestor of Eldev drama." Kun opera is late Yuan /1260-1368/ State, Ming⁵It originated from the folk songs of the Kunshan area of Suzhou in the early dynasties, and as a result of many compilations by Shii drama composers such as Wei Liangfu (1489-1566), the Kunshan melody was transformed into a noble and innovative melody called "Watermill Melody." Therefore, Wei LiangFu was called the "Angel of Disaster" by future generations. After him, Kunshan Shii dramatist Liang Chen Hui /1521-1594/ wrote the story of Yu Yue in the Kunshan dialect, "The Legend of Washing Silk," combining eloquent words with a clear voice, highlighting Kun opera from among many types of dramas, and becoming a noble Shii drama. It is considered that "/2022, 737/" laid the foundation. Kun opera is Ming (Chinese.大明Da Ming) / 1368-1662 / Late State, Qing /1636-1912/ At the beginning of the State, Shii drama reached its peak and was called "noble melody" and "central music." Writers gradually took part in creative writing. These include Tang Shanzu's "Pavilion of Heaven," Shen Jing's "Slush Note," Li Hui's "Handful of Snow," Hong Sheng's "Eternal Palace," and Kun Shan Ren's "Peach Blossom Deck" There are novels. Many drama theorists, such as Sheng Jing, Li Hui, and Wang Jide, have organized music and performances. In 1956, Zhojan's Kun opera received the attention of the state when the Kun opera "Fifteen Strings" was staged in Beijing. In 2001,

⁵ In 1368, the capital of the Ming Dynasty's military Yuan StateDayucaptured the city and took control of most of the territory up to the Great Wall. 1382 to become the final stronghold of the Yuan Dynasty in ChinaBy subjugating the remnants of the Mongol army in Yunnan Provinceall of China is included in the power. During the Ming Dynasty, most of the Great Wall was rebuilt and the Forbidden City was built.

Kun opera was included in the list of the Intangible Cultural Heritage of Humanity by UNESCO”/ 2022, 737/.

BEIJING OPERA

Peking Shii is one of the most representative Chinese dramas. Later, it was called Peking Opera and combined the significant types of plays. Peking Opera is the highest level of Chinese Shi’i drama due to its influence in China and the world. In 1800, to celebrate the birth of the Heavenly Benefactor Emperor, four large groups of Anhui from the Zannan region went to Beijing, one after the other. Anhui’s drama troupe and Kun opera were mainly performed. After visiting Beijing, he took samples from drama types such as the Beijing dialect and Qin dialect, which were popular in the North, and later combined the “Chu dialect” of the Hubei region to combine the Beijing dialect with Hunan and Guangdong dialects to form “Shi pi.” er huang” dialect became a unified dialect. It was collectively called “Pi huang shi drama” or “Peking Opera.” Peking Opera gradually became famous throughout China with improvements and innovations in every aspect of scenery, costumes, and music. The musical part of Peking Opera mainly uses instruments such as chucker, erhu, yueqin, and small three-stringed Schanz (formerly known as the “Peking Opera Grand Quartet”), and the “Uchang” or fighting part: drums, big and small tambourines, big cymbals are also included. Peking Opera has accumulated much experience in drama writing and staging during its development. Thousands of classics such as “The Loss of Tax Medicines,” “Suolin Wallet,” “Four Men Returning to Their Mothers,” “The Symbol of Method,” and “Mu Gui-Yeng’s Order” continue to spread beauty in domestic and Foreign stages. In 2010, Peking Opera was registered in the UNESCO World Intangible Cultural Heritage List” 2023,737/.

IMITATION OF THE HOUSE

The original name of this work was “Khenan Banzy.” Later, it became known as “Ui Durilag”. It has an ancient history, a rich cultural heritage, and a good melody. is one of the best representatives” /2022,738/. Uy is characterized by four dialects such as “Shanfu” dialect, Eastern Uy dialect, Western Uy dialect, and Shahe dialect (also known as “Bandi ban”). By the 30s of the 20th century, Chang Shanyu, Chen Suzhen, Yan Liping, Ma Jingfeng, Cui Liantian, and Tang Shicheng were the best opera actors. These actors have created their unique style with exceptional acting and character. Opera reformer Fan Cutting founded the drama theater, identified the best talents, reformed and improved the Shii drama circle system, improved the general style of modern opera, and was called the “father of modern opera.” There are more than 1000 traditional opera works. In the old form of the opera, the main characters were “Sheng Jing Chou” (the main character, the clown character, and the black man), and the content was to stop violence and war and sing the praises of honest ministers. After introducing the female lead, the novel’s content is based on the female lead. The main works

are: “Harmony of Spring and Autumn,” “Double Flower Gun,” “Order of Tu Gui Yeng,” “Harmony of Heaven and Earth,” “Nan Yang Guan,” “Veil of the Widow Queen,” “Qin Shuei Mei.” Since the 1950s, new works have appeared.

SHAOSHIN PLAY

This “Shaoxing Drama,” which was first popularized in Zhujiang province, was first called “Shaoxing Drama” in the ancient Yue region and later became known as “Yue Drama.” The words of “Shaoxing plays” are crisp, often focus on the theme of love, and have the characteristics of poetry south of the Yangtze River. Artists from Shaoxin Village in Zhejiang Province performed on the stage, and a professional “Small Circle of Singers” formed a new genre of Shii drama. At that time, “Shaoxing Shii Drama” shook the hearts of Shanghai audiences.

Since the 30s of the 20th century, the women’s circle of Shii dramas began reviving, becoming a men’s drama circle. Yao Shui Zhuan, who is known as the Queen of Yue dramas, the founder of the New Yue drama, Yuan Shuifen, and Fang Ruizhuang, celebrities such as “Dream of the Red Tent,” “Two Butterflies,” “Journey to a Westerner,” “Jade Hairpin,” “Xianglin Bride,” “Legend of the White Snake” and other classic plays. Among them, “Two Butterflies,” starring Yuan Shuifen and Fang Ruizhuang, was released in 1953, becoming the first color film since the founding of the People’s Republic of China. Since the 50s of the 20th century, Shaoxing drama has been called “Yue drama” and started a new experiment of combining male and female characters, trained male actors, and found an aesthetic pleasure that the audience can enjoy.

TRAVELING DRAMA

Qin dialect drama originates from the northwestern regions of China, such as Shanxi and Gansu. It was initially popularized in the Wanli period of the Ming Dynasty under the name of “ban zi” dialect drama, and it became popular throughout the country at the beginning of the Qing Dynasty. “Banzi” dialect dramas such as Hebei, Jin, and Yue are all deeply related to the Qin dialect. The Chinese dialect is considered the ancestor of other “ban zi” dialects. The place where your dialect originated is the region of the Yellow Plateau, a sparsely populated, grassy plain. It exemplifies the high tone of the Qin dialect and the elegant style of lively and straightforward words. The main works include: “Spring and Autumn Brushes,” “Unique Jewels of the Hō Clan,” “Eight Honest Paintings,” “Jade Tiger Pendant,” and “Innocent Case.” In the 1870s, a drama troupe led by Wei Changsheng, a leading artist of the Qin dialect, performed several times in Beijing and demonstrated his prodigious skills. At that time, the Peking dialect drama was very late, so eventually, the masters of Peking Shii drama began to learn the “Ban zi” dialect. Later, Wei played in Changxin, Hebei, Tianjin, Shandong, and Southern Yangzhou, and the Qin dialect spread throughout the country and became very popular. The main works of Qin dialect dramas include: “Liang Hong Gui,” “Zhaojun Gone Far Away,” and “Madness.”

A SERIOUS DRAMA AND SHANSHI IMITATION

Jin drama is called Shanxi opera because it first became popular in that province. “Jin drama is “Pu” or “Beilu” drama /北路梆子/, “Shandun” drama /上党梆子/ It is believed to have emerged from the four major drama traditions of Shanxi. It developed into the song style of the rice-growing area of Puju, Shanxi⁶”. “Jin drama originated in the early Qing Dynasty (1644-1911), and then in the early 20th century, Shanxi merchants dominated Chinese trade, spreading Shanxi drama to other provinces such as Hebei, Shanxi, Gansu, and Inner Mongolia.⁷/Siu, Wang-Ngai; Lovrick, Peter, 1997. 16-17/.



Picture #2. From a part of the Jin dialect play.

There are more than 200 famous plays in the repertoire of Jin drama, and the accompanying music is composed of 9 people. For music: strings and percussion. There will be erhu, cymbals, small gongs, and drums. Due to this influence, there were four major dialect dramas in Shanxi province: “Middle Road Banzi,” “Northern Road Banzi,” “Fuzhou Banzi,” and “Shandong Banzi.” In 1954, it was officially called “Jin Drama”. “Jin dialect drama” emphasizes singing ability. Especially in the major parts of the main character, more than two characters sing in recitative form, mutually and alternately.



Picture #3. Shanxi Opera Performance at Shanxi Heku Open Air Theater. /29 September 2022⁸/,

Compared to the fast, strong, and powerful chants of Shanxi Province, the melody of Jin Song Drama is softer, the rhythm is more musical, and the singing and speaking are more Jinzhong local dialects. “Jin drama has produced many celebrities during its development. Ding Guoshan, who is called the great king of Jin drama, created the character of Jin drama, Chen Huiyin is the queen of Jin drama, and Wang Ai Ai can be mentioned.



Picture #4. Weight from the play

Talents of Jin drama have created many genres, such as: “Shu Shen,” “Ching Yi,” “Eren-faced,” “Baga Stream,” and “Baga Dan.” There are more than 500 works in the repertoire of Jin drama, and the content shows the struggle between honest and cunning people. There will be plays such as: “Broken Golden Branch,”

⁶ Ye, Tan (2008). Historical Dictionary of Chinese Theater. The Scarecrow Press. p. 271–272.

⁷ Siu, Wang-Ngai; Lovrick, Peter (1997). Chinese Opera: Images and Stories. UBC Press. pp. 16–17.

⁸ https://en.wikipedia.org/wiki/Shanxi_opera

“Golden Sand Beach,” “Fa Gate Temple,” “Ming Deep Comma,” “Butterfly Cup,” etc.

Yue⁹operatic

“Yue” originated from the ancient Chinese opera “Shaoshin”.¹⁰**operatic**” has become the second most popular opera genre in China.”¹¹ In 1906, in Shengzhou, Zhejiang Province, Yue opera featured male actors and femininity in singing, acting, and directing. Despite its rural origins, the play has made China’s wealthiest city, Shanghai, its second home, rivaling both Beijing and Shanghai Opera. “Yue opera is spoken in the Wu language, so it became popular in the Wu-speaking regions of southern Jiangsu, Zhejiang, and Shanghai. Yue’s opera fans are mainly women, so his repertoire contains relatively more love stories and less acrobatic combat. ¹⁵ “Before 1906, the predecessor of Yue opera was the hymn to the story. It was originally a pastime for the people of Shen County. His lyrics were mostly collected from the conversations of the peasants while they were working. People liked them because they vividly depicted everyday life. Farmers in Sheng County, near Shanghai, found it difficult to make a living, so they turned this folk art into a second source of income. Over the years, song poetry formed the basic source material for Yue opera, and folk music gradually developed its style. Yue opera began in 1906, according to oral history handed down by folk talents.¹²is believed to be. Soon after, in 1916, the name was changed to “Shaoxing Civil Opera” (pinyin: Shào Xing Wén Xi 绍兴文戏). Shaoxing was transformed into an opera. The drama is different from other dramas because it solves the unusual situation of a woman playing the role of a man.

Operas performed by women

At the beginning of the 20th century, young Chinese women had only two options for making a living. Either make them a child bride in a wealthy family or work in a factory. So, when Wall Street, the world’s trading center, collapsed, many factories in Shanghai closed down, which dealt a heavy blow to the economy. Because of this, women are forced to take training as female actors to earn a living. They usually underwent three months of training and then attended performances to gain acting experience. In February 1923, a girls’ opera was opened, and huge sums were spent on recruiting and encouraging young women. After an apprenticeship, the girls formed the first professional women’s band. 1920, the women’s Xizi (Xizi, 戏子) group came out. “The government assumed that plays performed by women would reduce the value of art. However, the progress made

⁹ https://en.wikipedia.org/wiki/Yue_opera

¹⁰ Yue opera is called «yueju» in Chinese pronunciation. According to some researchers in Hoishi, it is found under the name Yueju.

¹¹ Melvin, Sheila (1999-09-04).»*Into the Stronghold of Shaoxing Opera*».The New York Times.

¹² Jiang, Jin (2009). *Women Playing Men: Yue Opera and Social Change in Twentieth-Century Shanghai*. University of Washington Press. ISBN 978-0-295-98844-3.

by those artists became noticeable, and many women's groups were formed. By the beginning of 1930, Zhujiang province had a drama group of about two hundred women and two thousand students. The rise of Shaoxing opera in the early 1930s can be explained by two factors that explain the development of Shaoxing opera at that time. "One of them is the increase in economic incentives.

The Evolution of Yue Opera

Yue opera became popular in Shanghai in the early 1930s, drawing on the experience of other developed Chinese opera genres, such as Peking and Kun, which originated from rural folk songs and ballads in Zhejiang. "Yue drama became director-centered and changed the scene system. Lu Xun's "New Year's Sacrifice" with a strong focus on portraying the character and psychology of the characters 《美女》 created, a new opera based on a new theme adapted from the novel."



Picture No. 5. Ten famous actresses named "Ten Sisters" in 1947. Front Row (LR): Xu Tianhung, Fu Quanxiang, Yuan Xuefeng, Zhu Shuizhao, Fan Ruizhuang, Wu Xiaolou. Back Row (LR): Zhang Guifeng, Xiao Dangui, Xu Yulan, Ying Guifang.

In the 1920s, Yue adopted literary and expressive techniques such as dialogue, song, drama, and film, developing a style of realism and free acting. It reached its peak of popularity in the late 1950s and early 1960s. Realism in drama during this period and expressionism were used to make the river. "After the 1980s, Yue became popular again but was challenged by a new form of entertainment. "At first it was only men, but in 1923 female groups began to play, and in the 1930s the form became exclusively for women.¹³".

Conclusion

In summary, the ancient traditional Chinese dramas became the source of the development of Chinese national opera. Therefore, it is believed that the development of the national singing style influenced the development of opera singing. In the course of its development, singing drama, which has been developing for a very long time, has created many different ways of singing in the form of song, singing, traveling, moaning, chanting, melodic singing, narrative singing, and recitative-sentence singing. These ancient plays include singing, speaking, reading, acting, dancing, martial arts, circus performances, and acrobatics.¹⁴- types such as walking on wooden legs and introducing various Chinese national musical instruments were essential to preserving the national style and appearance.

¹³ *Hometown of Yueju Opera Marks 100th Anniversary*. (2006) Reprint from China Daily, April 6, 2006. China Internet Information Center. Retrieved 2 August 2010.

¹⁴ Acrobatics - this group of actors can easily do what others can't do with wheels. Jump over each other, perform complex turns and jumps with enthusiasm and courage.

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塔雷什农业气候区亚热带柿子病害病原菌种类组成
**SPECIES COMPOSITION OF PATHOGENS OF DISEASES OF
SUBTROPIC PERSIMMON IN THE AGROCLIMATIC ZONE OF
TALYSH**

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摘要。本文介绍了对亚热带柿子潜在危险疾病的病原菌分生孢子菌的研究结果。描述了这些真菌的形态和培养特征，以及它们的流行程度、感染强度和致病特性。我们的研究目的是研究塔雷什农业气候区亚热带柿子栽培中真菌群落的种类组成和分布，并确定最有害的病原菌。通过田间和实验室实验研究，确定了寄生在亚热带柿子栽培中的真菌种类组成。亚热带柿子的主要病害是由病原真菌引起的，包括灰腐病 (*Botrytis cinerea* Br.)、拟茎点霉 (*Phomopsis diospyri* Bong.)、黑星病 (*Ragnildiane Levieri Vass*)、大茎点霉 (*Macrofoma kaki Hara*)、炭疽病 (*Colletotrichum kaki Maffei*)、拟盘孢子囊霉 (*Pestalotia diospyri* Syl.)。

关键词：斑点病；病原菌；分生孢子器；密生孢子；病原菌群；植物病原真菌。

Abstract. *This article presents the results of studying pycnidial fungi, which are the causative agents of potentially dangerous diseases in subtropical persimmons. The morphological and cultural characteristics of these fungi, as well as their prevalence, intensity of infection, and pathogenic properties, are described. The aim of our research is to study the species composition and distribution of mycobiota on the subtropical persimmon culture in the agroclimatic zone of Talysh, and to identify the most harmful pathogens. Through field and laboratory experimental studies, the species composition of fungi parasitizing the subtropical persimmon culture was determined. The main diseases of subtropical persimmons are caused by pathogenic fungi, including gray rot (*Botrytis cinerea* Br.), *Phomopsis* (*Phomopsis diospyri* Bong.), scab (*Ragnildiane Levieri Vass*), *Macrofoma* (*Macrofoma kaki Hara*), anthracnose (*Colletotrichum kaki Maffei*), and *Pestalotia* (*Pestalotia diospyri* Syl.).*

Keywords: *spot disease; pathogen; pycnidia; pycnospores; pathogenic mycobiota; phytopathogenic fungi.*

Introduction. Persimmon is considered one of the most important fruit crops. In Azerbaijan, in particular, the Lankaran-Astara zone has all the necessary conditions for the steady growth of production of subtropical persimmon fruits and their processing. Its plantings are found in the Zagatala-Sheki, Karabakh, Shirvan, Ganja-Kazakh zones, as well as in a number of lowland areas, in particular in Khachmaz, where it successfully grows in the household plots of the population.

The most common varieties in our country are Hyakume, Maru, Khachia and Kostata.

According to the ripening time of persimmon fruits in the conditions of Azerbaijan, all varieties are divided into early, middle and late. The fruits of the first group ripen in late September, and late-ripening varieties in early November. In the activities for growing persimmon, it is important to protect it from fungal diseases, which can cause great damage to the crop. In humid subtropics, more than 20 different types of diseases have been noted on persimmon, the pathogens of which cause enormous damage. Among them, the overwhelming majority of species are phytopathogenic fungi (more than 80%). The adverse effects of environmental factors cause a weakening of plant immunity and lead to the activation of fungal pathogenic mycobiota [17, R.32-35].

Materials and methods

To determine the distribution and intensity of persimmon diseases in 2011-2023, we conducted route surveys of fruit-bearing plantations in the Talysh agroclimatic zone. Route surveys were conducted throughout the growing season. Collection, description and microscopy of fungi were carried out using standard mycological methods [1; 10; 15]. Determination of pathogens, as well as harmfulness and intensity of disease development was carried out using generally accepted methods [16]. Field route surveys were carried out by laying out stationary accounting sites. Isolation of pure cultures and determination of pathogens were carried out using generally accepted methods in phytopathology. The work is based on the methods of route-expeditionary and laboratory studies. When describing the collected material, characteristic diagnostic signs of pathogens were noted. Plant diseases were recorded using the following indicators: prevalence of the disease and the intensity or degree of damage to plants [2, pp. 160-162]. The species of pathogens, the timing of the appearance of disease symptoms, and the degree of susceptibility were studied. A 4-point scale was used to establish the distribution and intensity of diseases [4; 5: 6].

Results and discussions

As a result of long-term research (2011–2023), we registered about 20 species of fungi on subtropical persimmon in the agroclimatic zone of Talysh. Their species composition and prevalence on vegetative plants have been partially described earlier. In the Lenkoran-Astara zone, among persimmon diseases, the following deserve attention in terms of their harmfulness and general economic significance:

1. *Phomopsis* - *Phomopsis diospyri* Bong. Imperfect pycnidial fungus - Fungi imperfekti, to the order-Sphaeropsidales, family-Hyalosporaeae.

In domestic and foreign literature, information about the fungus *Phomopsis diospyri* and the diseases it causes is given in the works of Khazaradze, Khidureli, Dzimistarshvili, where there are indications that on persimmon trees, along with other fungi, *phomopsis* is quite often found [12, pp. 112-118; 13, pp. 253-260].

In the Lenkoran-Astara zone, *Phomopsis* is detected annually. The dynamics of the disease is determined by temperature and relative humidity. Fruit disease progresses with the onset of high temperatures (35-37°) at a relative humidity of 80-90%. Our data show that persimmon *Phomopsis* is not only a widespread disease, but also has a high degree of damage, which determines its harmfulness. Persimmon yield losses from *Phomopsis* (average data for 2014-2018) amounted to 43%. In terms of its negative economic significance, *Phomopsis* is almost as good as gray rot of persimmon. Branches, fruits and leaves are often infected with the disease. When branches are infected, cancerous growths appear on them. Depending on the age of the branches, the symptoms of the disease are different. Infection of one-year-old branches always begins at the attachment points of leaves, where brown spots with a blackish border form. At this time, the wood underneath is almost always black, the bark is recessed compared to the healthy part and longitudinal cracks are visible on it. On the peripheral part of the spot, on the border with the healthy part, fruiting of the fungus in the form of black dots is noticeable. On two- to three-year-old branches, the spots are blackish, and at the edges, a callus forms, has a stratified appearance and is covered with longitudinal cracks. After being surrounded by a spot, the upper part of the branch gradually withers and finally dries up. Fruits become infected both when newly set and when ripe. Newly set fruits rot, mummify and finally fall off; on the cups of such fruits, pycnidial fruiting of the fungus in the form of black dots is formed. In autumn, in humid weather, the disease intensifies. At this time, it moves from the cups to the fruits, as a result of which the fruits are easily separated and fall off, and the cups remain on the branches and are covered with fruiting fungus.

When the leaves are affected, brown spots bordered by a dark border are noticed on their edges. On the spots, pycnidial fruiting in the form of black dots is formed on both sides of the leaf.

From the results of our studies, it follows that the pathogen *Phomopsis diospyri* mainly affects the fruits and branches of subtropical persimmon, in rare cases - the leaves of these trees. On the infected tissues of persimmon, light brown spots appear, which take on a whitish-gray tint and on which fruiting fungus develops in large quantities in the form of black dots-pycnidia, which have a round, ellipsoidal, sometimes ovoid shape. The size of the pycnidia of the fungus species described by Khazaradze (1957) varied within 56-108 X 200-324 μm , while in the

species described by us it varied within 80-120 X 200-300 μm [3, pp. 153-156; 13, pp. 253-260;] The pycnidia are blackish, 200-300 μ in size with a porus at the top. Two different spores are formed in the pycnidia - short rod-shaped and filiform. Rod-shaped spores with two drops of oil have a size of 5-11 X 2-3 μ . Filiform spores are colorless, unicellular, bent, 16.5-22.5 x 1.5-5 μ in size. Both rod-shaped and filiform spores are often found in the same pycnidia [7, p. 172-174].

2. Pestalotia (Pestalotia diospyri Syl.). We noted pestaloccea of persimmon on leaves in the form of crimson-brown spots of varying sizes, outlined by a black border. Sometimes, even due to the multitude of spots, most of the leaf dries up. When infected, the epidermis of the leaf peels off, and good fruiting of the fungus is visible on it in the form of black dots. Often the tissue of the leaf covered with a spot is destroyed and the affected leaf becomes reticulated. Fruits are infected at different periods of development. The calyxes and peduncles are especially affected. Sometimes their falling off is noticeable. [11, P. 54-59]. Fruit peduncles of the fungus are in the form of black dots. In wet weather, a blackish mucous exudate is noticeable on the infected fruits. Spores are five-celled, of which 3 internal ones are colored, and two peripheral ones are colorless. The upper cell has 2-3 colorless eyelashes, and the last, fifth one passes into the conidiophore phase. Spores are 19-27x8-10 μ in size. [14]

3. Scab (Ragnildiane Levieri Vass), Scab for persimmon is considered one of the dangerous diseases. Scab - leads to the death of all areas of affected tissue, which can be distinguished by black spots on shoots and leaves. Infects both adults and seedlings. Especially causes infection of leaves and shoots. Sometimes damage to fruits is observed. On leaves, scab appears in the form of dark brown, slightly rounded spots, which sharply differ from the healthy part of the leaf and are delimited by a black border. Sometimes there are even cases when the entire surface of the leaf is covered with spots. At this time, the leaves quickly wither and fall off. Fruiting of the fungus occurs on both sides of the leaf, often on the underside in the form of a dark velvety coating. Spots on the shoots do not differ in their external symptoms from spots that appeared on the leaves. They differ only in that the spots on the shoots are more elongated, covered with a dark velvety coating and bordered. There are even cases when growths are visible along the edges of the spots. Shoots affected by scab lag behind in growth and often dry up above the spots. Fruits are mainly affected during the ripening period, on which black spots appear. Spots on the fruits are superficial with characteristic peeling of the bark. Fruiting of the fungus is mostly formed on the underside of the leaf. conidiophores are simple brown, 26-34x4-6 μ in size. conidiospores are cylindrical or spindle-shaped, single- or double-celled, rarely three-celled, 28-34x4-6 μ in size. The fungus overwinters as conidiospores and mycelium in the affected organs. Humidity and high temperature are of great importance for the spread of the disease.

4. Gray mold - *Botrytis dioispyri* Br. The fungus belongs to the group of imperfect fungi - Deuteructes, to the order Hyphomycetales, the family Mucedinaceae.

Gray mold, the causative agent of the disease is a broadly specialized fungus *Botrytis dioispyri* Br. infects leaves, flowers, ovaries, shoots, fruits. The disease is observed to a greater extent annually in all areas. An outbreak of gray mold is provoked by sudden changes in temperature, too high air humidity and waterlogging of the soil. The manifestation of gray mold coincides with the beginning of the growing season, since for its development the fungus requires a large amount of moisture, which in the conditions of our subtropics takes place precisely in the spring. Conducted according to our many years of observations, the period of greatest activity of the fungus - the causative agent of gray mold (*B. dioispyri*) coincides with the mass flowering of persimmon. Drying and falling of flowers and ovaries in some years reaches 30-35%. It turned out that the fungus *B. dioispyri* overwinters mainly as mycelium both on the plant itself and on its affected remains (branches, leaves) on the soil surface. Therefore, persimmon botrytis in most cases appears in the spring - in April or May. Gray mold of persimmon mostly causes a disease of the fruit, which first appears at the stalk in the form of small brown spots, which then penetrate deep into the fruit, as a result of which they rot and fall off. The fallen fruits are initially brown and then covered with a grey coating. The grey coating is also clearly visible on the petioles remaining on the tree [8, pp. 65-69].

The grey coating formed on the affected organs is a reproductive organ - conidial fruiting. This coating consists of microscopic conidiophores and conidia formed on them in the form of clusters. At the ends of the branches of the conidiophores, conidia are formed in groups, which are light green, oval or spherical, with a clearly visible shell measuring 11-16 x 7-9 μ .

It was established that the causative agent of grey rot *B. dioispyri* is spread both by mycelium and spores. As a result of studying the influence of temperature and humidity on the growth and development of the fungus, it was found that the fungus develops within the temperature range of 5°—35°C, with optimal growth observed within the range of 18°—22°C, and at 30-35°C the growth and development of the fungus ceases. It is interesting that the optimal temperature conditions for fungal growth and spore germination coincide. The best germination of spores is observed in droplet-liquid moisture.

When studying the effect of nutrient media on the growth and development of the fungus, it was found that the fungus prefers substrates rich in carbohydrates. It was found that the fungus develops within the reaction of the medium at pH 2.5-8.0. Optimum reaction rates are pH 4.5-5.0. [14]

5. Macrophoma - Macrofoma kaki Hara; Macrophoma infects leaves, shoots and fruits of persimmon. Infection of trees begins in early spring and con-

tinues until late autumn. Brown spots of various shapes and sizes are clearly visible on leaves infected with macrophoma, on which dark brown or black fruiting bodies are scattered, which are covered with the epidermis of the leaf. After the epidermis ruptures, the pores of the fruiting bodies protrude above the tissues of the leaf. Our research conducted on household plots of persimmon plantings has established that the pathogen of this disease causes drying of uneven-aged branches of this crop. During the period of the beginning of sap flow with high humidity of the soil and air, the bark tissue of the infected branches swells and acquires a dark shade. When infected, elongated spots of different sizes are formed on them, on which pycnidia are irregularly scattered. Sometimes longitudinal cracks or cancerous formations appear on them in the second spot. Penetration of infection occurs through mechanical damage to the bark. During the period of formation of pycnidial fruiting of the fungus, the bark on the affected areas becomes lumpy and acquires a shade depending on the variety and age of the tree. In the laboratory, on various nutrient media, a strain of this fungus was easily isolated from naturally affected samples of dried persimmon. According to the morpho-anatomical characteristics of pycnidia, pycnospores of this fungus formed on artificial nutrient media are similar to samples of naturally affected organs of the tree. In this case, the most abundant pycnidial fruiting was observed on the surface of agarized beer wort at a temperature of 18-20°. On nutrient media, srdah orkovno and artoflno agar, agar Chapka growth of the fungus is delayed and pycnidial spore-bearing fungus is insignificant. Pycnidia are numerous, spherical, almost tny.

When fruits are infected, they mummify, and slightly convex spherical black dots are clearly visible on the affected tissue, which are conidial spore-bearing fungus - pycnidia, 150-200 μ in diameter. Fruits rot and fall off; some rotten and mummified fruits remain on the tree; browning of fruits begins with the calyx and peduncle; spores are colorless, ellipsoidal or oblong, 15-20 μ long.

Long-term studies have established that the main sources of renewal and regular annual disease of vegetative and generative organs of persimmon are the mycelium, conidia and pycnospores of the studied fungus that have overwintered from year to year on the affected branches, fruit stalks and calyces. In the spring, when favorable conditions occur, an intensive dissemination of the infectious stock of the disease occurs with subsequent damage to the organs. [14]

6. Anthracnose or brown spot - *Colletotrichum Kaki Maffei*

We noted anthracnose of persimmon both on leaves and on fruits. On leaves, anthracnose appears in different places, but mostly on the edges and tops of the leaf. The spots are light brown, but gradually turn gray. Concentric circles of fruiting fungus, which occurs in the form of black dots, are visible on the leaves.

Fruit infection in most cases occurs during their ripening period. The spots on them are brown with concentric zonality. conidiospores are cylindrical with rounded ends, colorless, 18-21 \times 4-7 μ in size; [14]

Выводы

Thus, it has been established that the main pathogens of potentially dangerous diseases of subtropical persimmon in the Talysh agroclimatic zone are pyrenicidal fungi. Their prevalence, morphological and cultural characteristics, and pathogenic properties have been studied. For the first time, new fungi have been registered for the zone, which are the causative agents of highly harmful diseases. The species composition of fungi parasitizing persimmon depends on abiotic and biotic environmental factors, among which the main ones are weather conditions, variety resistance, and agricultural technology. Micromycetes are well adapted to changing external environmental factors, which enables them to survive in a wide range of weather conditions.

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7岁以上儿童重型颅脑损伤应激保护性矫正后自主神经张力昼夜节律变化
**CHANGES IN THE CIRCADIAN RHYTHM OF AUTONOMIC
TONE IN SEVERE COMBINED TRAUMATIC BRAIN INJURY
DEPENDING ON STRESS-PROTECTIVE CORRECTION IN
CHILDREN OVER 7 YEARS OLD**

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注释。对ICU收治的20名7.1至18岁儿童的自主神经反应进行了研究，根据严重颅脑损伤的严重程度将其分为2组，结果表明，入院当天以及与第1天指标相比的长期观察动态中，各组之间的RVT指标没有显著差异。在整个观察过程中，第2组的ANS交感神经紧张反应比第1组更明显。第2组患者的平均昼夜节律中OBT指标值较高。第2组受伤儿童全天所研究的指标，无论白天还是黑夜，都保持较高的活动水平，比第1组的数据高出70%以上。

关键词：自主神经紧张的昼夜节律，严重颅脑损伤，压力保护性矫正。

Annotation. *As a result of a study of the autonomic reaction of 20 children aged 7.1 to 18 years who were treated in the ICU, divided according to the severity of severe combined craniocerebral injury into 2 groups, it was revealed that in day of admission, as well as in the dynamics of prolonged observation relative to the indicator on day 1, there were no significant differences in the RVT indicator between groups. Throughout the observation, the tendency for a more pronounced sympathotonic reaction of the ANS in group 2 than in the first remained. Higher values of the OBT indicator in the average circadian rhythm were revealed in patients of group 2. The studied indicator in injured children of group 2 throughout the day, regardless of the light or dark period of the day, remained at a higher level of activity by more than 70% exceeding the data in group 1.*

Keywords: *circadian rhythm of autonomic tone, severe combined traumatic brain injury, stress-protective correction.*

Relevance. It has been established that the restructuring of the mechanisms of regulation of functional systems under stressful conditions depends on the individual typological characteristics of the child and the least adaptive is the sympathicotonic type of autonomic regulation, which also determines a less favorable prognosis for the restoration of the functions of organs and systems. The authors come to the conclusion that determining the type of autonomic regulation and systemic blood flow makes it possible to clarify the hierarchy of interactions of functional systems under stress conditions. Researchers have found that the autonomic nervous system (ANS) directly affects capillary blood flow and tissue perfusion. The juxtaglomerular apparatus in children is also not yet formed, while the vasoactive systems (renin-angiotensin-aldosterone system - RAAS, intrarenal adenosine) are active and easily stimulated by hypoxia. Based on a systematic approach, the typological features of the interaction of parameters of the homeostatic mechanisms of the blood flow systems, hematopoiesis, immunity, and hemocoagulation in sick school-age children were studied. New data have been obtained on the patterns of reorganization of relationships between functional systems in various nosological forms of diseases. Previously, we confirmed the opinion of researchers that the severity of brain damage affects the hemodynamic state of a child with STBI. A feature of shock in traumatic brain injury in children is the tendency to quickly change the phase of hemodynamic compensation with decompensation and deepening of shock. However, due to the lack of information on the peculiarities of autonomic regulation in conditions of severe combined traumatic brain injury in school-age children, we made an attempt to study and evaluate RVT in order to optimize the management of specialized patients [1-7].

Goal of the work. To study the response of the circadian rhythm of autonomic tone to severe combined traumatic brain injury depending on stress-protective correction over the age of 7 years.

Material and research methods. The study included 20 children aged 7.1 to 18 years. Upon admission to the intensive care unit, the victims underwent a set of diagnostic measures, the biochemical composition of the blood and its general analysis, the coagulation potential of the blood was studied, X-rays of the chest organs and existing areas of bone fractures were performed as indicated, and all victims underwent a computed tomographic examination of the head. The Injury Severity Score (ISS) was used to assess the severity of injury. The resulting value (from 1 to 75 points) in digital value shows the severity of the damage. Abroad, the ISS scale has become the most widely used and is the anatomical standard for the severity of damage [Demetriades D. et al., 1995; Osier T. et al., 1997; Oestern H.-J., 1997; Tatic M. et al., 2000; Wagner AK et al., 2000]. Non-invasive continuous monitoring with hourly recording of indicators, carried out in the intensive care unit, consisted of measuring blood pressure, RVT, blood oxygen saturation, heart rate (HR), myocardial oxygen demand (MOD).

During the period 2018-2022, the components of intensive complex therapy were studied in 10 children (group 1) aged 7.1-18 years. A comparative analysis was carried out with a group of 10 children identical in diagnosis, age, and severity of condition for 2023-24. (2nd group). There were no significant differences in age, gender, duration of hospital treatment, or duration of intensive care in the ICU. Due to the severity of the injury, the duration of mechanical respiratory support (MRS) in group 2 was slightly longer, amounting to 11.6 ± 5.6 days, while in group 1 the duration of mechanical ventilation was 8.6 ± 2.5 days (Table .1).

Table 1.

Groups	Days in hospital	In the ICU	Duration of mechanical ventilation
1	18.4±9.7	14.3±8.9	8.6±2.5
2	23±10.8	14.5±8.7	11.6±5.6

Comparative data on the volume of drug correction in the first 10 days of treatment revealed a significantly greater use of painkillers. Thus, if in group 1 fentanyl was administered at a rate of 13.9 ± 5.8 mcg/kg per day, then in group 2 it was almost 4 times more (52.6 ± 20.9) ($p < 0.05$). Profol in group 1 was administered at an average dose of 0.9 ± 0.7 mg/kg/day, and in group 2 the daily dose of profol administered was 26.7 ± 8.4 mg/kg per day (188% more than in first). Ardoin was administered in group 1 at 9.0 ± 3.6 mg/kg per day, in group 2 - almost twice as much (16.8 ± 5.6 mg/kg per day). Thus, attention was drawn to the fact that with relatively large trauma, volume of damage, and severity of TBI in dynamics in group 2, stress-limiting therapy was significantly increased. Moreover, the selected drugs for deeper sedation differed from those used before 2022 in their pharmacological properties, creating more favorable conditions for protecting the injured brain from excessive increases in ICP and secondary damage inevitable with STBI

The research data were processed by the method of variation statistics using the Excel program by calculating arithmetic means (M) and errors of means (m). To assess the significance of differences between two values, the parametric Student's test (t) was used. The relationship between the dynamics of the studied indicators was determined by the method of paired correlations. The critical significance level was taken equal to 0.05.

Results and its discussion. The severity of damage on the ISS scale was 23.1 ± 5.72 points in group 1, and in group 2 - 29.8 ± 4.0 points. Acute cerebral insufficiency corresponded to the Glasgow scale in group 19.7 ± 1.56 points, in 2 - 7.4 ± 1.4 points. A tendency was revealed for relatively more severe injuries (according to the ISS scale – 29.8 ± 6.0 points) and SCBI (according to the Glasgow scale 7.4 ± 1.4) in children of group 2. A comparative analysis of the average parameters of the circadian rhythm of RVT in the acute period of SCBI in chil-

dren over 7 years old revealed a significant increase in the mesor of the circadian rhythm of RVT by 57%, sympathetic autonomic regulation in the acrophase by 64%, with a tendency towards an increase in sympathotonic activity in the bathyphase, amplitude indicator and daily range RVT fluctuations (Table 2).

Table 2.

Average level of parameters of the phase structure of the circadian rhythm of OBT

Groups	Mesor	In acrophase	In bathyphase	Amplitude	Waste range of OVT
1	1.4±0.2	1.7±0.1	1.1±0.2	0.3±0.1	0.6±0.2
2	2.2±0.4*	2.8±0.7*	1.6±0.3	0.6±0.4	1.2±0.6

Table 3.

Circadian rhythm RVT

Days	1 group	2nd group
1	1.5±0.2	1.7±0.4
2	1.7±0.1	2.0±0.2
3	1.6±0.1	1.9±0.1*
4	1.6±0.1	1.9±0.1*
5	1.4±0.1	1.8±0.1*
6	1.5±0.1	1.8±0.1*
7	1.6±0.1	1.8±0.1
8	1.6±0.1	1.9±0.2
9	1.5±0.1	1.9±0.2
10	1.7±0.1	2.0±0.2
eleven	1.6±0.1	2.0±0.2
12	1.6±0.1	2.1±0.2
13	1.3±0.1	2.2±0.2
14	1.3±0.1	2.1±0.1
15	1.4±0.1	2.3±0.2
16	1.5±0.1	2.1±0.1
17	1.2±0.1	1.9±0.2
18	1.1±0.2	2.1±0.2
19	1.5±0.2	2.1±0.3
20	1.3±0.1	1.9±0.2
21	1.3±0.2	2.0±0.3
22	1.5±0.1	2.6±0.4
23	1.4±0.1	2.8±0.7
24	1.2±0.1	2.4±0.5
25	1.2±0.1	3.0±0.4

26	1.1±0.1	3.3±0.3
27	1.3±0.2	2.7±0.4
28	1.1±0.1	3.2±0.4
29	1.2±0.2	3.8±0.3

Table 4.
Average circadian rhythm of RVT

Watch	1 group	2nd group
8	1.4±0.2	2.4±0.5*
9	1.4±0.2	2.5±0.6*
10	1.5±0.2	2.3±0.5*
eleven	1.4±0.2	2.4±0.5*
12	1.5±0.2	2.4±0.5*
13	1.4±0.2	2.3±0.5*
14	1.4±0.2	2.3±0.5*
15	1.4±0.2	2.3±0.5*
16	1.5±0.2	2.3±0.5*
17	1.4±0.2	2.3±0.5*
18	1.4±0.3	2.3±0.5*
19	1.4±0.2	2.3±0.6*
20	1.4±0.2	2.4±0.6*
21	1.4±0.2	2.3±0.5*
22	1.4±0.2	2.3±0.6*
23	1.4±0.2	2.2±0.4*
24	1.4±0.2	2.1±0.4*
1	1.4±0.2	2.1±0.4*
2	1.4±0.2	2.1±0.4*
3	1.4±0.2	1.9±0.3
4	1.3±0.2	2.0±0.4*
5	1.4±0.2	2.0±0.3*
6	1.4±0.2	2.1±0.3*
7	1.4±0.2	2.3±0.4*

*-reliable relative to group 1 indicator

On the day of admission, as well as in the dynamics of observation relative to the indicator on day 1, there were no significant differences in the RVT indicator between groups. However, on days 3-6, there was a significant increase in the activity of sympathetic regulation in children of group 2 relative to the indicator in group 1 by 18%, 18%, 28%, 20% (Table 3). In the subsequent days of observation, the tendency for a more pronounced sympathotonic reaction of the ANS in group 2

than in group 1 continued (Fig. 1). Noteworthy is the comparatively higher level of sympathetic activity in group 2, represented by higher values of the OBT indicator in the average circadian rhythm. The studied indicator in injured children of group 2 throughout the day, regardless of the light or dark period of the day, remained at a higher level of activity by more than 70% exceeding the data in group 1 (Fig. 2). The findings were associated with more severe TBI and extracranial injuries. In this situation, apparently, it is necessary to determine the feasibility of a more pronounced deepening of medicinal sleep, which can lead to a significant decrease in the reversibility of changes in the structure and function of the cell, and in general the viability of the organism at the cellular level. Most likely, it makes sense to ensure the maintenance of metabolic activity, not limited to improving oxygenation, correcting shifts in clinical and biochemical parameters of homeostasis, but to add metabolite therapy aimed at combating energy deficiency and mitochondrial failure. The projection of the peak of the acrophase of the circadian rhythm of OBT was noted at 9 a.m., the bathyphase at 3 o'clock, which corresponds to the physiological parameters of the circadian rhythm of RVT (Fig. 2).

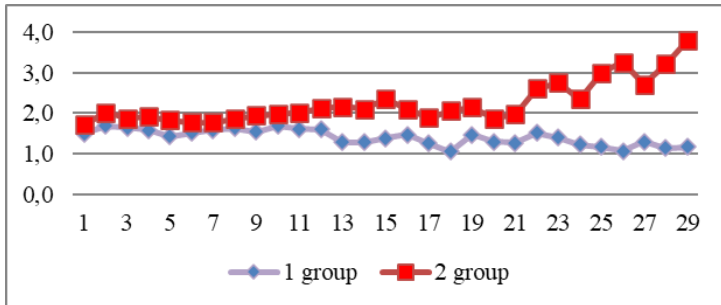


Figure 1. Dynamics of the mesor of the circadian rhythm of OBT in units.

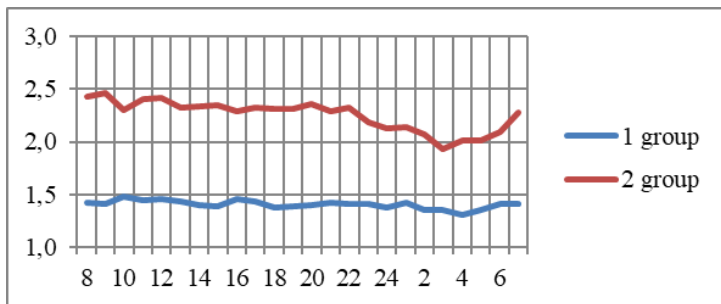


Figure 2. Average circadian rhythm of RVT, in units.

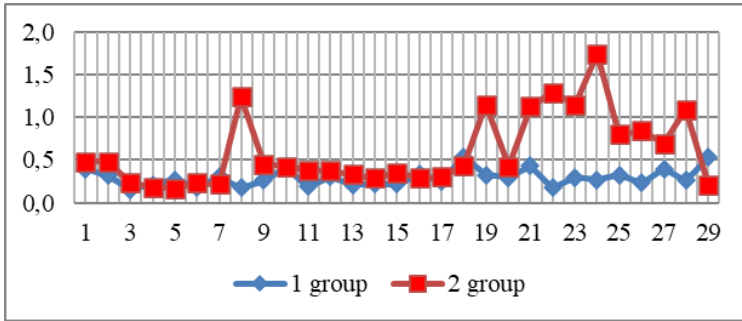


Figure 3. Dynamics of the amplitude of the circadian rhythm of RVT

The dynamics of the amplitude and daily range of OBT fluctuations indicated a relatively more significant tendency of hypersympathetic response in group 2 on the 8th day, after the 19th day, than in group 1 (Fig. 3). A direct strong correlation between MVP and the severity of the sympathotonic reaction was found (0.9) in group 1, while in group 2 this relationship was (0.15). The direct effect of RVT on the formation of a hyperdynamic type of hemodynamics was noted in group 1 through the IOC (0.79) and feedback from the OPSS (-0.65). The direct relationship between RVT and IOC (0.61), as well as RVT and TPR (-0.37) in group 2 was somewhat less pronounced. The increase in SV during the sympathotonic reaction turned out to be more noticeable in group 2 (0.73) than in group 1 (0.44). There was a tendency towards a stimulating effect of nootropic (0.46) and anti-inflammatory (0.51) therapy on RVT in group 2 (Fig. 4). The most significant was the significant decrease in the dependence of MVP on RVT as a result of stress-protective correction in group 2.

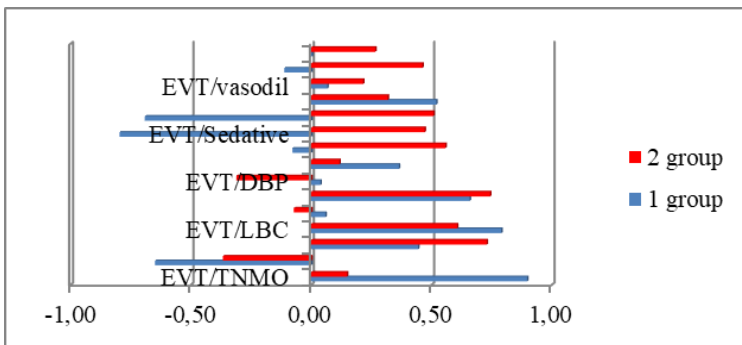


Figure 4. The relationship between the autonomic response, hemodynamics, and drug correction

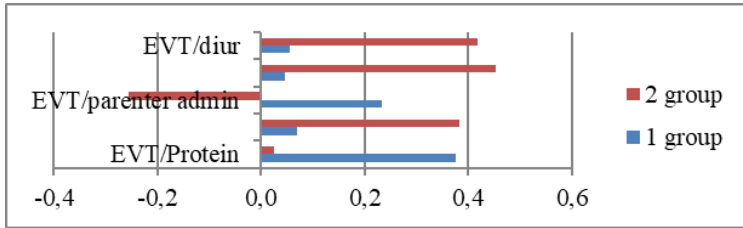


Figure 5. Correlation between water balance and autonomic regulation

Noteworthy is the tendency for a direct relationship between the stimulating effect of sympathetic activity on the urinary system (0.42) with an increase in the volume of enteral fluid administration (0.45), which is regarded as a positive effect of maintaining the compensatory response of renal function to infusion therapy in group 2 of patients (Fig. 5).

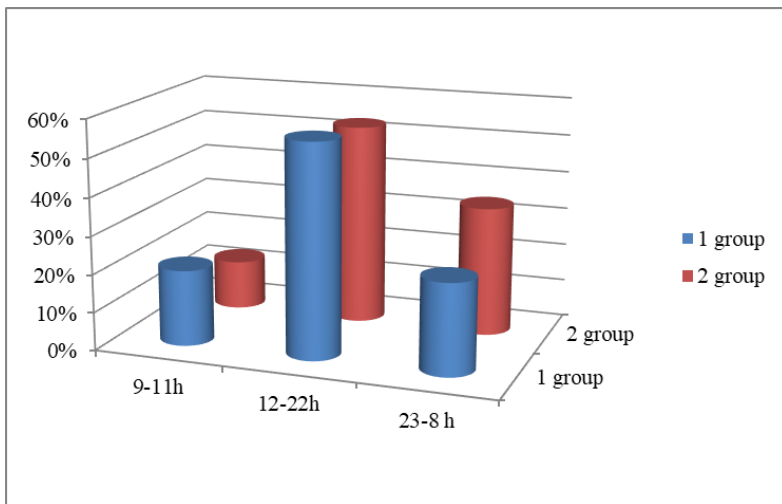


Figure 6. Duration of inversion of the circadian rhythm of RVT in % of the total duration of treatment.

The duration of inversion of the circadian rhythm of RVT as a percentage of the total duration of treatment was slightly longer in group 2, amounting to 34%, versus 24% in group 1 (Fig. 6).

Conclusion. On the day of admission, sympathotonic reactions were observed in both groups. In the dynamics of observation, no significant differences were found in relation to the indicator on the 1st day of the RVT indicator between the

groups. Throughout the observation, the tendency for a more pronounced sympathotonic reaction of the ANS in group 2 than in the first remained. Higher values of the parameters of the phase structure of the RVT indicator in the average circadian rhythm were revealed in patients of group 2. The studied indicator in injured children of group 2 remained at a higher level of activity throughout the day, regardless of the light or dark period of the day, exceeding the data in group 1 by more than 70%.

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来自城市和农村的大一新生的身体表现

**PHYSICAL PERFORMANCE OF FIRST-YEAR STUDENTS OF
UNIVERSITIES WHO ARRIVED FROM CITIES AND RURAL
SETTLEMENTS**

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摘要。本文采用 V.L. Karpman 的台阶测试标准方法,对 356 名青少年学生的身体机能水平 (PP) 进行了分析,这些学生就读于俄罗斯的七所专业大学,其中城市学生占 214 名,农村学生占 142 名,农村学生占 39.9%。首先,PP 并不完全取决于居住地,而是取决于所受的教育。其次,年轻男性的 PP 和最大耗氧量 (VO₂max) 值受到多种综合因素的显著影响,其中最重要的是高中和青年体育学校在进入大学之前接受常规体育教育和运动相关的高水平运动活动。结果表明,在专业体育大学就读的年轻男性的 PP 和 VO₂max 水平显著 ($p < 0.05$) 较高。

关键词: 俄罗斯大学一年级男生, 身体机能。

Abstract. *The article presents an analysis of the level of physical performance (PP) using the standard method of the step test by V.L. Karpman in 356 students of adolescence, who entered seven specialized universities of Russia from cities (214 - 69.1%) and rural settlements 142 - 39.9%). Firstly, it is suggested that PP does not reliably depend on the region of residence, but depends on the profile of the education received. Secondly, that PP and the values of maximum oxygen consumption (VO₂max) of young men are significantly influenced by a number of combined factors, the most significant of which is the high level of motor activity associated with regular physical education and sports, both in secondary school and in the Youth Sports School, preceding admission to the university. It is shown that the level of PP and VO₂max is significantly ($p < 0.05$) higher in young men studying in specialized physical education universities.*

Keywords: *first-year male students of Russian universities, physical performance.*

Relevance. In recent years, the health of schoolchildren and students in our country has been of particular concern [2, 8], since its preservation at a young age determines its condition in subsequent age periods. The health and physical development of students in comprehensive schools and students is the key to preserving both the labor and defense potential of our country. It should be noted that much attention has always been paid to the concept of a health culture, an assessment of the morphological and functional state of schoolchildren and students living in various regions of the Russian Federation [10, 11, 13]. At the same time, the deterioration in the health of the young population of Russia, which is

often associated with a decrease in the level of physical activity and lifestyle, is of particular concern [4, 6, 12]. One of the most important indicators for assessing the functional state of the human body is PP, which, in our opinion, has not been sufficiently studied in modern students of various specialized universities of the Russian Federation [1, 5, 9, 14, 15]. In this regard, scientific research aimed at developing regional standards for the morphofunctional state of modern student youth is relevant and in demand. We are deeply convinced that today it should become a mandatory rule - a university physical education teacher, starting classes with students, must have a clear idea of their health, functional state and adaptive capabilities. At the same time, in our opinion, his arsenal of research should include simple and safe assessment methods that can be used in any conditions of the educational or training process.

Object of the study: students of adolescence at various universities of the Russian Federation.

Subject of the study: physical performance and maximum oxygen consumption in young men who entered various universities of Russia from cities and rural settlements. Research hypothesis: firstly, it is suggested that in adolescent students at the initial stage of receiving higher education, the PP does not reliably depend on the region of residence, but depends on the profile of the education received. Secondly, the level of PP of the adolescent organism and the values of the VO₂max are influenced by a number of combined factors, the most significant of which are the high level of motor activity associated with regular physical education and sports, both in comprehensive schools and in youth sports schools.

Objective: to assess the influence of the region of residence on the level of PP and VO₂max of adolescent students at the initial stage of receiving higher education in various universities of the Russian Federation.

Material and methods. Using a random sampling method, the study of physical fitness and maximal physical fitness was conducted in 385 young men, graduates of comprehensive schools, who entered eight universities of the Russian Federation to receive specialized education: Irkutsk State University (ISU) - 74 (19.2%), Siberian Federal University (SFU) - 69 (17.9%), Novosibirsk State Pedagogical University (NSPU) - 50 (12.9%), Tyumen State University (TymSU) - 48 (12.4%), Tyumen State Medical University (TyumSMU) - 29 (7.5%), Ural State University of Physical Education - (UralSUPE) 46 (11.9%), Tchaikovsky State Academy of Physical Education and Sports (TSAPES) - 37 (9.6%), Khabarovsk Regional Institute of Educational Development named after K.D. Ushinsky (KRIDE) - 32 (8.3%). There were 232 (60.2%) young men who entered universities from cities, 153 (39.8%) people from rural settlements.

The level of PP was studied using the standard step test PWC170 [3], recommended by the International Program of the World Health Organization (WHO),

which has found application in the practice of student sports, with the calculation of the VO2 max [7]:

$$\text{VO2 max} = 2.2 \times \text{PWC170} + 1070.$$

The results of the study were processed on a personal computer using the Statistika program. The reliability of differences was assessed using Student's t-criterion, and the differences were considered reliable at $p < 0.05$.

Ethical review. The principles of voluntariness, rights and freedoms of the individual guaranteed by Articles 21 and 22 of the Constitution of the Russian Federation, as well as the Order of the Ministry of Health and Social Development of Russia No. 774n of August 31, 2010 "On the Ethics Council" were observed. The study was conducted in compliance with the ethical standards set out in the Declaration of Helsinki of the World Medical Association "Ethical principles for medical research involving human subjects", which was adopted at the 59th General Assembly in October 2008. The authors obtained oral consent from the students to conduct the study and publish the data.

Results and discussion.

There are practically few studies that shed light on the values of PP and BMD in young men who entered universities in Russia from cities and rural areas in different geographical locations, which served as the purpose of this report. Assessing the results of the physical performance of young students (18-19 years old) of various Russian universities who entered higher education institutions from cities and rural settlements, we note that they indicated that at the time of the examination it was at the level of good (TSU, ISU, SFU, NSU, KRIDE) and excellent (UralSUPC and TSAPCaS) values characteristic of this age period of ontogenesis (Table 1).

Table 1

Physical performance indicator in young men who entered higher education institutions of the Russian Federation from cities and rural settlements ($M \pm m$)

University	Number of people	PWC 170 kgm/min Urban	PWC 170 kgm/min Rural	Student's criterion Tst=reliability of differences (P)
UralSUPC n=46	n=28 n=18	998±2	1028±3	Tst=2,3 P<0,05
TSAPCaS n=37	n=23 n=14	989,23±1,5	1021,62±2	Tst=5,12 P<0,01
ISU n=74	n=44 n=30	973,90±1,9	996,41±2,1	Tst=2,8 P<0,01
TSU n=48	n=28 n=20	971,55±1,7	992,73±1,9	Tst=3,23 P<0,01
NSU n=50	n=31 n=19	963,66±2,2	990,38±2,5	Tst=2,43 P<0,05

SFU n=69	n=41 n=28	958,47±2,3	987,56±2,1	Tst=2,98 P<0,01
KRIDE n=32	n=19 n=13	952,78±1.8	973,15±2,1	Tst=2,74 P<0,05
TyumSU	n=18 n=11	913,53±1.8	941,47±2,0	tst=2,59 p<0,05

In the first case, the PP was in the range from 900 to 1000 kgm/min, and in the second case, in the range from 1000 to 1500 kgm/min. Analyzing the obtained data, we, firstly, concluded that higher PP values were observed in young men who entered sports-oriented universities, such as TSAPCaS and UralSUPC. Secondly, we note that regardless of the region of study, all young men had a fairly good level of PP. Thirdly, the numerical values of PP in young men from different regions of Russia had almost the same indicators in kgm/min. Fourthly, reliable ($p<0.05$) differences in PWC 170 kgm/min were revealed between young men who entered to receive education from cities and rural settlements, regardless of the territorial location of the university. Fifthly, we confirmed the hypothesis that the young men who entered specialized sports universities in Russia have significantly ($p<0.05$) higher PP (Fig. 1) and VO₂max than young men from other specialized universities. We assumed that the closer the university is to the European territory of the Russian Federation, the higher the level of PP in young men.

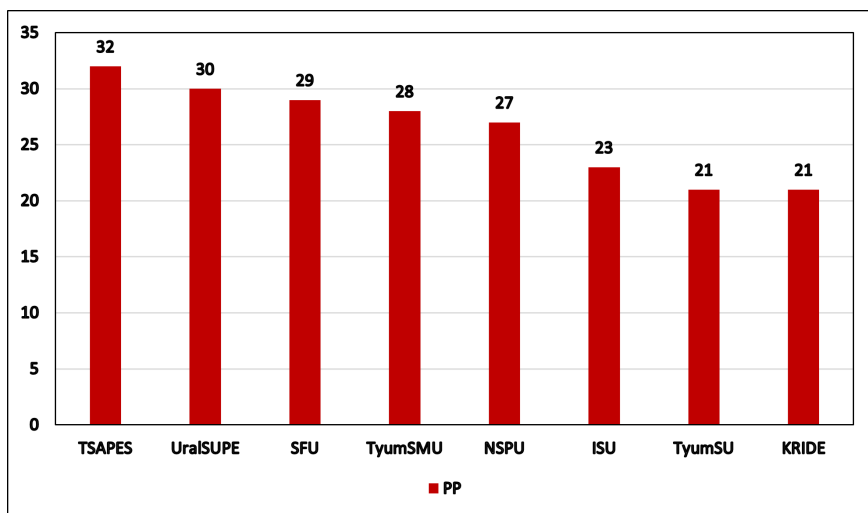


Figure 1. Differences in the level of physical performance in kgm/min of young men who entered Russian universities from cities and rural settlements.

When assessing the calculated values of the VO₂max in the PWC 170 sample, we assumed that the average values were from 38 to 44 ml/min/kg, and above average from 45 to 52 ml/min/kg. The VO₂max above average was noted only among young men from UralSUPC and TSAPCaS (Fig. 2), which we also associate with the high level of physical activity that occurred before entering the university due to regular sports activities.

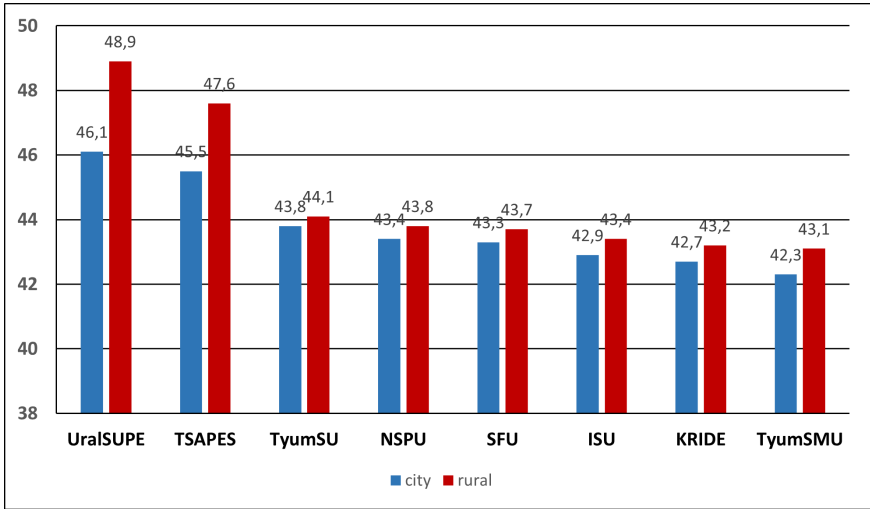


Figure 2. Maximum oxygen consumption (ml/min/kg) in young men who entered Russian universities from cities and rural areas.

As we expected, the VO₂max is significantly ($p < 0.05$) higher only in young men who entered “sports” universities - UralSUPC and TSAPCaS, while there are no reliable differences in young men from other territorially located universities of the Russian Federation. First of all, we associate this with the high level of physical activity that took place before entering the university.

It is of undoubted scientific interest to compare the data we obtained from students of specialized universities of the Russian Federation with the VO₂max indicators of highly qualified athletes (Table 2). We understand that it is not correct to compare the VO₂max of highly qualified athletes, especially of an older age, with young men who were just schoolchildren yesterday, but such a comparison shows what limitless possibilities a person has if he competently and consistently plays sports.

Table 2
VO2 max index in highly qualified athletes

No.	Surname	Kind of sport	VO2max
1	Oskar Svendsen	Cycling	97,5
2	Espen Harald Bjerke	Skiing	96,0
3	Kurt Asle Arvisen	Bike racing	93,0
4	Greg Lemond	Bike racing	92,5
5	Tore Ruud Hovstad	Skiing	92,0
6	Gunde Svan	Skiing	91,0
7	Harri Kirvesniemi	Skiing	91,0
8	Miguel Indurain	Cycling	88,0
9	Anders Auckland	Skiing	88,0
10	John Anders Gaustad	Skiing	87,0
11	Edvard Boasson Hagen	Cycling	86,4
12	Thor Hushovd	Cycling	86,0
13	Ole Einar Bjoerndalen	Biathlon	86,0
14	Chris Froome	Cycling	84,6
15	David Bedford	Running	85,0
16	Lance Armstrong	Cycling	84,0
17	Mark Walters	Cycling	83,5
18	Jens Arne Svartedal	Skiing	83,0
19	Kipchogo Keino	Running	82,0
20	Craig Virgin	Running	81,1

Conclusions.

1. Thus, the authors confirmed the hypothesis that physical performance and maximum oxygen consumption, analyzed by the PWC 170 method in adolescent students studying in specialized universities in Russia, are at a good and almost the same level, regardless of the region of residence. The data obtained during the study should be taken into account when conducting physical education classes at the university. In absolute values, physical performance is higher in young men who entered the “sports” universities of the Russian Federation.

2. Maximum oxygen consumption in young men at the initial stage of receiving a university education depends on the profile of study and is at a sufficient level, which will give each of them the opportunity to engage in physical education not only as part of the educational process, but also to attend sports sections of their choice.

In this article, we only identify possible problematic issues related to the regional characteristics of the PP of students of adolescence, which we plan to solve in the process of their education.

The authors declare no conflict of interest in the presented article.

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小鼠结肠病理生物群的建模

MODELING OF THE COLONIC PATHOBIOME IN MICE

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摘要。了解病理生物组在 2 型糖尿病等疾病发展中的作用，需要开发一个稳定的病理生物组模型。这项研究的目的是通过脾切除术模拟小鼠病理生物组的形成。结果表明，在第 30 天，结肠病理生物组主要成分的水平发生了显著变化，这种变化持续到第 60 天并不断加深，这使得形成一个病理生物组模型成为可能，在此基础上可以模拟微生物组相关疾病。

关键词：nomobiom、脾切除术、小鼠、脾肠轴病理生物组、炎症。

Summary. *Understanding the role of the pathobiome in the development of diseases such as type 2 diabetes mellitus, requires the development of a stable model of the pathobiome. The aim of the study was to simulate the formation of a pathobiome in mice by splenectomy. It is shown that on day 30, a significant change in the level of the main components of the colonic pathobiome is achieved, which persist and deepen by day 60, which makes it possible to form a pathobiome model on which microbiome-associated diseases can be modeled.*

Keywords: *nomobiom, splenectomy, mice, spleen-gut axis pathobiom, inflammation.*

Introduction

The normobiome of the colon is a dynamic, self-regulating system in which each component occupies a certain place and performs certain functions to maintain and preserve both its species and to ensure other components of the ecosys-

tem, including the host. In case of damage to the normobiome, adaptation systems are first activated and in this case we can talk about stage 1-2 dysbiosis. However, if the possibilities of adaptive mechanisms are exhausted, one or another component (some kind of bacteria, viruses or fungi) is destroyed or their growth and spread are suppressed, other mechanisms for restoring microbial homeostasis are activated, which lead to the formation of a different system, different from the normobiome, which at a new level is a dynamic and self-regulating system, but it no longer performs the function of providing the “host” with the necessary vitamins and other metabolites, but, on the contrary, leads to the development of inflammatory bowel diseases and the body as a whole. This system is called “pathobiom”. and, on the other hand, the very introduction of antibiotics damages the liver, heart, pancreas and does not allow to obtain an etiopathogenetically justified model of diseases.

The presence of a pathobiome is a risk factor for the development of almost all socially significant diseases [1]. It has been shown that patients with a low α -diversity of the intestinal microbiome [2] and a high relative content of pathogenic gram-negative bacteria and enterococci [3] are at a higher risk of developing sepsis in postoperative patients [4]. In patients with intestinal barrier dysfunction, an increased level of LPS-containing bacterial extracellular vesicles is detected [5,6], which also confirms the relationship between the microbiota and the host organism. It has been shown to be associated with various therapeutic interventions, primarily with antibiotic therapy and parenteral nutrition [7]. The most important functions of the normobiome include maintaining an adequate immune response of the body to pathogens. In the neonatal period, intestinal bacteria play a vital role in the development and maturation of the spleen [8]. The microbiome-spleen axis plays an important role in modulating the process of systemic inflammation and the development of immune responses in allergic reactions [9] Patients with primary general variable immunodeficiency have a reduced level of circulating IgM memory cells and intestinal IgA+ plasma cells. In addition, they show a violation of the mucous barrier and a reduced content of secretory sIgA in it [10]. In mice, splenectomy leads to a decrease in circulating IgM memory B cells and the disappearance of intestinal plasma cells secreting IgA, impaired immune status. In humans, splenectomy also leads to the development of infectious complications caused by pathogenic and opportunistic microflora, at different times after splenectomy, the growth of *Streptococcus pneumoniae*, *Escherichia coli*, *Staphylococcus aureus*, *Neisseria meningitidis*, *H. influenzae* and other microorganisms of colonic origin is noted [11]. Among the infectious complications after splenectomy, diseases of the respiratory system caused by these agents are most common. Animals and people with a removed spleen may also develop infectious diseases, which have received the group name “insurmountable (fatal) Post-Splenectomy

infections” (Overwhelming Post-Splenectomy Infections - OPSI) [12]. The incidence of sepsis after splenectomy is 50-600 times higher than the incidence of sepsis in the general population [13]. On the other hand, it is known that patients with type 2 diabetes mellitus show specific changes in the microbiome, which allows us to talk about a diabetes-specific pathobiome. When modeling diabetes mellitus by administration of streptozotocin, disorders in the structure of the islets of Langerhans develop more effectively and stably in case of damage to the spleen or thymus. TLRs is the main class of receptors for pattern recognition in mammalian cells. TLRs can induce the expression of proinflammatory cytokines through interaction with conserved molecular structures associated with the pathogen and subsequently activate the nuclear factor- κ B (NF- κ B) signaling pathway and produce proinflammatory cytokines in mammals, including humans. Among TLRs, TLR4 is closely related to DM2 and plays an important role in the pathogenesis of insulin resistance and DM2. It is also assumed that an increase in the frequency of DM2 due to the consumption of glucose with food is associated with the function of TLR4, which is a receptor for lipopolysaccharide of gram-negative bacteria [14].

The problem of modeling the pathobiome in laboratory animals is complicated by the fact that the microbiome in rodents has significant adaptive and regenerative capabilities, therefore, the formation of a stable pathobiome model is possible when exposed to the central organs of the immune system. A model has been described that ensures the formation of the intestinal pathobiome in white mice irradiated with gamma quanta [15], however, special equipment is required to reproduce this model. A method for modeling intestinal dysbiosis in rats is also described [Patent SU 1,562,952 A1], in which thymectomy is performed in mongrel rats under hexenal anesthesia. In this case, the removal of the thymus caused pronounced violations of the ratio of microorganisms - inhabitants of normal microflora, intestines, which was characterized by a general decrease in the proportion of indigenous flora with a simultaneous increase in opportunistic and pathogenic forms of microorganisms. These changes persist for 6 to 8 months, which allows us to talk about the formation of a pathobiome, that is, a complete change in the microbial landscape with subsequent effects on all organs and systems. The disadvantages of this solution are the complexity of surgical intervention in the neck area, where a large number of blood vessels pass, which requires the use of large animals (rats). In addition, the thymus in an adult organism undergoes significant involuntional changes, individual differences in the degree of accidental thymus involution also affect the reproducibility of the model. Data on the effect of splenectomy on the development of dysbiosis followed by the formation of a pathobiome are contradictory. Splenectomy in mice cause an increase in CD8+GP33+ T cells and effector KLRG1+ T cells in the mesenteric lymph nodes [11], so the patho-

biome formation leads to the changes of the immune system reaction to the viral and bacterial infections. The aim of the study was to study the possibility of the formation of a colonic pathobiome in mice by splenectomy

Materials and methods

The work was performed on 40 male mice of the Balb/c line with a body weight of 18-20 g. The mice were randomized into three groups: a control group (10 mice) and two experimental groups of 15 mice each with withdrawal dates from the experiment on the 30th and 60th days after splenectomy. The mice were free of specific pathogens and were kept in an isolated room throughout the study, under standard conditions (feed and drinking water ad libitum). The animals were kept and removed from the experiment in accordance with the order of the Ministry of Health of the USSR No. 755 dated 08/12/1977 and Directive 2010/63/EU of the European Parliament and of the Council of the European Union of September 22, 2010 on the protection of animals used for scientific purposes. The study was approved at a meeting of the local ethics commission of the Federal State Budgetary Scientific Research Institute of the Russian Academy of Sciences.

The splenectomy operation was made as it was described in the standard protocol [15]. An oblique incision with a length of 0.3-0.5 cm was made in the left hypochondrium. The spleen was removed into the wound, a ligature was applied to its gate, after which the spleen was removed. In the postoperative period, antibiotic therapy was not performed. During the postoperative period, 3 mice died. The survival rate was 90%.

A bacteriological method was used to assess the composition of the luminal microbiota. In mice of the experimental and control groups, on the 30th and 60th days after surgery, crops were carried out using the method of decimal dilutions of faecal suspension. Feces were weighed, homogenized in saline solution (NaCl, 0.15 M) in a ratio of 1:9 (by weight), and sterile saline solution was also used for subsequent decimal dilutions. To isolate and identify bacteria, selective nutrient media produced by HiMedia (India) were used to assess the presence of *Enterobacteriaceae*, *Enterococci* (*E. fecalis*, *E. fecium*) and *Lactobacilli* in CFU/ml. After recalculation, N (CFU/g) was converted to logarithmic form and microbiological parameters were compared using parametric statistics methods. The differences were considered significant at $P < 0.05$.

Results

On the 30th day after splenectomy, the content of lactose-positive coliform enterobacteria decreased by 1.2 times compared with the control, and the number of lactose-negative increased by 1.1 times. The amount of *E. fecium* significantly decreased by 1.2 times, and the amount of *E. fecalis* did not change compared to the control, as a result of which the enterococcal pathogenicity index, which is defined as the ratio of these species, increased by 1.2 times. The number of lac-

tobacilli decreased by 1.1 times on day 30 compared to the control. On the 60th day after splenectomy surgery, the content of lactose-positive enterobacteria decreased by 1.5 times compared to the control, and the number of lactose-negative ones increased by 1.1 times. The amount of *E. fecium* significantly decreased by 1.2 times, and the amount of *E. fecalis* did not change compared to the control, as a result of which the enterococcal pathogenicity index, which is defined as the ratio of these species, increased by 1.2 times. The number of lactobacilli decreased by 1.2 times on day 30 compared to the control.

Changes in the quantitative composition of the luminal microflora of the colon in BalbC mice on the 30th and 60th days after splenectomy

Group	Enterobacteriaceae (lgN)		Enterococci (lgN)		Lactobacilli (lgN)
	Lac+	Lac-	E.faecalis	E.faecium	
Control	5,9±0,4	4,7±0,7	5,0±0,01	8,5±0,4	7,8±0,7
30 days	5,1±0,9	5,2±0,7	5,3±0,6	7,0±0,5	7,2±0,8
60 days	4,0±0,0	5,1±1,0	5,1±1,0	7,2±0,4	6,6±1,5
Significant reliability	P(1-3) <0,01			P(1-2) <0,01 P(1-3) <0,01	P(1-3) <0,05

Thus, on the 30th day after splenectomy, spontaneous formation of the pathobiome occurred, on the 60th day after splenectomy, quantitative and qualitative shifts in the microbiome persisted, which can be assessed as a formed pathobiome.

Conflict of interest. The authors declare that there is no any conflicts of interest.

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智能系统发展趋势

TRENDS IN THE DEVELOPMENT OF INTELLIGENT SYSTEMS

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摘要。本文提出了人工智能类型的分类,并在此基础上提出了智能系统的概念。本文考虑了人工智能的类型学,建议将其划分为几个领域:按一组关键特征和掌握的知识领域数量。在此基础上,人工智能系统分为强人工智能系统和弱人工智能系统、广人工智能系统和狭人工智能系统。本文介绍了智能系统的主要特征:学习、适应和自组织的能力,并给出了智能系统在科学和公共生活各个领域的应用实例。本文还考虑了智能系统的优缺点、发展的可能性和前景。

关键词: 人工智能、弱人工智能、强人工智能、智能系统。

Abstract. *The article proposes a classification of artificial intelligence types, on the basis of which the concept of an intelligent system is formulated. The typology of artificial intelligence is considered, which suggests its division into several areas: by a set of key features and by the number of mastered areas of knowledge. On this basis, artificial intelligence systems are divided into strong and weak, broad and narrow. The key features of intelligent systems are presented: the ability to learn, adapt and self-organize, and examples of the use of intelligent systems in various areas of scientific and public life are given. The advantages and disadvantages, possibilities and prospects for the development of intelligent systems are also considered.*

Keywords: *Artificial intelligence, weak artificial intelligence, strong artificial intelligence, intelligent system.*

Introduction

Intelligent systems are becoming increasingly popular in the modern world, where automation and artificial intelligence play a key role in various industries. These systems are capable of performing complex tasks that were previously available only to humans, such as decision-making, learning, and adaptation.

The typology of artificial intelligence suggests its division into several areas. According to a set of key features that a system should have, artificial intelligence

is divided into strong and weak. The signs of strong artificial intelligence are: actions in conditions of multitasking and uncertainty, the ability to self-learn and present knowledge, use of strategies and the ability to communicate, as well as make decisions. The main difference is the ability to combine the listed abilities to solve assigned tasks.

Weak artificial intelligence is designed to solve narrow problems - this can be translating text sources or playing checkers. It uses a fixed set of rules, without having extensive knowledge of the subject of imitation. Nevertheless, weak artificial intelligence is useful methodologically. It allows you to check using neural network systems, rank data using statistical models, etc. Back in 1980, J. Searle distinguished strong intelligence from weak intelligence by the presence of self-awareness and perception. The second classification feature is the number of mastered areas of knowledge. According to this feature, artificial intelligence is divided into broad and narrow. In addition, there are systems that work with one type of data - texts, photos, videos, sounds, etc., and with many types. Accordingly, they are called uni- and multi-modal. It should be understood that the assessment systems do not correlate with the methodology of solving problems. It does not matter at all what methods are used to solve the problem - using a neural network or statistical methods - the operability of the solution is important.

To achieve the goal of the study, theoretical methods of scientific research were used: classification, generalization, comparative analysis and synthesis, analysis of scientific and specialized literature.

Main results

Thus, it is possible to formulate the concept of an intelligent system as a general artificial intelligence - strong, broad, multimodal. Such an intelligent system is capable of self-learning, can plan and set strategic goals (strong artificial intelligence); can generalize knowledge from different areas and use it for work (broad artificial intelligence); takes into account not only text information, but also images, sounds, etc. (multimodal artificial intelligence). In essence, intelligent systems are a class of systems capable of performing complex intellectual functions, such as decision making, learning, adaptation, and self-organization. They are used in various fields, including robotics, artificial intelligence, information technology, and many others.

Discussion

An intelligent system is a computer system that can perform tasks that require intellectual abilities, such as learning, adaptation, and self-organization. There are several types of intelligent systems:

Expert systems - systems that use expert knowledge to solve specific problems.
Decision support systems - systems that help users make decisions based on data analysis.
Cognitive systems - systems that model human thinking and behavior.

Multi-agent systems - systems consisting of multiple agents that work together to achieve a common goal.

One of the key features of intelligent systems is their ability to learn. This means that they can improve their results based on the experience and data they receive. For example, a speech recognition system can improve its recognition accuracy based on the analysis of the errors it makes when processing speech.

Another important feature of intelligent systems is their ability to adapt. This means that they can change their behavior depending on changes in the environment or user requirements. For example, a production management system can automatically adjust its production plan if demand for products changes.

Intelligent systems also have the ability to self-organize. This means that they can independently form structures and processes to achieve their goals. For example, a project management system can automatically distribute resources between different tasks depending on priorities and deadlines.

Intelligent systems are used in various fields, including medicine, finance, manufacturing, transportation, and many others. There are a number of examples where intelligent systems are used (Table 1):

Table 1
Examples of the use of intelligent systems in various fields

Application area	Examples of using intelligent systems
Medicine	intelligent systems are used to diagnose diseases, monitor patients, and develop new drugs.
Finance	intelligent systems help analyze financial data, predict market trends, and manage investment portfolios.
Production	intelligent systems are used to automate manufacturing processes, optimize resource use, and improve product quality.
Transport	intelligent systems are used to manage traffic flows, optimize routes, and prevent accidents.

The current scientific literature includes several key areas of research in the field of intelligent systems applications.

In the field of robotics and artificial intelligence, research focuses on creating intelligent systems that can perform complex tasks such as navigation, object recognition, and decision making. Examples of work include research in the field of autonomous vehicles, robotic manipulators, and speech recognition systems.

Information technology - here the focus is on creating intelligent systems that can process large amounts of data and draw conclusions based on this data. Examples of work include research in the field of machine learning, deep learning, and natural language processing.

In the part characterizing expert systems, it is emphasized that these systems are designed to imitate human expert knowledge and decision making. They are used in various fields, including medicine, finance, and management. Examples of work include research in the field of creating knowledge bases and decision support systems.

In the field of the Internet of Things, research focuses on creating intelligent systems that can interact with the physical world through sensors and actuators. Examples of work include smart homes, smart cities, and the Industrial Internet of Things.

Research has also been conducted in the field of cognitive science. This focuses on understanding how people think and make decisions and using this knowledge to create intelligent systems. Examples of work include cognitive psychology, neuroscience, and neuroscience.

In the case of cyber-physical systems, these systems combine the physical world with the digital world to create hybrid systems that can interact with their environment and adapt to changing conditions. Examples of work include smart factories, smart buildings, and smart grids.

In the field of game theory and multi-agent systems, research focuses on creating intelligent systems that can cooperate and compete with each other to achieve shared or individual goals. Examples of work include multi-agent systems, game theory, and collective intelligence.

Networking and distributed systems – this focuses on creating intelligent systems that can operate efficiently in distributed and networked environments. Examples of work include research in the areas of distributed artificial intelligence, blockchain, and cloud computing.

Much attention in the literature has been given to data security and protection. In this area, research focuses on creating intelligent systems that can protect data and prevent cyberattacks. Examples of work include research in the areas of cryptography, cybersecurity, and intrusion detection.

There has also been considerable interest in the ethical aspects of artificial intelligence recently. This focuses on studying ethical issues related to the use of intelligent systems, such as bias, transparency, and accountability. Examples of work include research in the areas of AI ethics, law, and regulation.

These are just a few of the many areas in which intelligent systems are being researched. Each area represents a distinct set of approaches, methods, and tools that are used to create intelligent systems that can solve complex problems in various contexts.

Conclusion

Since the topic of artificial intelligence in general, and intelligent systems in particular, is very relevant, it is necessary to touch on the issue of their advantages

and disadvantages. Intelligent systems have a number of benefits, including increased efficiency, reduced costs, and improved product quality. However, they also have disadvantages, such as potential job losses and data security issues.

Overall, intelligent systems are a powerful tool for solving complex problems in various fields. They allow you to automate routine operations, increase work efficiency, and improve the quality of decisions. . They continue to evolve and improve, opening up new opportunities for automation and improving the quality of people's lives.

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制定客运系统指标体系计算方法
**DEVELOPMENT OF A METHODOLOGY FOR CALCULATING
THE SYSTEM OF INDICATORS OF THE PASSENGER
TRANSPORT SYSTEM**

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注释。特大城市及其周边地区的发展导致客运量增加，这些客运量无法使用铁路运输，但都渴望到达大都市的核心。本文考虑开发一种计算客运系统指标的方法。

关键词：物流运输系统、大都市客运、客运物流流程。

Annotation. *The development of megacities and their regions leads to an increase in passenger traffic, which cannot use rail transport, but aspires to the core of the metropolis. The article considers the development of a methodology for calculating of indicators of the passenger transport system.*

Keywords: *logistics transport system, passenger transportation in the metropolis, passenger logistics processes.*

In this article it is proposed to calculate indicators for the passenger transport system:

- quantitative indicators:
 - dimensions of boarding and disembarkation of passengers;
 - the movement dimensions of trains and other types of transport;
 - passenger turnover of the transport hub;
 - passenger capacity of transport in a transport hub.
- quality indicators:
 - passenger's time loss index;
 - load factor;
 - workload indicator.

Quantitative indicators are needed to: ensure satisfaction of the needs for the transportation of passengers and goods; guarantee the safety of train traffic; effectively use the capacity and carrying capacity of sections and processing capacity of stations, etc.

The dimensions of boarding and disembarkation of passengers are proposed to be calculated using the formulas:

$$N_b = \frac{P_{dep}}{\rho}, \quad (1)$$

where N_b – passenger boarding dimensions;

P_{dep} – number of departing passengers;

ρ – passenger capacity of transport in a transport hub.

$$N_{dis} = \frac{P_{arr}}{\rho}, \quad (2)$$

where N_{dis} – dimensions of the disembarkation of passengers;

P_{arr} – number of arriving passengers;

ρ – passenger capacity of transport in a transport hub.

In this article the movement dimensions of trains and other modes of transport should be determined by the formula:

$$N = \frac{A}{p}, \quad (3)$$

where A – passenger traffic on the type of transport in question;

p – the capacity of vehicles.

The passenger turnover of the transport hub is proposed to be calculated using the formula:

$$P_{th} = \sum_{i=1}^m a_i * K, \quad (4)$$

where a_i – the number of passengers traveling on the i -th transport at the transfer hub;

K – the number of vehicles in the transfer hub.

To calculate the indicators of the passenger transport system, it is necessary to take into account the capacity of various vehicles, therefore it is proposed to introduce the concept of passenger capacity, which takes into account the number of vehicles and the capacity of each, that is, how many passengers can leave this transport hub, taking into account the integration of various modes of transport.

The passenger capacity of transport (ρ) in a transfer hub is the number of passengers who can travel simultaneously in a certain number of vehicles in a transfer hub.

The passenger capacity of transport (ρ) in a transfer hub it is proposed to calculate as follows:

$$\rho = \sum_{i=1}^m A_i * p_i, \quad (5)$$

where A_i – the number of plying vehicles in the transfer hub (area);

p_i – passenger capacity in the i -th vehicle.

Qualitative indicators make it possible to estimate the costs of technical means of transport for carrying out transportation work and, mainly, the degree of use of rolling stock.

The total time spent by a passenger on the way is a determining factor in choosing a route. The total time is the time spent approaching the bus stop, waiting for a vehicle, traveling from the point of departure to the destination, transferring, moving from the bus stop to the destination.

In this paper, an indicator such as the passenger's time loss index is proposed. The time that a passenger spends before or between trips (transfer) negatively affects the choice of route. The higher the passenger's time loss index, the more likely it is that the passenger will use another mode of transport.

The passenger time loss index is the time spent by passengers at stations associated with waiting for a train, a long transition to the transport and transfer hub, spent on approaching the stopping complex, is determined on the basis of direct accounting by categories of time losses.

$$T_{pli} = t_x + T_w + t_{th} \quad (6)$$

where t_x – time spent on the approach to the bus stop complex;

T_w – vehicle waiting time;

T_{th} – the time spent on the transfer.

$$T_w = t_i * \frac{P}{P_{cap}} \quad (7)$$

where t_i – time interval between rolling stock, h;

P_{cap} – rolling stock capacity;

P – passenger traffic.

$$t_{th} = t_{tr}(P) + T_w + t_{add} \quad (8)$$

where $t_{tr}(P)$ – transit time, depending on passenger traffic;

t_{add} – additional time spent on buying tickets, passing through the security checkpoint, turnstiles, etc.

This article proposes the calculation of the workload indicator of the logistics transport system, which is characterized by multifunctional use, as it allows you to analyze the logistics transport system as a whole, by districts, by transport hubs, stations, etc.

For each district (district, quarter, transport hub), it is proposed to use the following target function - the congestion indicator to determine where the laying of railway tracks (metro, tram, surface railway lines) is most in demand.

The workload indicator is an indicator that characterizes the quality of the integrated logistics transport system.

$$Z = \zeta * T_{pli} \rightarrow \min \quad (9)$$

where Z – occupancy rate, pass*minutes;

ζ – the load factor.

The load factor. – this is the ratio of the number of passengers using the megapolis transport system to passenger capacity.

$$\zeta = \frac{\{\sum_{j=1}^n b_{j*n}\} - \alpha * \{\sum_{j=1}^n b_{j*n}\} - \gamma * \{\sum_{j=1}^n b_{j*n}\}}{\sum_{i=1}^m A_i * p_i}, \quad (10)$$

where b_j – the number of residents in the j -th house;

n – number of houses in the area;

α – the ratio of motorists – this is the proportion of passengers in the transport system who prefer to travel by car (including carsharing);

γ – the ratio of residents who do not make the trip – this is the proportion of residents of j -th houses who do not use the transport system;

p_i – passenger capacity in the i -th vehicle;

A – the number of vehicles in the area;

T_{pli} – the passenger time loss index.

The value of the traffic indicator of the transport system:

$Z < 50$ – low traffic transport system;

$Z < 100$ – low-traffic transport system;

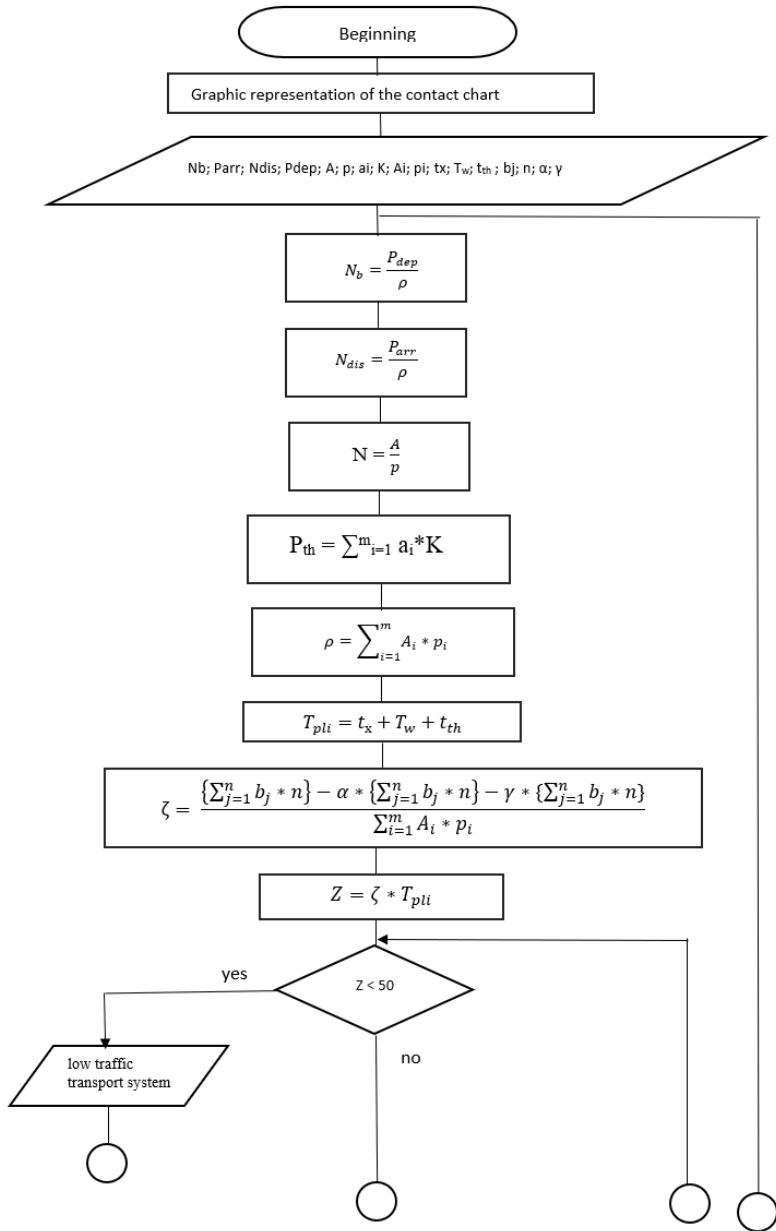
Z from 100 to 150 – medium-load transport system;

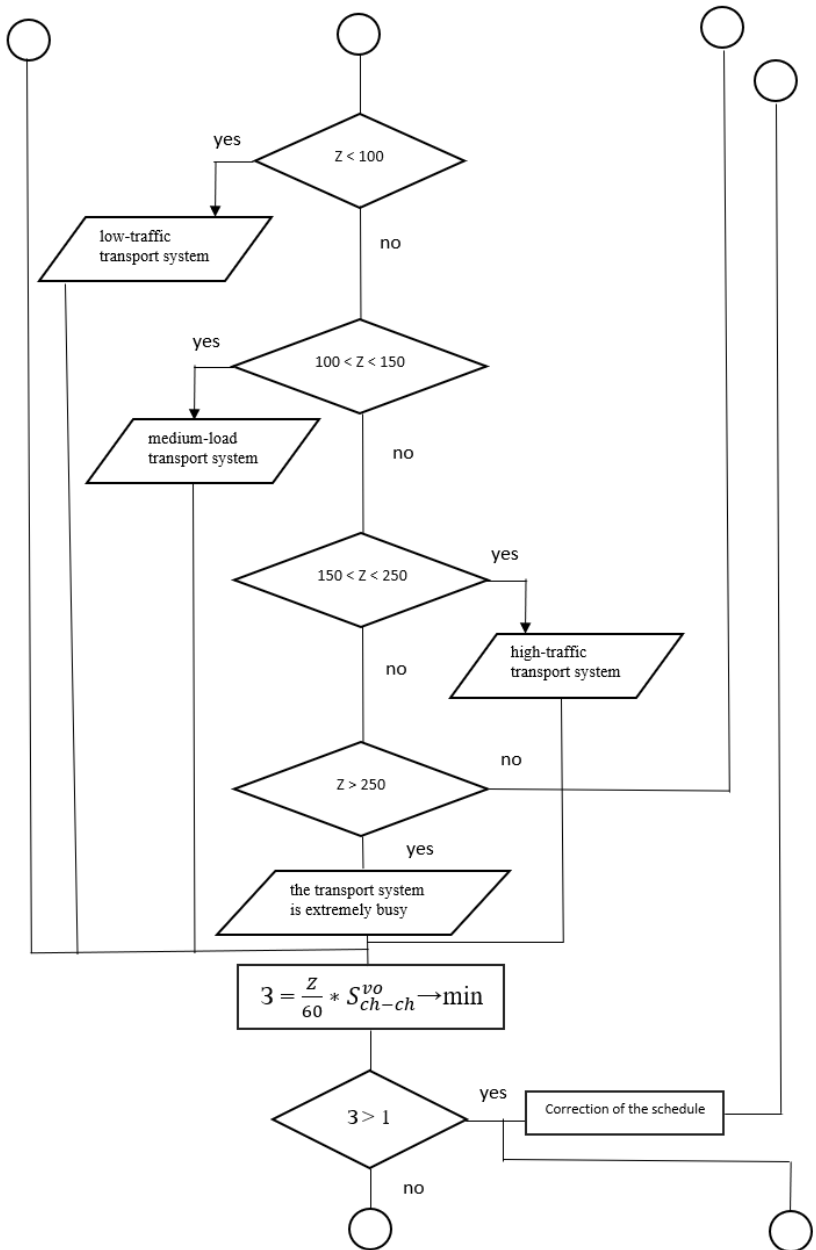
Z from 150 to 250 – high-traffic transport system;

$Z > 250$ – the transport system is extremely busy.

The criteria for the value of the congestion indicator Z were adopted based on the analysis of the economic assessment of the time spent on transport trips.

The objective function of the coefficient of economic effect is checked, if the coefficient is more than one, then the correction of the graph is performed, if the coefficient of economic effect is less than one, then the graph is printed for approval (figure 1).





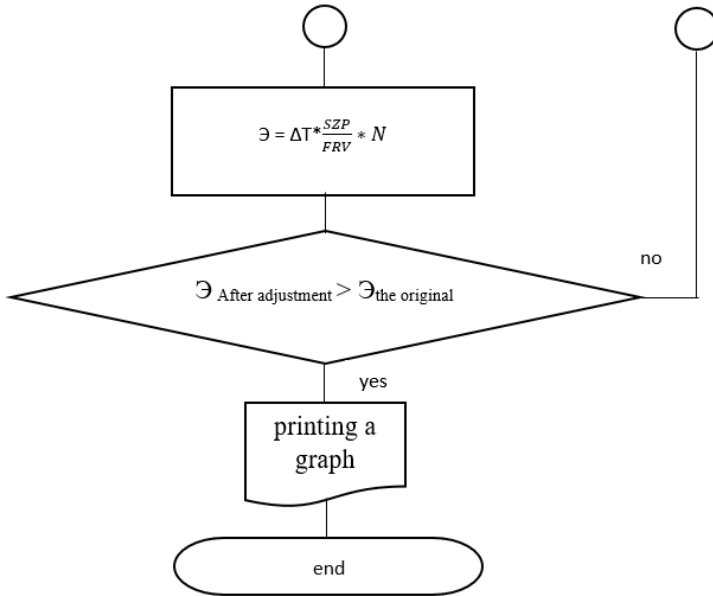


Figure 2. Algorithm for calculating contact schedule indicators (compiled by the author)

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生产含果胶饮料预防糖尿病的实际方面

ACTUAL ASPECTS OF PRODUCTION OF PECTIN-CONTAINING BEVERAGES FOR THE PREVENTION OF DIABETES MELLITUS

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摘要。本文讨论了从野生原料生产含果胶饮料用于糖尿病患者或糖尿病前期患者的营养的重要性。在世界范围内，中青年糖尿病发病率不断上升的背景下，扩大功能性和专业性营养品市场变得越来越重要。尽管健康饮食在世界人口中越来越受欢迎，但这一领域尚未得到充分研究。有必要扩大此类产品的范围，其中一个领域就是功能性饮料。根据血糖指数，满足糖尿病患者营养需求的野生浆果和草药可以作为这种饮料的原料。最重要和正确的解决方案之一可能是用苹果果胶丰富饮料。考虑创造这种产品的另一个原因是公众对其健康益处和功能特性缺乏认识。因此，本文的关键问题之一是描述具有抗糖尿病特性的饮料生产的主要方面以及实现扩大此类产品范围的问题。

关键词：含果胶饮料、功能性食品、糖尿病、糖尿病食品、血糖指数、功能性食品市场。

Abstract. *The article discusses the relevance of the production of pectin-containing drinks from wild-growing raw materials used in the nutrition of people with diabetes or in a prediabetic state. In the context of the growing incidence of diabetes in young and middle-aged people in the world, it is becoming important to expand the market for functional and specialized nutrition. Despite the growing popularity of healthy eating among the world's population, this area has not yet been fully studied. There is a need to expand the range of such products, and one of such areas can be functional drinks. Wild berries and herbs that meet the nutritional requirements of people with diabetes according to the glycemic index can serve as raw materials for this type of drink. One of the most important and correct solutions can be the enrichment of drinks with apple pectin. Another reason for considering the creation of such a product is the lack of public awareness of*

its health benefits and functional properties. Thus, one of the key issues of this article is the description of the main aspects of the production of drinks with antidiabetic properties and the actualization of the issue of expanding the range of such products.

Keywords: *pectin-containing drinks, functional food, diabetes mellitus, diabetic food products, glycemic index, functional food market.*

It is known that diabetes mellitus is characterized by an increase in blood glucose levels due to a relative or absolute insulin deficiency. One of the main ways to prevent diabetes is to reduce the consumption of carbohydrates and saturated fats. Simple carbohydrates should account for no more than 10% of the daily caloric intake. In addition to the basic requirements for the diet, it is necessary to enrich it with vitamins and microelements, many of which have additional antidiabetic properties. Due to the increased pace of life in modern society, the time resource for adjusting the diet is limited, which necessitates the search for functional products offered by this market sector. One of the options for enriching the diet with useful nutrients is the additional introduction of available products, including drinks [2]. The classification of the world soft drink market for 2024 in percentage terms is presented in Diagram 1, where it is clear that drinks with added sugar account for 24% of the total market share, while functional drinks without sugar account for only 18%. Among them, drinks that meet the glycemic index requirements account for about 5-6%, which indicates that the beverage market is insufficiently saturated with preventive products, given the growing demand for them among the population. In this regard, it is advisable to consider the relevance of the production of such drinks and the development of their recipes.

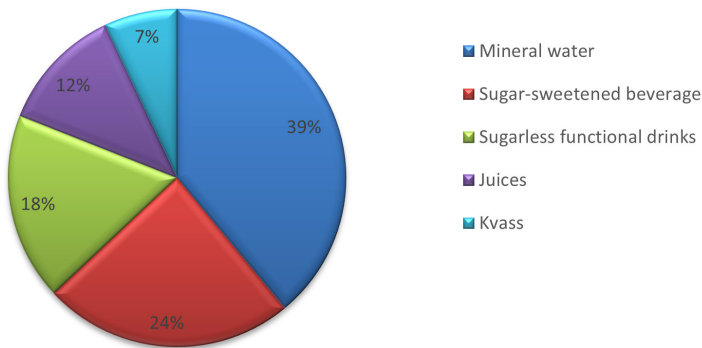


Figure 1. *World classification of soft drinks*

From 2019 to 2024, there was a sharp shift in the global production of soft drinks from high-sugar products to low-calorie drinks using natural juices, plant extracts and sugar substitutes. According to forecasts, with the growing popularity of the product among the adult population, as well as the introduction of functional nutrition into the diet, the volume of consumption will steadily grow and by 2026 its share will be 41% [4].

Consideration of the problem of expanding the range of pectin-containing drinks without an organic connection of pectin products as an integral part of the diet in modern environmental conditions does not allow us to assess its extreme relevance. Given the preventive rate of pectin consumption (2 g per person per day), its need for year-round consumption of preventive pectin products, including drinks, for only 100 million people is over 70 thousand tons [6].

The effect of pectin on the regulation of blood glucose levels has been studied. Its caloric content is 52 kcal per 100 grams. In hydrated form, pectin has the most effective physiological effect on the human body. The substance slows down the process of digestion and absorption of carbohydrates, prevents an increase in blood sugar levels after eating, and due to its gel-like consistency when entering the stomach, it prolongs the feeling of satiety. Regular consumption improves the sensitivity of the body's cells to insulin. It is known that pectins reduce blood cholesterol levels, which reduces the risk of atherosclerosis and cardiovascular diseases associated with diabetes. Pectin is useful for intoxications, infectious diseases, and also removes heavy metals and radionuclides from the human body, which is especially important for the diet of residents of areas with unfavorable radiation background or polluted air [8]. A study is known on the effect of adding pectin to the diet of patients with diabetes. Patients with stage I arterial hypertension and diabetes mellitus compensated by diet were divided into treatment with conventional non-drug methods (dietary measures, limitation of table salt and alcohol, dosed physical exercise) (Group 1, n=24) or these methods with the addition of apple pectin at a dose of 25 mg/day (Group 2, n=24). Arterial pressure was monitored, biochemical blood tests were performed before and at the end of three-month treatment. The study showed the following results: a decrease in systolic blood pressure by 8.9 ± 0.4 and 16.8 ± 0.7 ($p < 0.05$), 22.5 ± 1.3 and 31.7 ± 1.9 mm Hg ($p < 0.05$), diastolic blood pressure - by 5.0 ± 0.3 and 9.6 ± 0.4 ($p < 0.05$), 11.7 ± 0.6 and 15.9 ± 1.1 mm Hg ($p < 0.05$) in the 1st and 2nd groups, respectively. The level of total cholesterol decreased by 8.3 and 14.6% ($p < 0.05$), 8.1 and 13.9% ($p < 0.05$), basal glucose level - by 15.3 and 23.7% ($p < 0.05$), 14.0 and 21.8% ($p < 0.05$) in the compared groups, respectively [1].

The data show that the use of apple pectin at a dose of 25 mg/day has a significant additional antihypertensive, hypolipidemic and hypoglycemic effect in patients with hypertension in combination with diabetes mellitus. The results of

mass surveys conducted by the Institute of Nutrition of the Russian Academy of Medical Sciences show that the majority of the population in the conditions of unfavorable environmental conditions in the world almost all year round has a deficiency of vitamin C, folic acid and thiamine, riboflavin and vitamin E. A deficiency of macro and microelements (calcium, manganese, zinc, iodine, selenium and chromium) was also revealed. According to WHO, some of the necessary nutrients for enriching the preventive diet of diabetics and people at risk are vitamins B₁, B₆ and B₁₂, vitamin H (B₇), which reduces blood glucose levels, as well as zinc, manganese and chromium [6]. In Russia, one of the available sources of macro and microelements necessary for the prevention of diabetes is wild berry and herbal raw materials, the advantage of such raw materials is their complete safety from the point of view of quality control of products for their use in industrial production. Also, many wild berries are an additional source of pectin. Diagram 2 shows the percentage content of pectin in some types of wild raw materials [7].

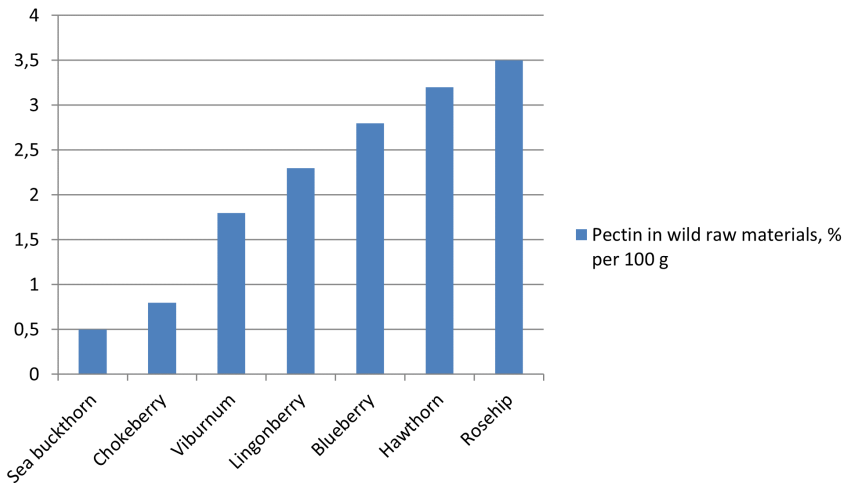


Figure 2. Pectin content in wild raw materials (% per 100 grams)

According to the histogram, it can be concluded that rose hips, hawthorn, blueberries and lingonberries are the richest in pectin. The use of this wild raw material may be appropriate in places where it grows, for example, in northern regions. Also, a wide variety of raw materials containing pectin allows its use in various qualitative and quantitative combinations to increase the range of functional products with a different spectrum of organoleptic characteristics [5].

The glycemic index of wild berries does not exceed 45 units on average. Thus, we can conclude that it is advisable to use wild berry raw materials for the production of functional food products for diabetics, including drinks.

It is known that effective natural antioxidants are flavonoids and oxyaromatic acids. Weaker antioxidants are vitamins E, C and carotenoids. Figure 3 shows the total antioxidant content of some wild berries.

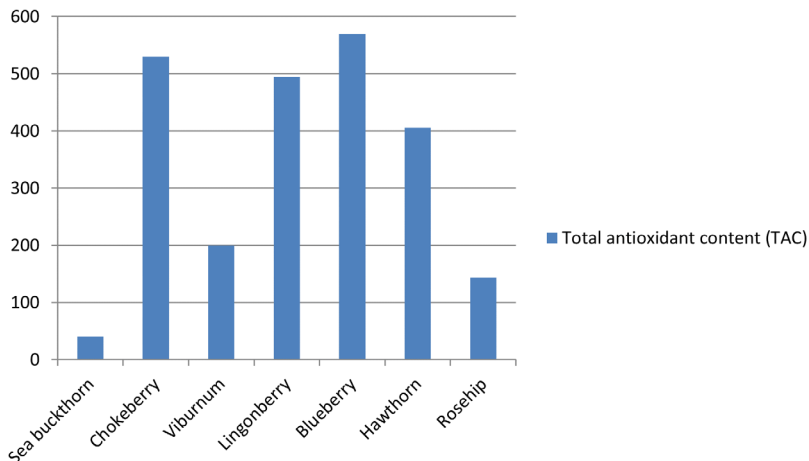


Figure 3. Total antioxidant content in berries in mg/100 grams

It is known that antioxidant deficiency can contribute to the development of diabetes. A 21-year study was conducted in Finland, which showed that low vitamin E supply is one of the risk factors, high content of this vitamin was noted in rose hips, which indicates the feasibility of its use as a raw material for beverage production. Vitamin E is part of LDL (low-density lipoproteins, a transport form of cholesterol) and the higher the level of vitamin in the cell membrane, the higher the ability of LDL to resist oxidation of peripheral vessels, which enhances glucose metabolism. Hawthorn and viburnum have a similar effect. The leaves and fruits contain flavonoids, which have proven antioxidant activity, as well as fatty oils, β -carotene, selenium, vitamins: B1, B2, PP, C, E. Antioxidants improve the condition of patients with diabetes, reducing the manifestations of neuropathy and retinopathy. Chromium in the amount of 300 mcg. is important in glucose metabolism and increases insulin sensitivity. The results of the study showed that daily intake of two doses of vitamin C at 500 mg can reduce blood sugar levels and reduce its sharp rise after meals in patients with type 2 diabetes. In most subjects, this decrease was more than 30% [3].

Based on the available data, we can conclude that it is advisable to use wild-growing raw materials for the production of functional drinks for the prevention of diabetes, as environmentally friendly and rich in minerals and vitamins, with improved beneficial qualities with additional enrichment with pectin.

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磁场中石墨与微团簇水的插层
**INTERCALATION OF GRAPHITE WITH MICROCLUSTER
WATER IN A MAGNETIC FIELD**

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摘要。本文提出了一种磁场中微团簇水剥离石墨的模型。该模型基于表面层厚度,对于石墨而言,表面层厚度为 3 个单层石墨烯。水的团簇结构与所有液体一样,是一种由表面和体积中原子相互作用的差异引起的物理现象。本文得出一个方程,该方程表明,任何对水的影响(化学杂质、振动、超声波、电场和磁场、温度升高等)都会导致水的表面张力增加,从而有助于石墨的剥离。利用本文中获得的方程(可以在磁场中通过水实现石墨剥离,并以环保的方式获得石墨烯。

关键词: 插层、石墨、磁场、水单层。

Abstract. *The article proposes a model of graphite exfoliation by microcluster water in a magnetic field. The model is based on the thickness of the surface layer, which for graphite is 3 monolayers of graphene. The cluster structure of water, like all liquids, is a physical phenomenon caused by the difference in the interaction of atoms on the surface and in the volume. The article obtains an equation that shows that any impact on water (chemical impurities, vibration, ultrasound, electric and magnetic fields, increased temperature, etc.) leading to an increase in the surface tension of water will contribute to the exfoliation of graphite. Using the equations obtained in the article (it is possible to obtain graphite exfoliation by water in a magnetic field and obtain graphene in an environmentally friendly way.*

Keywords: *intercalation, graphite, magnetic field, water monolayer.*

Delamination (intercalation) of layered crystals using mica (muscovite - $\text{KAl}_3\text{Si}_3\text{O}_{12}\text{H}_2$) as an example was used by I.V. Obreimov back in 1930 [1] to determine the surface energy and adhesion energy of mica crystals. This method was implemented at a higher level in [2] and by us theoretically in [3]. In the cleavage plane, the adhesion energy for mica is: $W_{aa} = 0.809 \text{ J/m}^2$ [3]; $W_{aa} = 0.81 \pm 0.38 \text{ J/m}^2$ [3]; $W_{aa} = 0.76 \text{ J/m}^2$ [1]. All measurements are equal within the error. Delamination of layered graphite crystals was performed mechanically using adhesive tape in 2004 [4]. A single-layer graphite sheet is called graphene. However, it is impossible to use graphene obtained mechanically on an industrial scale. Therefore, various methods for obtaining graphene have appeared, a review of which is given in the monograph [5]. We have also proposed a method for exfoliating layered graphite crystals with microcluster water [6], the theoretical justification of which is given in the works [7, 8].

The aim of this article is to model the intercalation of graphite by microcluster water in a magnetic field. Let us start with graphite. It is a thermodynamically stable sp²-hybridized allotropic modification of carbon. The crystal structure of graphite [9] has hexagonal symmetry and consists of flat layers of carbon atoms located parallel to each other (Fig. 1a). The structure of graphite layers is shown in Fig. 1b, constructed using the methodology of our work [10].

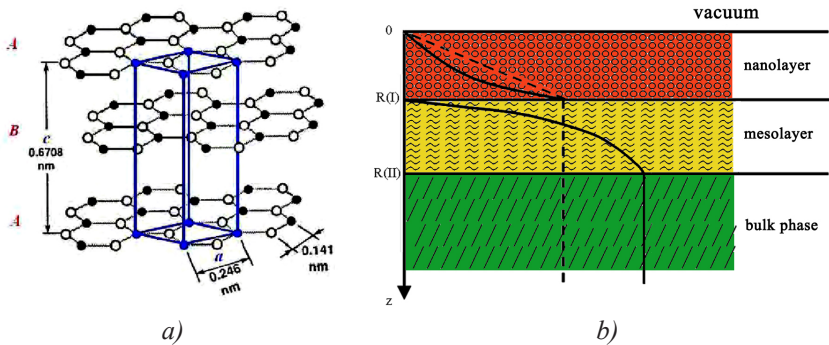


Figure 1. Graphite structure [9] (a); graphite layer structure [10] (b).

The R(I) layer is described by the equation [10]:

$$R(I) = 0,17 \cdot 10^{-9} \cdot \alpha \cdot \upsilon \text{ [m]}. \quad (1)$$

In equation (1) we need to know one parameter – the molar volume of the element, which is equal to $\upsilon = M/\rho$ (M is the molar mass, ρ is its density), $\alpha = 1 \text{ m}^{-2}$ is a constant to maintain the dimensionality ($R(I) = \text{[m]}$). Using formula (1), we calculate R(I) (Table 1) for graphite parallel to the plane $x = a = b$ and perpendicular to this plane $x = c$.

Table 1.

Parameters $R(I)$ of graphite [11].

Graphite	Structure	M, g/mol	ρ , g/sm ³	$R(I)_a$, nm	$R(I)_c$, nm
C	C6/mmc-D ⁴ _{6h}	12,0107	2,26	0.90 (3)	2.46 (3)

From Table 1 it is evident that the thickness of the $R(I)_a$ layer is equal to: 0.9 nm in the upper plane and 2.46 nm perpendicular to this plane (Fig. 1a), i.e. it represents a nanostructure according to Gleiter [12]. In Table 1 the number of graphite monolayers is given in brackets, equal to $n = R(I)/a$ (a is the constant of the graphite crystal lattice). It is evident that the number of monolayers in graphite is 3. This is confirmed by experimental data (Fig. 2).

Figure 2a shows the change in internal pressure from the number of graphene layers [14]. Figure 2b shows the intensity of the peak G of the Raman scattering of graphene from the number of its layers [15]. Figure 2c shows the change in the coefficient of thermal expansion of graphene from the number of graphene layers [16]. Figure 2d shows the sputtering intensity of the C^{2-} ion, which increases abruptly with an increase in the number of graphene layers deposited on a copper substrate [17]. The presented figures show that graphite contains 3 graphene monolayers, which confirms our model (1).

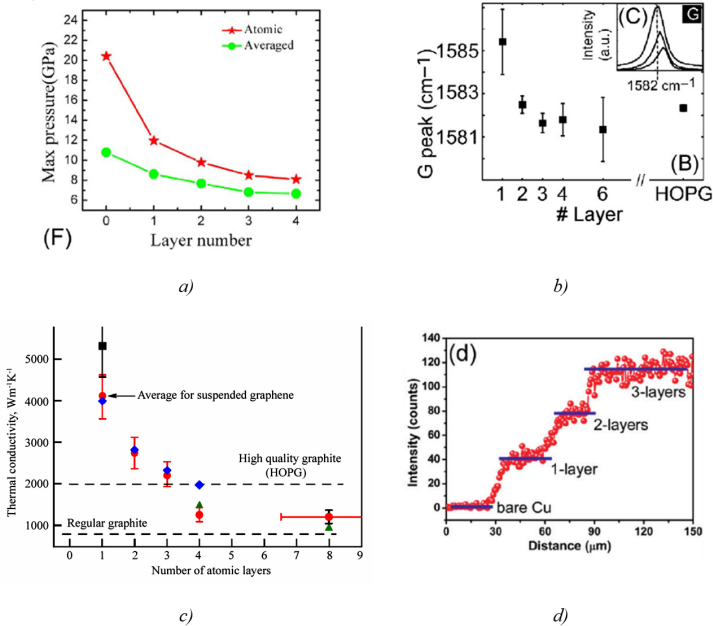


Figure 2. Change in graphene parameters depending on the number of its layers.

If we take into account that we have obtained the formula [10]:

$$A(r) = A_0 \left(1 - \frac{R(I)}{r} \right), \quad R(I) < r < R(II) \tag{2}$$

$$A(r) = A_0 \left(1 - \frac{R(I)}{R(I) + r} \right), \quad 0 < r < R(I).$$

where $A(r)$ is a physical property of the nano- and mesolayer; A_0 is a property of the volume; $r = z$ (Fig. 1 b). In the $R(I)$ layer, the size effect must be taken into account and the surface energy of the $R(I)$ layer becomes equal to γ_1 [18]:

$$\gamma_1 = \gamma_2 (1 - R(I)/R(I) + h) \approx 0,3\gamma_2, \tag{3}$$

Equation (3) shows that the surface energy of the $R(I)$ layer is three times less than the surface energy of the main crystal. To separate the $R(I)$ layer from the rest of the crystal, energy must be expended, which is called the adhesion energy [19]:

$$W_a = \gamma_1 + \gamma_2 - \gamma_{12} \approx \gamma_1 + \gamma_2 = 1,3\gamma_2, \tag{4}$$

where γ_{12} is the energy at the phase boundary, which is small due to the second-order phase transition.

We calculate the internal stresses σ_{is} between phases γ_1 and γ_2 using the formula [19]:

$$\sigma_{is} = \sqrt{W_a \cdot \dot{L} / R(I)}, \tag{5}$$

where E is Young's modulus of elasticity. Let's calculate the elastic parameters for graphite.

Table 2.
Elastic parameters of graphite

Carbon	W_{aa} , J/m ²	W_{ac} , J/m ²	σ_{isa} , MPa	σ_{isc} , MPa	E_a , GPa	E_c , GPa
Graphite	3,613	0,798	5740	1370	7,59	3,48

Let us now discuss the issue of microcluster water. Graphite practically does not react in pure water. Its layered structure does not allow water molecules to penetrate between the graphite layers. Therefore, graphite remains stable and does not dissolve [20]. In 1993, Ken Jordan proposed his own versions of stable “water quanta” consisting of 6 of its molecules [19]. Subsequent experiments and ab initio calculations allowed us to find out more about the cluster structure of water [20-24]. In their opinion, the composition of water clusters consists of 3 to 50 water molecules in each (Fig. 3). A review of the cluster structure of water is given in [25].

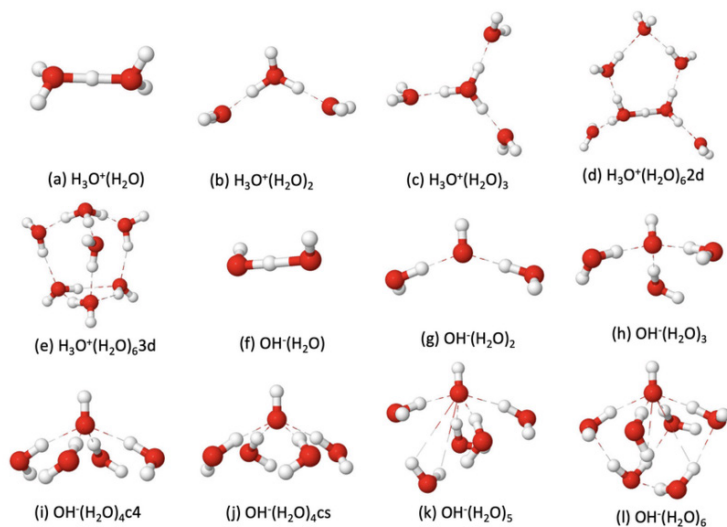


Figure 3. Clusters in the structure of water [25].

Two Patents (Lorenzen L.H.) more than 20 years ago described the process of obtaining microcluster water [26, 227]. First, the source water is boiled to obtain steam. Next, the steam is passed through a magnetic field and the steam is condensed at a temperature above 0°C in the presence of light in the range from far infrared to ultraviolet spectrum. At least one metasilicate salt stabilizer and a food additive template are added to the condensed steam. The concentration of the food additive is 1%. The condensed steam is subjected to a pressure of more than 1 atm; and then the pressure is released to produce microcluster water. Microcluster water gives a resonance NMR signal 170 at 115 HZ, has a conductivity of at least $3.7\ \mu\text{S}/\text{cm}$ and has a surface tension of less than 61 dynes/cm. Dr. Hidemitsu Hayashi [28] in February 2023 published an article against the cluster structure of water. The most commonly used evidence is the results of nuclear magnetic resonance (NMR) [26, 27]. The idea is that the larger the bandwidth, the larger the water cluster. At first glance, this looks quite convincing. However, the problem is that the bandwidth depends on the pH [28], not the cluster size. Any deviation from neutral pH in either direction will lead to a similar result [28]. Dr. Hidemitsu Hayashi argues that so far there has been no convincing evidence from a physical and chemical point of view for the existence of stable water microclusters, and research in this area has consistently refuted this assertion, which is not surprising since this assertion contradicts the basic and fundamental principles of chemistry. What do we assume about cluster water in this article? According to Rusanov A.I.,

the thickness of the surface layer should be understood as a layer of water that is electrically neutral and has a size of 1-2 nm [29]. According to Ken Jordan's idea [19], this layer of water consists of 6 of its molecules ($6 \times 0.193 = 1.15$ nm).

Using experimental data, we calculate $R(I)$ using formula (1) at $T = 25\text{ }^\circ\text{C} = 298\text{ K}$; $\gamma = 72.8 \cdot 10^{-3}$ (J/m²); $\nu = 18 \cdot 10^{-6}$ (m³/mol); $R_0 = 8.31$ (J/K mol); $R(I) = 1.1$ nm. This means that the number of monolayers in the $R(I)$ layer is $n = R(I)/a$ ($a = 0.193$ nm is the radius of the water molecule) ≈ 6 . It can be concluded [30] that the thickness of the surface layer of water meets the condition of Rusanov A.I. [29] and the clusters of Ken Jordan [19]. In other words, the cluster structure of water, like all liquids, is a physical phenomenon caused by the difference in the interaction of atoms on the surface and in the volume. For liquids, mixing of layers leads to the cluster structure of most of it. If we return to formula (4), we can conclude that the intercalation of water into graphite and its subsequent stratification is possible when the following relationships are met:

$$\begin{aligned} W(C) - W(H_2O) &\rightarrow \min, \\ \gamma(C) - \gamma(H_2O) &\rightarrow \min, \end{aligned} \tag{6}$$

where $\gamma(C) = 0.798$ J/m² is the surface energy of graphite in the c plane; $\gamma(H_2O) = 0.0728$ J/m² is the surface energy (surface tension) of water.

Equation (6) shows that any effect on water (chemical impurities, vibration, ultrasound, electric and magnetic fields, increased temperature, etc.) leading to an increase in $\gamma(H_2O)$ will contribute to the exfoliation of graphite.

Let us now consider the effect of a magnetic field on the value of $\gamma(H_2O)$. In work [31], a system of permanent magnets mounted on a piezoelectric plate was used to activate water to modulate the magnetic field. The conductivity and permittivity of water activated by this source were experimentally studied. The effect of a magnetic field on bidistillate ($0.84 \cdot 10^{-4}$ Ohm⁻¹m⁻¹) leads to an increase in surface tension with an increase in the magnitude of the tension (Table 3).

Table 3.
Parameters of bidistillate in a magnetic field [31]

Magnetic field, T	pH		Surface tension		Dielectric constant	
	fractions of a unit	%	10 ⁻³ N/m	%	F/m	%
0.19	0.35	5.1	1.6	2.2	1.5	1.8
0.35	0.44	6.4	3.7	5.1	1.4	1.7
0.48	0.62	9.1	4.7	6.4	1.4	1.7
0.57	0.62	9.1	5.3	7.3	1.4	1.7

Table 3 shows that $\gamma(H_2O)$ increases by times when the magnetic field strength changes by three times, i.e. linearly: $\gamma(H_2O) = \alpha H$, where α is the proportionality coefficient, H is the magnetic field strength. Since in our case $\alpha = 3$, equation (6)

yields: $\gamma(C) - 3H = 0$ and $H \approx 0.3$ T. With such a magnetic field strength, graphite can be exfoliated with water.

Thus, using equations (1) – (6), it is possible to obtain exfoliation of graphite with water in a magnetic field and obtain graphene in an environmentally friendly way.

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低废弃杂粮面包生产过程中食品基质成分和目标产物的抗氧化活性
**ANTIOXIDANT ACTIVITY OF FOOD MATRIX COMPONENTS
AND TARGET PRODUCTS DURING THE PROCESS OF LOW-
WASTE PRODUCTION OF MULTIGRAIN BREAD**

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摘要。在测试低废物生物技术以生产基于研磨麦芽黑麦粒（黑麦奶油）获得的乳液的杂粮面包时，研究了食品基质成分和目标产品的抗氧化活性。主要产品是基于粉碎黑麦麦芽乳液的杂粮面包。将乳液与粉碎的生麦芽分离后，获得蛋糕作为制造附加产品（黑麦饼干）的二次原料。结果表明，在制备食品基质的过程中，成分最初的高氧化活性被逆转。目标产品具有高抗氧化活性，从而确保了产品的高营养价值。

关键词：杂粮面包、麦芽、黑麦奶油、蛋糕、抗氧化活性、黑麦饼干、低废物技术。

Abstract. *During the testing of low-waste biotechnology for the production of multigrain bread based on an emulsion obtained by grinding malted rye grain (rye cream), the antioxidant activity of the food matrix components and target products was studied. The main product was multigrain bread based on an emulsion of crushed rye malt. After separating the emulsion from the crushed raw malt, cake was obtained as a secondary raw material for the manufacture of an additional product (rye biscuits). It was shown that during the preparation of the food matrix, the initially high oxidative activity of the components is inverted. The target products have high antioxidant activity, which ensures high nutritional value of the products.*

Keywords: *multigrain bread, malting, rye cream, cake, antioxidant activity, rye biscuits, low-waste technology.*

Introduction. Despite the wide range of bakery products, consumer demand cannot be considered satisfied. White bread occupies a dominant position. At the same time, it is well known that the most useful bread is that containing bran, i.e. those grain parts that are deliberately removed during the processing of cereals. Therefore, an important area of modern food technology is the development of recipes and technology for types of bread enriched with vitamins, microelements, organic acids, enzymes and antioxidants [1]. One approach to solving this problem is the production of multigrain bread, the food matrix of which combines various types of cereals and pseudocereals. Currently, interest in rye products is returning [2]. Indeed, rye is not inferior to wheat in many agrotechnical and technological properties, and surpasses it in total nutritional value. Buckwheat is a promising type of raw material as a pseudocereal crop, the grain of which is enriched with protein and important micronutrients (for example, iron) [3]. Buckwheat and oat flour are types of plant materials with a subthreshold level of prolamins. Therefore, the complex use of rye, oat and buckwheat grains can expand the range of useful properties of bread as a product of daily consumption. To ensure the functional properties of the product, not only the composition of the food matrix is important, but also the physicochemical form of the ingredients. Therefore, along with traditional flour, grain components that form a new taste and activate digestion are increasingly included in the composition of bakery products. In this case, the most useful is sprouted grain (raw malt), containing an enzyme-substrate concentrate of macronutrients. A technology for bioactivation of rye grain using oxidative stress technology has been developed and described, for which the grain mass was treated with chemical and biological stimulators of free radical oxidation [4]. Under the influence of free radicals, the processes of loosening of grain shells and hydration were activated, which made it possible to reduce the malting time of grain to 12 hours and optimize the germination rate. Sprouted grain was crushed, the resulting emulsion was separated from the cake. The emulsion (“rye cream”) was used as a base for kneading dough with subsequent addition of other components. In this case, the cake was not a production waste, but a secondary raw material, which was then sent to the production of an additional product - rye biscuits (Fig. 1).



Figure 1. Stages of low-waste technology for manufacturing multigrain bread

Thus, this technology for producing multigrain bread has a low-waste nature, implements the principles of environmental friendliness, optimality and rational use of raw materials.

A necessary stage of the work was to confirm the increased nutritional value of the resulting products, both the main (multigrain bread) and additional (biscuits). An integral indicator of the functional properties of a food product is antioxidant activity, i.e. the ability to reduce the impact of exogenous and endogenous factors of oxidative stress that constantly affect the human body.

The aim of the work is a comparative analysis of the antioxidant activity of ingredients and target products in the process of producing multigrain bread and rye biscuits.

Materials and methods. The procedure for obtaining raw rye malt, as well as the recipe and technology for producing multigrain bread were described earlier [5]. After separating the rye cake, it was frozen and stored in a freezer at a temperature of -18°C until use. Rye biscuits were made as described in [6] with modifications that included varying the composition of the biscuit dough. Chia seeds, flax seeds, or honeysuckle paste were used as variable components. Flax seeds were hydrated for 8 hours before being included in the biscuit dough. Grated cheese (Parmesan variety) was used as an adhesive (binding) material during the formation of biscuits. Antioxidant (AO) activity was analyzed by luminol-dependent peroxide-induced chemiluminescence using 10^{-4}M FeSO_4 solution as a peroxide decomposition trigger. Quantitative assessment was performed by pulsed light sum (S), equivalent to the number of free radicals (FR) formed. The light sum value was normalized by the centile method. The measured parameter was the degree of decrease or increase in FR production under the influence of the analyzed

samples compared to the control (saline solution). The methodology is described in detail [7]. Statistical processing of the results was performed using the parametric Student’s criterion. Results and their discussion. Fig. 2 shows the results of a comparative analysis of the AO activity of the main ingredient (rye cream), dough after proofing, and the target product (multigrain bread) in comparison with the closest analogue (rye bread “Borodinsky”). From the given figure it is evident that fresh rye emulsion has not antioxidant, but prooxidant properties. This is a completely expected and easily explained phenomenon. Indeed, in the process of bioactivation stimulated by chemical and biological oxidation activators, the resulting emulsion is a biochemical reactor, where chain free-radical processes develop with the participation of autolytic enzymes released from lysosomes [8]. At the same time, the AO activity of the dough during proofing increases significantly, since the light sum under the influence of the sample is 28% of the control level. This is due to the fact that the design of the food matrix includes the introduction of components with high antioxidant potential (oat and buckwheat flour, milk, egg melange, spice mix). The final AO activity of the target product exceeded the corresponding indicator of the analogue (Borodinsky bread). Apparently, the result is due to the higher diversity of the composition of multigrain bread compared to Borodinsky (Fig. 2).

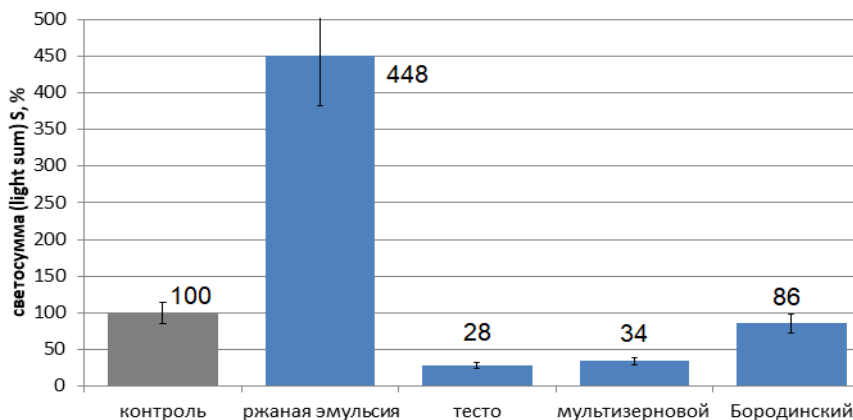


Figure 2. Antioxidant activity of multigrain bread and rye bread “Borodinsky”

Fig. 3 shows the results of measuring the antioxidant activity of secondary raw materials – malt cake in the composition of semi-finished biscuit products based on cake with various flavor and functional additives.

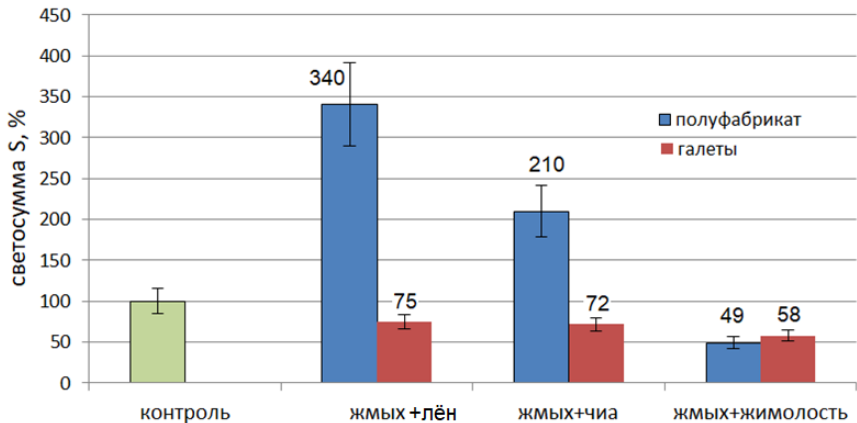


Figure 3. Antioxidant activity of semi-finished products and ready-made biscuits based on malt cake

It follows from the figure that the AO activity of semi-finished products varied significantly depending on the flavor additives. In accordance with the forecast, the sample with honeysuckle paste, a rich source of bioflavonoids, was characterized by the maximum AO activity [9]. The AO activity of bioflavonoids significantly exceeds the corresponding potential of flax and chia seeds, therefore, already at the stage of the semi-finished product, the free radical background is leveled. At the same time, for the consumer, these differences are insignificant, because they reflect the properties of the semi-finished product. On the contrary, the AO activity of ready-to-eat products (baked biscuits) was quite high, and for biscuits with the addition of flax or chia seeds, it was quite comparable (the level of the light sum relative to the control was 75% and 72%, respectively). In this case, the addition of honeysuckle also significantly increased the AO potential of the product.

Conclusions

1. Malt emulsion (rye cream) and malt cake have prooxidant rather than antioxidant properties, apparently due to the release of a large number of autolytic components during accelerated malting of grain.
2. At the stage of kneading the dough, subsequent proofing and baking, the prooxidant activity of rye cream is inverted into antioxidant.
3. Flavor additives in the form of chia seeds, flax or honeysuckle paste reliably affect the antioxidant activity of both finished rye biscuits and semi-finished products. Consequently, the inclusion of these additives in the composition of biscuit dough provides not only a variety of flavors, but also protection from free radical oxidation even before the stage of heat treatment.

4. Rye biscuits with the addition of honeysuckle paste were characterized by the highest antioxidant activity.

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贵月桂 (*Laurus nobilis* L.) 的遗传性状和特性与其在西乔治亚州条件下的生产力之间的相关性

**CORRELATION OF GENETICALLY DETERMINED TRAITS
AND PROPERTIES OF NOBLE LAUREL (*LAURUS NOBILIS* L.)
WITH ITS PRODUCTIVITY IN THE CONDITIONS OF WESTERN
GEORGIA**

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注释。本文介绍了一项研究的结果，该研究的目的是确定贵月桂 (*Laurus nobilis* L.) 的遗传决定特征和特性与其在西乔治亚州条件下的生产力之间的相关性。为此，建立了月桂树生产力（精油、干叶）与植物营养器官的形态生物学特征之间的相关性；以及月桂树生产力对植物生长强度的依赖性。研究结果表明：月桂树叶中精油含量的定量指标与植物生长强度无关；植物生产力在一定程度上取决于灌木生长的活力；月桂树叶中精油含量与叶片大小和叶片形状之间没有相关性；雄性和雌性植物之间可以存在高油和低油形式。

关键词：月桂树，相关性，生产力，高油含量，叶子含量，精油含量。

Annotation. The article presents the results of a study, the purpose of which was to determine the correlation of genetically determined characteristics and properties of noble laurel (*Laurus nobilis* L.) with its productivity in the conditions of Western Georgia. For the above, a correlation was established between the productivity of laurel (essential oil, dry leaves) and the morpho-biological characteristics of the vegetative organs of the plant; as well as the dependence of laurel productivity on the intensity of plant growth. The results of the study showed: quantitative indicators of the essential oil content in laurel leaves do not correlate with the intensity of plant growth; plant productivity depends in a certain way on

the vigor of bush growth; there is no correlation between the content of essential oil in laurel leaves with the size of the leaf and the shape of the leaf blade; Between male and female plants there can be both high-oil and low-oil forms.

Keywords: Bay laurel, correlation, productivity, high oil content, foliage content, essential oil content.

For the Georgian economy, the production of subtropical industrial crops, in particular essential oil plants, from which valuable oils are produced in France, Italy, Bulgaria, Spain, the USA, South American countries, India, China, Japan, is of great and multilateral national economic importance. including in Georgia. The Noble Laurel belongs to this group of subtropical essential oil crops. This evergreen, perennial plant has been cultivated since ancient times. In Georgia, laurel was not only introduced into cultivation, it is also common in the wild, so Georgia can be considered the birthplace of laurel. Today, in the form of cultural plantings, it is found in all regions of Georgia. [2, 1]

According to most taxonomists, only two species of laurel are known in the world flora - Noble laurel - *Laurus nobilis* L. and Canary laurel - *Laurus Canariensis*. In Georgia, only the species-population of the Noble Laurel is widespread, in the form of its diverse forms-variations. [12]

Since ancient times, the laurel plant has found many uses in the form of dried leaves in the food industry, medicine, perfumery, cosmetics, and a number of other sectors of the national economy, so people have long propagated and planted laurel plants to obtain dry leaves. Later they began to use laurel in the form of distilled essential oil. Its use in this form is more acceptable, effective and cost-effective.

In the last century, Georgian research organizations carried out very large and significant research work to develop progressive cultivation technologies, increase production levels, reduce production costs and improve other economic indicators of subtropical industrial crops, including laurel, as a result of which, currently in In Georgia, laurel culture is less labor-intensive, provides high income, combines well with other crops and contributes to the rational use of natural and labor resources in the subtropical economy.[1]

Despite this, there are still many questions to be studied and clarified in the area of laurel culture. As noted, the only species of laurel common on a global scale – *Laurus nobilis* – is a complex population. It consists of forms that differ sharply in morphological and biological characteristics and especially in the content of essential oils. Therefore, the taxa of the species-populations of laurel common in Georgia differ sharply from each other. [3, 4, 5]

Based on the above, research work was carried out to establish, in the case of laurel, a correlation between the oil content and the morphological characteristics of the plant in order to simplify the process of selecting high-oil forms.

Purpose and objectives of the study. The purpose of our study was to establish a correlation of genetically determined traits and properties of noble laurel (*Laurus nobilis* L.) with its productivity in the conditions of Western Georgia. To achieve this, the following tasks were set:

- establishing a correlation between the productivity of laurel (essential oil, dry leaves) and the morpho-biological characteristics of the vegetative organs of the plant;
- establishing a connection between the productivity of laurel and the intensity of plant growth.

Object of study. As the object of the study, selected laurel plants were taken from industrial plantations, household plots and individual plantations existing in various regions of Western Georgia. In a certain way, plants selected from natural plantings (Heta, Mount Urta, etc.) were also used as objects of study.

Experimental part. The main research was carried out on the basis of the Nosiri educational research farm and its Meskhetian branch of the Akaki Tsereteli State University, in the laboratory of subtropical crops of the agricultural faculty of the Akaki Tsereteli State University. To solve problems, the determination of the essential oil content in raw materials was carried out mainly using the Ginsberg micromethod and the accelerated method for determining oil-contents by microscopic analysis. The productivity of laurel plants was determined by green mass, or the number of leaves obtained from each plant, by the usual method, by weighing the entire mass of leaves or average samples.

Scientific work on the selection of Laurel Noble was started in 2009 and continues. The article presents the results of work from 2019-2022, which were carried out specifically on the issue of determining the correlation of genetically determined traits and properties of the noble laurel (*Laurus nobilis* L.) with its productivity in the conditions of Western Georgia.

From the point of view of establishing the connection between the morpho-biological characteristics of laurel and its productivity, we determined the difference between the variations, primarily in oil content. From each variation, average samples of raw materials were taken and the oil content was repeatedly determined in them, after which some plants selected from commercial variations were subsequently used by us as objects to establish a correlation between oil content and morpho-biological characteristics and also to select high-oil plants forms

To establish a correlation between the productivity of laurel and the morphological characteristics of its vegetative organs, using Ginsberg methods and microscopic analysis, hundreds of differences in oil content in laurel plants were determined by external morphology. The most highly oily form of laurel turned out to be MB-1; it contains 2.04% essential oil in the raw leaf; in second place is form No. 18 (1.85%), then form S-1 (1.75%) and form H-4 (1.70%). As a result of

repeated determinations, only the oil content in high-oil forms was finally established, as a result of which the previously obtained data were confirmed.

During the study, it was significantly noted that the oil content in laurel leaves depends on age. To confirm this, we determined the oil content in the leaves of some selected forms in young (under 1 year old) and adult (1 year old).

Table 1
Results of determining the content of essential oil in young and adult laurel leaves (average indicators for 2019-2022)

Plant name	Sample by leaf age	Essential oil content, %	Average essential oil content difference
MB-1	Mature leaves	2.035	11.0
MB-1	Young leaves	0.185	
A-1	Mature leaves	0.416	4.5
A-1	Young leaves	0.092	
KZ-1	Mature leaves	0.370	8.0
KZ-1	Young leaves	0.0468	
H-4	Mature leaves	1,850	8.9
H-4	Young leaves	0.207	
Average difference			8.1

As can be seen from the table, the oil content in young leaves is on average 8 times less than in adult leaves.

To establish what correlation exists between the oil content and the morphological characteristics of the plant, studies were carried out using the Ginsberg method and the method of microscopic analysis and it was found that the essential oil content does not depend on the shape of the leaf and the size of the leaf blade.

Table 2.
Results of determining the essential oil content and yield of raw laurel leaves

# growth	Content of essential oil in leaves, %	Type of plant by leaf shape	Leaf yield	Essential oil yield
			per experimental plant, kg.	per experimental plant, kg.
1	3.32	broadleaf	1.10	0.035
2	3.29	broadleaf	0.85	0.028
3	3.14	small-leaved	1.15	0.036
4	3.06	small-leaved	0.75	0.023
5	3.00	small-leaved	0.84	0.025
6	1.77	small-leaved	1.00	0.018
7	0.98	broadleaf	0.97	0.01

8	0.95	broadleaf	0.80	0.008
9	0.93	small-leaved	0.90	0.008

Note: experiments to determine the yield of essential oil and leaves were carried out on plants up to 5 years old

As a result of our repeated analyses, it turned out that all high-oil plants (form No. 18, H-4, S-1, etc.) form thin leaves. Based on this, multiple analyzes were specifically carried out on the oil content of thin-leaved and thick-leaved plants (Table 3).

Table 3
Dependence of essential oil content on leaf thickness

Plant No.	morphological properties of the leaf	content of essential oil in the leaf, %
3-1	husband. plant, with thick, dark green, wide leaves	0.450
3-2	husband. plant with medium thick leaves	0.624
Form C-1	husband. plant with thin leaves	1.712
3-3 form No. 15	husband. plant with thin leaves	0.450
3-4 form No. 16	wives plant with thick, medium-sized leaves	0.381
3-5 form No. 18	wives a plant with slightly wavy-edged, lanceolate, thin leaves of medium size,	1.803
3-6 form No. 17	wives plant with thick leaves	0.385
3-7 Form H-4	wives plant with thin leaves	1.72

As can be seen from the table, the thin-leaved form in all cases contains significantly more essential oil.

Indicators of oil content in male and female plants were also established, and it turned out that in this case there is no connection between the sex of the plant and the oil content (Table 3).

Observations of the dynamics of oil content in laurel plants confirmed that this indicator is directly related to climatic conditions. At the same time, more essential oil is consumed in summer when the high temperature decreases than in autumn and winter.

In addition to the above, the tasks set included the goal of conducting research to determine the correlation between the characteristics of the growth and development of laurel and productivity (the mass of the resulting leaf and the amount of essential oil) and what nature it has (Table 4).

Table 4

Types of laurel plants according to the nature of growth in the conditions of the Kutaisi Botanical Garden

# plants	Average growth by month									Average annual growth, cm	Type of plant according to growth pattern
	April	May	June	July	August	September	October	November	December		
1	5.6	12.4	11.7	5.6	5.9	7.8	8.9	7.3	2.3	67.5	strongly growing
2	5.9	13.1	13.0	5.1	5.3	7.6	8.2	8.8	3.0	70.0	strongly growing
3	3.7	7.7	3.6	5.7	4.3	7.5	11.1	5.8	0.9	50.3	slow growing
4	2.9	7.4	4.8	5.8	4.7	6.9	8.6	9.4	0.1	50.6	slow growing
5	5.8	12.6	11.9	5.7	5.9	9.0	8.0	8.0	3.1	70.0	strongly growing
6	4.1	13.9	12.0	9.0	5.8	8.2	8.0	10.3	0.8	72.1	strongly growing

Based on the final results, we can conclude that in order to select highly productive forms of laurel, first of all, on the basis of special analyzes, it is necessary to select high-oil-bearing forms and among them strong-growing individuals. It is precisely these high-oil-bearing and strong-growing ones, i.e. Production is interested in forms that produce a large amount of green mass, since they provide a high economic effect.

To determine the yield of bay leaves at the end of 2009, the number of leaves obtained from branches cut in winter was taken into account. Based on the counting of leaves and the results of determining the essential oil by microscopic analysis and the Ginzburg method, the established yield was recalculated per unit area - hectares, it turned out that plant productivity in a certain way depends on the growth force of the bushes - strongly growing plants produce more leaves. Based on the results of these studies, the characteristics of the growth and development of laurel and their correlation with productivity were determined and it was established that the intensity of laurel growth does not correlate with its productivity. Both fast-growing and slow-growing forms can be highly productive or low-productive (in terms of essential oil content).

Conclusions:

1. Quantitative indicators of the essential oil content in laurel leaves do not correlate with the intensity of plant growth. Among fast-growing laurel plants there are both high-oil and low-oil forms, the same situation occurs in the case of plants with slow growth.

2. To select highly productive forms of laurel, it is initially necessary, on the basis of special analyses, to select highly oil-bearing forms, and then among them highly growing individuals, since highly oil-bearing and vigorously growing forms, i.e., those producing a large amount of green mass, provide a high economic effect.
3. The productivity of plants depends in a certain way on the growth strength of the bushes - vigorously growing plants give a larger leaf yield, but the same high yield can be obtained in the case of weakly growing plants, which is due to their more frequent foliage.
4. There is no correlation between the content of essential oil in laurel leaves with leaf size and leaf blade shape.
5. According to our research, all high-oil forms with a thick leaf blade do not have high-oil individuals, which indicates that only thin-leaved forms should be used as starting material for selecting high-oil forms as starting material. The shape of the leaf blade does not matter.
6. These studies conducted to determine the oil content confirm that between male and female plants there can be both high-oil and low-oil forms.

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沉积过程中有机矿物基质的自组织
**SELF-ORGANIZATION OF THE ORGANOMINERAL MATRIX
DURING SEDIMENTATION**

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摘要。对陆源岩和碳酸盐岩的物理化学活性的研究揭示了有机物与硅质碳酸盐基质形成复杂关联的区间。岩石表面的此类有机矿物位点会影响岩石的润湿性、原生水饱和度、电、弹性强度和过滤电容特性。考虑了沉积过程中有机矿物基质能量活性形成的可能机制。在有机物质存在下结晶矿物硅质和/或碳酸盐基质时,可以使用两种与分子相互作用的机制:固定在矿物体积中和吸附在矿物表面上。在解释地球物理工作材料、打开层和形成油田开发系统时,必须考虑沉积物中有机矿物组合对岩石性质的影响。

关键词: 陆源岩、碳酸盐岩、有机矿物基质、表面能量非均匀性、阳离子交换容量、物理化学分子相互作用、碳氢化合物。

Abstract. *The study of the physico-chemical activity of terrigenous and carbonate rocks revealed intervals in which organic matter forms a complex association with a siliceous-carbonate matrix. Such organo-mineral sites on the rock surface affect the wettability, the amount of primary water saturation, electrical, elastic-strength and filtration-capacitance properties of rocks. Possible mechanisms of formation of the energy activity of the organomineral matrix during sedimentation are considered. When crystallizing a mineral siliceous and/or carbonate matrix in the presence of organic substances, 2 mechanisms of interaction with molecules can be used: immobilization into a mineral volume and adsorption onto a mineral surface. The influence on the properties of rocks of organo-mineral associations in the context of sediments must be taken into account when interpreting the materials of geophysical work, opening layers, and forming a field development system.*

Keywords: *terrigenous rock, carbonate rock, organo-mineral matrix, energy heterogeneity of the surface, cation exchange capacity, physico-chemical molecular interactions, hydrocarbons.*

The state of the surface of the organo-mineral matrix is one of the most important factors influencing decision-making when choosing methods for opening and developing a gas-oil reservoir. In petrophysical practice, methods for determining the physico-chemical activity of a mineral surface, assessing the level of surface hydrophobization, and wettability are not standardized today. There is no general approach to assessing the parameters that determine the wettability of rocks, the influence of the organo-mineral surface on the value of primary water saturation, electrical, elastic-strength and filtration-capacitance properties of rocks is not taken into account. Laboratory studies of rocks of the Frolov, Bazhenov and Abalak formations, Artinsky and Domanik horizons have shown that in some intervals of the studied sections, rock samples represent an organomineral complex. Geochemical studies of the heterogeneity of the organo-mineral matrix of carbonate rocks of domanic deposits of the Volga-Ural oil and gas province allowed us to identify intervals in the studied section where organic matter forms a complex association with a siliceous-carbonate matrix [1].

The results of pyrolytic studies of domanic deposits have recorded atypical behavior of the measured parameters S4 and S5 for some lithotypes of carbonate rocks, i.e., on the pyrograms of the samples before extraction, a combination of peaks S4 (the amount of CO₂ released during the decomposition of S) and S5 (the amount of CO₂ during the decomposition of carbonates) was observed. The indivisibility of the S4 and S5 peaks on the pyrograms indicates that the carbonate and organic components of the rock are in a certain agglomeration, which is also fixed by optical and electron microscopy methods during lithological studies. A comparison of the lithological features of the described lithotypes in the context of domanic deposits does not allow us to identify any parameter that would radically distinguish “different from other” lithotypes and explain their special geochemical behavior. However, if we study the microstructure of carbonate rock samples only from SEM images, then the crystals look like pure calcium carbonate CaCO₃, and with the use of point element sensing, a violation of the stoichiometric formula of calcium carbonate has already been recorded, i.e. more carbon and less calcium are noted in the samples.

High-molecular carbonate-organic associations are noted not only in domanic. In the study of limestones (early Permian, Arta horizon) The authors of the Orenburg oil and gas complex [2] identified organo-mineral complexes, described their non-standard properties and made the assumption that the carbonate rock is a polymer of complex structure and has not only an inorganic, but also an organic nature. The same organo-mineral complexes were isolated in the Assel-Arta section of the Lower Permian carbonate deposits of the Astrakhan arch [3], and in the section of the dolomites of the Preobrazhensky horizon (Proterozoic, Vend, Eastern Siberia, Russia) [4], and in the intervals of carbonated rocks of the Bazhenov formation [5].

When studying the physico-chemical activity of terrigenous deposits of the Achimov, Frolov, Bazhenov and Abalak formations, non-standard results were also obtained. When studying the physico-chemical activity of terrigenous deposits of the Achimov, Frolov, Bazhenov and Abalak formations, non-standard results were also obtained. It is classically believed that the physical and chemical activity of rocks is directly dependent on the content of clay minerals. However, the study of the activity of the mineral surface of the rocks of the Achimov, Frolov, Bazhenov and Abalak deposits revealed an interesting pattern for these rocks – the cation exchange ability increased expectedly with an increase in the content of clay minerals and organic matter in core samples. However, when studying the ratio of hydrophilic and hydrophobic centers on the mineral surface of rocks of the Frolovsko-Bazheno-Abalaksy complex by the method of water vapor adsorption, a closer correlation was recorded between the degree of hydrophobization of rocks and the content of silica in samples than on the content of clay minerals and organic matter [5].

For the collection of samples from the Frolov-Bazhen-Abalak deposits of several deposits of the Krasnoleninsky arch and the Gydan Peninsula, the relationships of physico-chemical activity (the content of Na^+ , K^+ , Mg^{2+} , Ca^{2+} cations in the total exchange complex) from the amount of clay minerals and organic matter in the rock, as well as from the content of silica, were analyzed. Based on the dependence of the percentage of Na^+ in the total exchange complex on the content of organic matter, 3 zones were identified:

- a) with a predominance of sodium (50-80%) – represented by clay rocks of the Frolov, Abalak and partially Bazhenov (northern part of the region) formations,
- b) with a predominance of calcium and potassium – represented mainly by rocks of the Bazhenov formation,
- c) with a predominance of $\text{Mg}^{2+}>65\%$ in the exchange complex – represented by weakly clay and non-clay rocks of abalak and bazhen [6].

For rocks of the Achimov deposits, zones of predominance of the Na^+ cation and the sum of cations ($\text{Ca}^{2+}+\text{Na}^+$) and (K^++Na^+) were also distinguished in the exchange complex, although for Frolov-Bazhen-Abalak rocks, the Mg^{2+} content in the selected zone varies between 65-95%, and for Achimov – $\text{Mg}^{2+}=5-8\%$. Nevertheless, for the Achimov fine-grained sandstones, even such a magnesium content distinguished them into a special group [7]. The analysis of the mineral and granulometric composition of the rocks of the studied deposits showed that SiO_2 is an amorphous silica or a fine-grained siltstone component. Thus, for the rocks of the Achimov, Frolov, Bazhenov and Abalak formations, mosaic hydrophobization of the organomineral matrix and the energetic activity of the silica surface were experimentally recorded.

Discussion of research results

Experimental confirmation of the existence of organo-carbonate associations in carbonate rocks, as well as the presence of energetic activity of the silica surface and mosaic hydrophobization of the organomineral matrix in terrigenous rocks, revealed the questions: at what stages of sedimentation can such complexes form and what chemical bonds can contribute to this? Discussion of research results Experimental confirmation of the existence of organo-carbonate associations in carbonate rocks, as well as the presence of energetic activity of the silica surface and mosaic hydrophobization of the organomineral matrix in terrigenous rocks, revealed the questions: at what stages of sedimentation can such complexes form and what chemical bonds can contribute to this? The process of sedimentogenesis can be schematically represented as the transfer of the solid phase, its deposition, and further transformation of the sediment into sedimentary rock. In the initial stage of sedimentogenesis, the system under study is a dispersed solution, i.e. the formation of several phases that do not mix and do not react chemically with each other. In addition to mineral particles, carbonate and/or silica gel and organic matter are present in the water, therefore, in order to evaluate the options for the formation of an organomineral matrix, the interaction of organic matter with silicon-containing, carbonate and clay should be considered.

Humic substances, formed from residues of plant and animal origin, are poly-disperse mixtures of organic heteropolymers, capable of forming metal-organic complexes and interacting with water using ionic, donor-acceptor and hydrophobic interactions. The formation of the “silica + organic matter” system has been studied quite well on the example of diatoms – this is the participation of proteins in the deposition of silicon. In the experimental study of the interaction of silica with humic acid, the following sequence of physico-chemical processes is described. Silica is actively dissolved in humic acids, since, according to the authors [8], as a result of the interaction of phenolic groups of humic acids with SiO_2 , an organosilicon compound is formed. During the formation of colloidal aggregates, the surface tension decreases through the adsorption process. According to the Peskov–Faience–Panet rule, ions capable of completing the crystal lattice are adsorbed from a colloidal solution to the surface of solid particles, i.e. ions similar to the composition of the particle, ions isomorphic (related) to ions of the solid phase or ions forming a difficult-to-dissolve compound with ions of the crystal lattice. In some surface Si—O—H groups, the H^+ proton can be replaced by the Na^+ (or Ca^{2+}) cation, which causes bridging bonds between colloidal particles with adsorbed cations, followed by coagulation and precipitation of colloidal silica. In humic acids, the degree of hydrogen substitution of carboxyl groups (—COH) with Na^+ , Mg^{2+} , and Ca^{2+} cations increases with increasing pH. The authors [9] consider the functional carboxyl group (—COOH) on the surface of dispersed silica particles as

an example of ionic adsorption and suggest that the chemisorption of the carboxyl group of humic acids (HA) onto a silica particle occurs through the formation of hydrogen bonds: $\equiv\text{Si}-\text{O}\cdots\text{H}-\text{OOC}-\text{HA}$. Thus immobilization (or restriction mobility) of organic matter in the case of rocks occurs when the organic matter is included in the mineral phase without changes in the structure of the substance. There are 2 types of immobilization of organic compounds with silica particles:

1) chemical interaction (covalent bonds);

a) in the surface silanol $\text{Si}-\text{O}-\text{H}$ groups, the proton has a slightly acidic character, therefore, silanol groups (unlike siloxane $\text{Si}-\text{O}$) more actively enter into metabolic reactions; the OH-group allows organic and inorganic functional groups to gain a foothold on the surface of silica [10];

b) the siloxane bond has a partially ionic character (by 40-50%), therefore, for organosilicon compounds, the $\text{Si}-\text{O}-\text{R}$ (Me) bond, where R is a hydrocarbon radical or Me is a metal ion, is one of the most durable bonds;

2) physical interaction (non-covalent bonds: electrostatic, donor-acceptor, hydrogen, hydrophobic); manifests itself during the adsorption of organic matter into the solid phase, when organic matter is incorporated into a gel or when organic matter is encapsulated in a sol-gel.

In the study of carbonate rocks, a comparison of the results of pyrolysis and lithological studies suggests that at the stage of fossilization or sedimentation, physico-chemical conditions arise for the immobilization of organic matter into a carbonate matrix and the creation of organo-carbonate agglomerates.

But the question arises: under what conditions is it possible to introduce (immobilize) organic matter into the structure of the mineral matrix at the time of crystallization of the carbonate? According to the authors [2], the interaction of organic and carbonate substances occurs under anaerobic conditions during the formation of supramolecular colloidal structures from carbonate salts of organic acids. At the same time, the sequence of stages of the formation of the organo-mineral complex is described by the mentioned authors as follows:

dilute solution of dead organics \rightarrow ordering of molecules into supramolecular structures (bilayers, biochemical membranes) and their laying \rightarrow crosslinking in the polymer structure \rightarrow transition to gel/sol (jelly) \rightarrow compaction and dehydration (syneresis or spontaneous decrease in gel/sol volume during compaction of the spatial structural grid of macromolecules, accompanied by the release of a free liquid phase; when during syneresis, the system goes into a thermodynamically more stable state) \rightarrow crystallization.

However, the great interest currently in nanotechnology and nanomaterials makes it possible to accelerate the accumulation of experimental experience in studying crystallization at the molecular level. In other words, there is a tendency to describe crystallization in the volume of molecular clusters and on the sur-

face of crystals, and not as a sequence of “germ–growth–macroaggregate”. The study of the nucleation and growth of nanocrystals by molecular imaging methods has confirmed the fact that these processes are variable, i.e., that under the same conditions in the system, the times of nucleation and crystal growth can differ significantly (sometimes by orders of magnitude!) [11]. It is the presence of macrovariability of the crystallization process that makes it possible to immobilize organic molecules into the structure of a carbonate crystal. The interaction of organic substances with the surface of clay minerals is well studied. The lateral faces and chips of clay particles are positively charged, the basal surfaces of clay minerals are negatively charged, therefore organic molecules can interact with various cations/anions of the mineral surface of clay minerals directly or through a water molecule, i.e. the main mechanism of interaction is adsorption.

Conclusions

An analysis of the possible mechanisms of self-organization of the natural system “organic matter - siliceous-carbonate gel - clay particles” showed that a new microstructure arises as a result of the rearrangement of interrelations. At the beginning of sedimentogenesis, during crystallization of a mineral siliceous and/or carbonate matrix in the presence of organic substances, the system can use 2 mechanisms of interaction with molecules: immobilization into a mineral volume (hydrolysis and polycondensation) and adsorption onto a mineral surface (hydrogen and covalent bonds). At the same time, organic matter can only be adsorbed onto the surface of clay minerals. It should be noted that the possibility of introducing organic matter into the crystal lattice of the mineral matrix, i.e. the presence of organo-mineral complexes and the energetic activity of amorphous and finely dispersed silica, casts doubt on some aspects of the standardization of applied techniques in the laboratory study of rock samples.

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环境对地球和其卫星月球之间相互作用机制的影响
**THE INFLUENCE OF THE ENVIRONMENT ON THE
MECHANISMS OF INTERACTION BETWEEN THE PLANET
EARTH AND ITS SATELLITE THE MOON**

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注释。本文致力于研究环境对它们在外层空间相互作用机制的影响，不仅考虑了机械特性，还考虑了我们恒星、地球及其卫星月球结构的大量物理数据。相互作用机制基于新的物理定律和多方面依赖理论，该理论考虑了许多事实，其中一种自然现象在不同程度上依赖于另一种自然现象。活性较高的物质体支配活性较低的物质体，因此不可能存在独立且恒定的常数、定律或物理量。例如，位于太阳系空间的两个物质体之间的新引力定律与位于太阳系空间的一个物质体与中心恒星太阳的新引力定律密切相关。同时，引力、宇宙相互作用和反应定律不断依赖于位于太空的物质体的新活动定律和太空物体自由落体加速度的新定律。而上述定律与太阳系空间中两个物体之间的新能量定律以及太阳系空间中一个物体与中心恒星（太阳）之间的新能量定律密切相关。这些恒星地球与其卫星月球之间相互作用的机制将有助于更好地理解引力影响海洋潮起潮落的方式，以及人类生活和整个自然界中过程的周期性。

关键词：太阳与地球相互作用的机制，地球与月球相互作用的机制，新物理定律，天体力学，天文学。

***Annotation.** The article is devoted to the influence of the environment, taking into account not only mechanical characteristics, but also numerous physical data of the structure of our star, planet Earth and its satellite the Moon on the mechanisms of their interaction with each other in outer space. The interaction mechanisms are based on new laws of physics and the theory of multifaceted dependence, which takes into account numerous facts, where one natural phenomenon is dependent on another to varying degrees. More active material bodies dominate over less active material bodies, so there cannot be independent and constant constants, laws or physical quantities. For example, the new law of gravity between two material bodies located in the space of the Solar System is closely related to the new law of gravity of one material body located in the space of the Solar System to the central star, the Sun. At the same time, the laws*

of gravity, cosmic interaction and reaction are in constant dependence on the new law of activity of a material body located in space and the new law of acceleration of free fall of bodies in space. And the listed laws are closely related to the new law of energy between two material bodies that are located in the space of the Solar System and the new law of energy of one material body located in the space of the Solar System to the central star, the Sun, and many others. These mechanisms of interaction between our star, planet Earth and its satellite the Moon will help to better understand the methods of gravitational forces that influence the ebb and flow of the oceans, as well as the periodicity of processes in the lives of people and our entire nature.

Keywords: *mechanisms of interaction of the Sun with planet Earth, mechanisms of interaction of planet Earth with the Moon, new laws of physics, celestial mechanics, astronomy.*

Since ancient times, humanity has tried to study the world that surrounds us. People have always been interested in the internal structure and origin of the Earth, the solar system and our Universe. These are the questions that have worried motivated people for centuries. Many legends and predictions of various peoples of the world and numerous cosmological theories of the formation of the planets of the solar system have survived to this day. However, we will highlight only the most popular scientific hypotheses.

German scientist Emmanuel Kant believed that the Sun and all the planets were formed from a cold dust cloud. This cloud rotated, gradually the dust grains became denser and united - this is how the Sun and other planets were formed.

French scientist and astronomer Pierre Laplace proposed his hypothesis about the emergence of the solar system. He believed that the Sun and planets were formed from a giant hot gas cloud. It gradually cooled, contracted and gave rise to the Sun and planets.

Soviet mathematician, geographer, geophysicist, astronomer Otto Yulievich Schmidt in 1944 put forward his hypothesis about the origin of the planets of the solar system. He believed that billions of years ago a giant gas and dust cloud revolved around the Sun, this cloud was cold. Over time, the cloud flattened and clumps formed. These clumps began to rotate in orbits, and planets gradually formed from them.

It must be especially emphasized that the hypotheses of Kant, Laplace and Schmidt are in many ways similar, and they formed the basis of the modern theory about the origin of the solar system and our planet Earth.

Modern scientists suggest that the Solar system, that is, the Sun and the planets, arose simultaneously from a giant cold gas-dust cloud. This cloud of interstellar gas and dust was spinning. Gradually, clots began to form in it. The central, largest

clump gave rise to a star - the Sun. Nuclear processes began to occur inside the Sun, and because of this it warmed up. The remaining clumps gave rise to planets.

From the above it is clear that scientists' ideas about the emergence of our solar system and the Earth developed gradually. Today, there are still many controversial, unclear issues that modern science needs to solve.

I believe that the hypothesis of Georges Buffon and the hypothesis of James Hopwood Jean are more plausible. These hypotheses are amenable to logical comprehension and can be proven using Newton's third law and the new laws of physics.

The English scientist James Hopwood Jeans at the beginning of this century suggested that in the distant past a certain star flew past the Sun at a very close distance, which, with its gravitational influence, tore part of the matter from the surface of our star. This substance, later breaking into pieces, formed planets.

The French scientist, naturalist, biologist, mathematician and naturalist Georges-Louis Leclerc Comte de Buffon suggested that our Earth was formed as a result of a catastrophe. Once upon a time, a huge comet crashed into the Sun, causing numerous splashes to scatter. Subsequently, these splashes began to cool, where planets were formed from the largest particles, including planet Earth.

Moreover, even at the present time, astronomers from the Paris Observatory and the Institute of Astrophysics of Andalusia have discovered the largest comet. The diameter of comet 2014 UN271 turned out to be 140 kilometers.

We will not abstract ourselves from this cosmic catastrophe that took place several million years ago, but will carry out a systematic analysis of the mechanism of formation of the planets of the Solar System from hot solid material particles scattered in outer space from this impact, providing specific mathematical proofs which, for clarity, we will present in a popular scientific form.

It must be especially emphasized that all the stars of our Universe, during their decay, release "ether", which, when moving away from the surface of the star, cools down and turns into the substance of outer space.

The mass of the "ether" or the substance of outer space can only be determined by the constant of the substance of outer space with the help of new and proven laws of physics, as well as mathematically prove and confirm the postulates of the greatest English scientist, physicist, mathematician, astronomer and thinker Isaac Newton.

It must be especially emphasized that inside the "ether" or the substance of outer space, electrically charged particles are interconnected by the forces of interaction of two point charges located in a vacuum. Now the word corpuscle, which was proposed by Isaac Newton, can be supplemented with modern words and expressions, such as molecule, atom, photon, electron, neutrino, meson, quark, antiquark, pion, kaon, tetraquark, hadron, proton, neutron and so on... However,

no one will ever know the percentage of all substances, their quantity and the combination of those included in the substance of outer space and the “ether”, which are constantly transformed during their movement, since we still poorly know how our microworld is structured and interacts with each other.

A new physical quantity that determines the substance of outer space was popularly presented in the scientific and practical journal “Higher School” No. 18 for 2017, page 27. Publishing house “Infinity”, Ufa. Currently, the “ether” and substance of outer space has a density that is currently $= 0.3126005345650193429716951029 \text{ kg/m}^3$.

If you isolate a solid mass of the substance of outer space and distribute it over one square meter, you will get a film less than one micron thick, which is located in one cubic meter.

In the application for invention No. 2005129781/06 (033405) dated September 28, 2005 and application for invention No. 2005140396/06 (033405) dated December 26, 2005, the mechanisms of the formation of planets of the Solar system in outer space from hot material bodies separated from surface of the Sun. All open mechanisms for the formation of planets in the Solar System are subject to the laws of nature and provide an opportunity to learn and take a fresh look at the existence of properties and phenomena of the material world previously unknown to us, which include:

- the mechanism of formation and production of thermoelectricity in the sphere of a material body located in space,
- the mechanism of formation and production of a magnetic field in the sphere of a material body located in space,
- the mechanism of formation of magnetic poles in the sphere of a material body located in space,
- a mechanism for launching and starting rotation of a magnetic system in the sphere of a material body located in space, counterclockwise, using the example of planet Earth,
- a mechanism for placing planets of the solar system with a magnetic field in one plane of outer space,
- the mechanism of autonomous rotation of the magnetic system in the sphere of a material body located in space, counterclockwise, using the example of planet Earth,
- a mechanism for launching and starting rotation of the magnetic system in the sphere of a material body located in space, clockwise, using the example of the planet Venus,
- the mechanism of autonomous rotation of the magnetic system in the sphere of a material body located in space, clockwise, using the example of the planet Venus,

- mechanism of formation of gravitational, interaction and reaction forces,
- mechanism of formation of volcanic activity on planet Earth,
- mechanism of formation of geopathogenic zones on planet Earth,
- the mechanism of formation of tsunamis and tornadoes on planet Earth,
- the mechanism of earthquake formation on planet Earth and so on...

It must be especially emphasized that the mechanism for the formation of the acceleration of free fall of bodies in space, Fig. 1, on any planet of the Solar system consists of force 1 generated from the rotation of the outer shell 2 in one direction and the rotation of the inner part of the core 3 in the opposite direction as on planet Earth. In this case, the inner part of the core 3 can be stationary, as on the Sun, and then the acceleration force of the free fall of bodies in space will be directed at an angle to the outer shell, or vice versa, as on the Moon, where the outer shell is stationary, and its inner part is in constant motion.

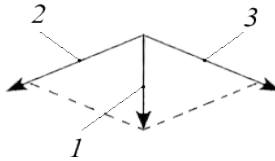


Figure 1

For example, on planet Earth, the outer shell 2 rotates in one direction, and the inner core 3 rotates in the other direction. When the outer shell of our planet rotates in one direction and the inner part of the core in another direction, an acceleration of the free fall of bodies in space 1 is created.

However, it must be especially emphasized that in addition to the acceleration created by the free fall of bodies in space on planet Earth, any material body located on the surface of our planet is affected by the mass of the air column.

Moreover, when the measuring instrument moves upward from the surface of our planet, the acceleration of free fall of bodies in space decreases, but if the measuring instrument is moved deeper into our planet, then the acceleration of free fall of bodies in space increases. The acceleration of the free fall of bodies in space on planet Earth was formed from a hot material body and was proven based on a specific law, which was set out in the scientific analytical journal “Scientific Observer” No. 1 (25) for 2013, pages 68-73. Publishing house “Infinity” Ufa.

The law of acceleration of free-falling bodies in space was formulated as follows:

The module of acceleration of free fall of bodies in space is equal to the square of the sum of the vector of rotation speed of the outer shell of the material body in one direction and the vector of rotation speed of the inner part of the material body

in the opposite direction, along the middle line of the intermediate layer divided by the difference between the radius of the outer shell of the material body and the radius of the inner part material body, along the midline of the intermediate layer plus the sum or difference of the distance measurement up or down from the surface of the outer shell of the material body.

$$g = \frac{(V_e + V_{nc})^2}{R_e - R_{nc} + h} = \frac{(M/c + M/c)^2}{M} = \frac{M^2}{M \cdot c^2} = \frac{M}{c^2}$$

where:

V_e - rotation speed of the outer shell of a material body around the equator counterclockwise, m/s

V_{ps} - rotation speed of the internal part of the material body along the middle line of the intermediate layer, m/s

h - positive height or negative depth of measurement from sea level at the equator to the surface of the outer shell of the material body, m

R_{ps} - radius of the internal part of the material body, m

g - module of acceleration of free fall of bodies in space, m/s²

R_e - radius of the outer shell of the material body, m.

For example, according to the law of acceleration of free fall of bodies in space, we determine the module of acceleration of free fall of bodies at the equator of planet Earth.

$$g = \frac{(V_e + V_{nc})^2}{R_e - R_{nc} + h} = \frac{(M/c + M/c)^2}{M} = \frac{M^2}{M \cdot c^2} = \frac{M}{c^2}$$

$$g = \frac{(465,10330531127327.M + 458,74092754269918.M)^2}{6378160.M - 6290910.M + 0.M} = 9,7820993304016607517746568.M/c^2$$

where:

g - free fall acceleration module on planet Earth, m/s²

h - height above sea level at the equator of planet Earth = 0 m

R_e - radius of the outer part of the shell of planet Earth = 6378160 m

R_{ps} - radius of the inner part of planet Earth to the middle line of the intermediate layer = 6290910 m

V_e - the speed of rotation of the outer shell of the planet Earth along the circumference of the equator counterclockwise = 465.10330531127328447687882460188 m/s

V_{ps} - rotation speed of the inner core of planet Earth along the midline of the intermediate layer = 458.74092754269918253045420097272 m/s.

It must be emphasized that when a material body moves away from the Earth's surface, the module of acceleration of free fall of bodies in space decreases proportionally, and when a material body approaches the midline of the intermediate

Belashov layer, the module of acceleration of free fall of bodies in space increases proportionally.

For example, according to the law of acceleration of free fall of bodies in space, we determine the module of acceleration of free fall of bodies in space near the surface of the Moon at perigee emanating from the surface of planet Earth at a distance = 362687250 m.

$$g = \frac{(V_e + V_{nc})^2}{R_e - R_{nc} + h} = \frac{(m/c + m/c)^2}{M} = \frac{M^2}{M \cdot c^2} = \frac{M}{c^2}$$

$$g = \frac{(465,10330531127327_M + 458,74092754269918_M)^2}{6378160_M - 6290910_M + 362687250_M} = 0,002353234547333949292654 \text{ M/c}^2$$

where:

g - free fall acceleration module on planet Earth, m/s²

h - height from the surface of planet Earth to the surface of the Moon located at perigee = 362687250 m

R_e - radius of the outer part of the shell of planet Earth = 6378160 m

R_{ps} - radius of the inner part of planet Earth to the middle line of the intermediate layer = 6290910 m

V_{eq} - the speed of rotation of the outer shell of the planet Earth along the circumference of the equator counterclockwise = 465.103305311273284476878824 60188 m/s

V_{ps} - rotation speed of the inner core of planet Earth along the midline of the intermediate layer = 458.74092754269918253045420097272 m/s.

For example, according to the law of acceleration of free fall of bodies in space, we determine the module of acceleration of free fall of bodies in space near the surface of the Moon at the apogee emanating from the surface of planet Earth at a distance = 405487250 m.

$$g = \frac{(V_e + V_{nc})^2}{R_e - R_{nc} + h} = \frac{(m/c + m/c)^2}{M} = \frac{M^2}{M \cdot c^2} = \frac{M}{c^2}$$

$$g = \frac{(465,10330531127327_M + 458,74092754269918_M)^2}{6378160_M - 6290910_M + 405487250_M} = 0,002104845877589356756821 \text{ M/c}^2$$

where:

g - free fall acceleration module on planet Earth, m/s²

h - height from the surface of planet Earth to the surface of the Moon at apogee = 405487250 m

R_e - radius of the outer part of the shell of planet Earth = 6378160 m

R_{ps} - radius of the inner part of planet Earth to the middle line of the intermediate layer = 6290910 m

V_{eq} – the speed of rotation of the outer shell of the planet Earth along the circumference of the equator counterclockwise = 465.10330531127328447687882460188 m/s

V_{ps} - rotation speed of the inner core of planet Earth along the midline of the intermediate layer = 458.74092754269918253045420097272 m/s.

From these calculations, we conclude that the acceleration of free fall of bodies in space created by the planet Earth near the surface of the Moon = 0.002104845877589356 m/s² is two and a half times greater than the acceleration of free fall of bodies in space created by the Sun = 0.0008367597908361204013377926 m/s².

The magnetic field of the Sun, its rotation and the formation around it of the acceleration of free falling bodies in space was popularly presented in the information and analytical journal “Actual Problems of Modern Science”, No. 6 (129) for 2022, pages 13-19. Publishing house “Sputnik +”, Moscow.

However, there are many other mechanisms of interaction between the Sun, planet Earth and its satellite the Moon, where we will prove with specific examples that the Moon is a gas satellite of our planet and has the acceleration of free fall of bodies in space 3.67 times greater than on planet Earth, which fully confirmed by the new laws of physics.

To begin with, according to the existing laws of physics, we will determine the mass and average density of planet Earth.

Let us determine the volume of a cylinder with a cosmic substance having the area of a circle of planet Earth, between the surface of the Sun and the surface of planet Earth located at an average distance from the surface of the Sun.

$$V = P \cdot r^2 \cdot h$$

$$V = 3.1415926535897932384626433832795 \cdot 6378100 \text{ m}^2 \cdot 149500000000 \text{ m} = 19106173341356616146930089.016221 \text{ m}^3$$

where:

V - volume of the cylinder with space substance, m³

r - average equatorial radius of planet Earth = 6378100 m

P - ratio of length to its circumference = 3.141592653589793238462643383

h - height of the cylinder between the Sun and planet Earth = 149500000000 m.

Let us determine the mass of the cosmic substance located between the surface of the Sun and the surface of planet Earth, located at an average distance from the surface of the Sun.

$$m_k = V \cdot P_k$$

$$m_k = 19106173341356616146930089.016 \text{ m}^3 \cdot 0.312600534565019342971 \text{ kg/m}^3 = 5972600000000000000000.0025357 \text{ kg}$$

where:

m_k - mass of the substance of outer space, kg

P_{to} - density of the substance = $0.3126005345650193429716951 \text{ kg/m}^3$

V - volume of the cylinder with the substance = $19106173341356616146930089.016221 \text{ m}^3$.

Based on Newton's third law, the force of one medium consisting of the substance of outer space acts on another medium, consisting of the gravitational force of the planet Earth, located in the space of the solar system must be equal in magnitude and opposite in direction.

$$F_{ts} = - F_{st}$$

$$5.9726 \times 10^{24} \text{ N} = - 5.9722 \times 10^{24} \text{ N}$$

where:

F_f - force of the substance of outer space = $5.9726 \times 10^{24} \text{ N}$

F_{tso} - the gravitational force of the planet Earth to the surface of the Sun = $5.9722 \times 10^{24} \text{ N}$.

Let's determine the volume of planet Earth.

$$V_3 = \frac{4 \cdot P \cdot r^3}{3}$$

$$V_z = [4 \cdot 3.1415926535897932384 \cdot 6378100 \text{ m}^3] : 3 = 1086832411937628837875.0037971403 \text{ m}^3$$

where:

V_3 - volume of planet Earth, m^3

r - average equatorial radius of planet Earth = 6378100 m

P - the ratio of the length to its circumference = $3.14159265358979323846264338$.

Knowing the mass and volume of planet Earth, we can determine the average density of our planet.

$$p_3 = \frac{m_3}{V_3}$$

$$P_1 = 5972600000000000000000000000.002 \text{ kg} : 1086832411937628837875.003 \text{ m}^3 = 5495.4194725863178424140909397748 \text{ kg/m}^3$$

where:

P_z - average density of planet Earth, kg/m^3

m_z - mass of planet Earth = $5972600000000000000000000000.0025357 \text{ kg}$

V_z - volume of planet Earth = $1086832411937628837875.0037971403 \text{ m}^3$.

It must be especially emphasized that in order to determine the mass and density of the Moon, it is necessary to calculate the substance of outer space between two measured material bodies located in outer space and select one of two values, where not only the gravitational force is greater, but also the acceleration of free fall of bodies in the space between two measurable material bodies. In this case, the planet Earth has more influence on the Moon with its mechanism of gravity and the acceleration of the free fall of bodies in space by two and a half times than

the force of gravity and the acceleration of the free fall of bodies between the surface of the planet Earth and the surface of the Sun.

Let's calculate the average distance from the surface of planet Earth to the surface of the Moon.

$$h_{av} = (h_a + h_p) : 2 = (405400000 \text{ m} + 362687250 \text{ m}) : 2 = 384043625 \text{ m}$$

h_{av} - average height from the surface of planet Earth to the surface of the Moon, m

h_a - height from the surface of planet Earth to the surface of the Moon at apogee = 405400000 m

h_p - height from the surface of planet Earth to the surface of the Moon located at perigee = 362687250 m

Let us determine the volume of a cylinder with a cosmic substance having the area of the circle of the Moon, between the surface of planet Earth and the surface of the Moon located at an average distance from the surface of planet Earth.

$$V = P \cdot r^2 \cdot h$$

$$V = 3.14159265358979323 \cdot 1737000 \text{ m}^2 \cdot 384043625$$

$$m = 3640240439558898164584.59623328 \text{ m}^3$$

where:

V - volume of the cylinder with space substance, m^3

h - height of the cylinder with space substance from the surface of the Moon to the surface of planet Earth = 384043625 m

r - average equatorial radius of the Moon = 1737000 m

P - the ratio of the length to its circumference = 3.141592653589793238462643.

Let's mentally imagine a cylinder with a diameter from the surface of the Moon to the surface of planet Earth, inside of which there is a mass of substance from outer space.

Let us determine the mass of the substance of outer space, which should be equal to the mass of the gas mixture of the Moon.

$$m_l = V \cdot p$$

$$3640240439558898164584.5962332804 \text{ m}^3 \cdot 0.3126005345650193429716951 \text{ kg/m}^3$$

$$= 1137941107351312552119.3278798377 \text{ kg}$$

where:

m_l - mass of the substance of outer space, kg

V - volume of the cylinder with space substance = 3640240439558898164584.53 m^3

p_k - density of the substance of outer space = 0.31260053456501 kg/m^3 .

Let's determine the volume of the Moon.

$$V_l = \frac{4 \cdot P \cdot r^3}{3}$$

$$V_l = [4 \cdot 3.1415926535897932384 \cdot 1737000 \text{ m}^3] : 3 = 5488176543757501604.913 \text{ m}^3$$

where:

VI - volume of the Moon, m³

r l - average equatorial radius of the Moon = 1737000 m

P - the ratio of the length to its circumference = 3.1415926535897932384626433832795.

Let's determine the total density of the Moon

$$\rho_1 = \frac{m_1}{V_1}$$

$$\rho_1 = 1137941107351312552119.3278798377 \text{ kg/m}^3 = 5488176543757501604.9139761 \text{ kg/m}^3$$

where:

\rho_1 - average density of the Moon kg/m³

m k - mass of space substance = 1137941107351312552119.3278798377 kg

VI - volume of the Moon = 5488176543757501604.91397 m³.

It must be especially emphasized that the planets of the Solar System are kept in their orbits according to the new law for determining the distance from the surface of the Sun to the surface of the planets of the Solar System, which was discovered and popularly presented in the scientific and practical journal "Higher School" No. 17 for 2018, page 49. Publishing house "Infinity" city of Ufa and is formulated as follows:

The distance from the surface of the Sun to the surface of the planets of the Solar System is directly proportional to the acceleration of free fall of bodies in the space of the measured material body by the diameter of the measured material body and inversely proportional to the acceleration of free fall of bodies around the Sun.

$$L_u = \frac{g_u \cdot D_u}{g_c} = \frac{M}{c^2} \cdot \frac{c^2}{M} \cdot M = M$$

where:

L and - distance from the surface of the Sun to the surface of the planet under study, m

g and - acceleration of free fall of bodies in space on the studied planet of the Solar system, m/s²

g c - acceleration of free fall of bodies around the Sun, m/s²

D and is the diameter of the planet under study, m.

Knowing the diameter of the measured planet of the Solar System and the distance from the surface of the Sun to the surface of the measured planet of the Solar System, it is possible to determine the acceleration modulus of the free fall of bodies in space on a given planet.

For example, according to the new law, we will determine the acceleration modulus of free falling bodies in space on planet Earth, which is located at an average distance from the surface of the Sun.

$$g_3 = \frac{L \cdot g_c}{D_3} = \frac{M}{c^2} \cdot \frac{M}{M} = \frac{M}{c^2}$$

$$g_3 = \frac{14950000000,000 \text{ m} \cdot 0,000836759790836 \text{ m/c}^2}{12756200 \text{ m}} = 9,80665000000 \text{ m/c}^2$$

where:

g_3 - acceleration of free fall of bodies in space on planet Earth, m/s^2

g_c - acceleration of free fall of bodies in space around the Sun

$= 0.00083675979083612040133779264214 \text{ m/s}^2$

L - average distance from the surface of the Sun to the surface of planet Earth = 149500000000 m

D_3 - diameter of planet Earth = 12756200 m.

Knowing the diameter of the Moon's satellite and the distance from the surface of the Sun to the surface of the Moon, we can determine the acceleration modulus of free fall bodies on the Moon.

For example, let us determine the acceleration modulus of free falling bodies in space on the Moon, a satellite of the planet Earth, which is located at an average distance from the surface of the Sun.

$$g_1 = \frac{L \cdot g_c}{D_1} = \frac{M}{c^2} \cdot \frac{M}{M} = \frac{M}{c^2}$$

$$g_1 = \frac{149500000000 \text{ m} \cdot 0,00083675979083612040133779264214 \text{ m/c}^2}{3476280 \text{ m}} = 35,98547548816551 \text{ m/c}^2$$

where:

g_1 - acceleration of free fall of bodies in space on the Moon, m/s^2

g_c - acceleration of free fall of bodies in space around the Sun

$= 0.00083675979083612040133779264214 \text{ m/s}^2$

L - average distance from the surface of planet Earth to the surface of the Moon = 384043625 m

D_1 - diameter of the moon's satellite = 3476280 m.

The acceleration of free fall of bodies in space around the Moon was calculated according to a new law published in the scientific and practical journal "Higher School" No. 18 for 2018, pages 61-67. The scientific article proved that the sphere of the Moon consists of a solid shell of frozen gas, which is covered with cosmic dust (the substance of outer space). It is difficult to determine the internal composition of the gas from the average density of the Moon, since the total density of the Moon is $207.34411480360591825555795958332 \text{ kg/m}^3$.

The gas inside the Moon's sphere can consist of many chemical components, but even gas mixtures consisting of helium and hydrogen can create the outer sphere of the Moon and remain in a solid state at the temperature of outer space - $270.45 \text{ }^\circ\text{C}$. Inside the solid shell, the gas mixture with cosmic dust particles is in

constant motion, since one side of the Moon is constantly heating up. The sunny side of the Moon can warm up to a temperature of +107 °C, and the side of the Moon located in the shadow can have a temperature of – 268.9 °C, which causes the gas mixture located inside the lunar sphere to constantly rotate using natural convection in which internal energy is transmitted by jets and flows of gas and occurs spontaneously in a substance when it is unevenly heated in a gravitational field. When the gas mixture rotates inside the sphere, the acceleration of free fall of bodies in space is created, which exceeds the earth's by 3.67 times, which is fully confirmed by the new law of physics.

Many people confuse the acceleration of free fall of bodies in space with the force of gravity between two material bodies located in the space of the Solar System. Especially when the force of gravity is closely related to the mass of the air column, as on our planet, which presses on all objects that enhance the acceleration of free fall of bodies in space on planet Earth. However, there is no air column on the Moon, but between the planet Earth and its satellite the Moon there are large differences between the acceleration of free fall of bodies on planet Earth and on the Moon, which are 3.67 times greater than each other.

The law of gravity between two material bodies that are located in the space of the Solar (or other) system is formulated as follows:

The gravitational force between two material bodies located in the space of the Solar System is equal to the sum of the product of the mass of the first material body by the gravitational acceleration modulus of the first material body, the product of the mass of the second material body by the gravitational acceleration modulus of the second material body, and the product of the square of the distance from the surface of the first material body to surface of the second material body, and is inversely proportional to the product of the distance from the surface of the Sun to the surface of the first material body and the distance from the surface of the Sun to the surface of the second material body.

$$F_g = \frac{[(m_1 \cdot g_1) + (m_2 \cdot g_2)] \cdot L_m^2}{L_{c1} \cdot L_{c2}} = \frac{H \cdot M^2}{M^2} = H$$

where:

F_g - the gravitational force between two material bodies located in the space of the Solar (or other) system, N

L_m - distance from the surface of the first material body to the surface of the second material body, m

L_{c1} - distance from the surface of the Sun to the surface of the first material body, m

L_{c2} - distance from the surface of the Sun to the surface of the second material body, m

S - area of a standing person = 0.3 m²

V is the volume of the air column, m³.

Let's determine the mass of the air column.

$$G = Y \cdot S = 1.293 \text{ kg/m}^3 \cdot 3000 \text{ m}^3 = 3879 \text{ kg}$$

where:

G - mass of the air column, kg

Y - air density = 1.293 kg/m³

V - volume of the air column = 3000 m³.

We determine with what force a person gravitates towards the active planet Earth at the equator.

$$F_o = G + F_{tf} = 3879 \text{ kg} + 133.600474706168320512 \text{ kgf} = 4012.60047470616832051245 \text{ kgf}$$

where:

G - air column mass = 3879 kg

F_o - human gravitational force to the active planet Earth, kgf

F_{tf} - the gravitational force of a person towards the active planet Earth at the equator = 133.60047470616832 kgf.

We determine with what strength a person gravitates towards the active planet Earth at the north or south pole.

$$F_o = G + F_{tf} = 3879 \text{ kg} + 13.623457011942745026 \text{ kgf} = 3892.6234570119427450263 \text{ kgf}$$

where:

G - air column mass = 3879 kg

F_o - human gravitational force to the active planet Earth, kgf

F_{tf} - the gravitational force of a person towards the active planet Earth at the poles = 13.6234570119427450263 kgf.

We determine the difference in gravitational forces at the equator and at the poles of the active planet Earth.

$$4012.6004747061 \text{ kgf} - 3892.62345701194 \text{ kgf} = 119.9770176942255754861244186719 \text{ kgf}$$

As can be seen from the calculations, the difference in gravitational forces at the equator, at the south and north poles for a person located under an air layer mass of 4012 kg and 3879 kg is not significant, and if we take into account the temperature and humidity of the air masses, this difference is completely leveled out. By the way, this is where the winds on our planet should originate.

To compare, according to the law of gravity, between two material bodies that are located in the space of the Solar System, we will determine the force of gravity of the astronaut towards the Moon.

$$F_g = \frac{[(m_e \cdot g_e) + (m_p \cdot g_p)] \cdot L_m^2}{L_{se} \cdot L_{sp}} = \frac{H \cdot M^2}{M^2} = H$$

$$F_g = \frac{[(1,1379 \cdot 10^{22} \cdot 35,9) + (70 \cdot 0,00)] \cdot 1, M^2}{149600000000 M \cdot 149600000000 M} = 1,829716669834670749835797 H$$

where:

F_g - the gravitational force between two material bodies on the Moon, which are located in the space of the Solar system, N

L_{sp} - distance from the surface of the Sun to an astronaut located on the surface of the Moon = 149600000000 m

L_{sl} - distance from the surface of the Sun to the surface of the Moon = 149600000000 m

g_h - acceleration of free fall of bodies in the space of the astronaut = 0.00 m/s²

g_l - acceleration of free fall of bodies on the Moon = 35.98547548816551 m/s²

L_m - distance from the surface of the Moon to the surface of the astronaut = 1 m

m_z - mass of the Moon = 1137941107351312552119.3278798377 kg

m_h - astronaut mass = 70 kg.

We convert the gravitational force of an astronaut located on the Moon, which does not have an air envelope, into kgf.

$$1 \text{ kgf} = 9.80665 \text{ N}$$

$$X \text{ kgf} = 1.8297166698346470749835797246953 \text{ N}$$

$$X = \frac{1,829716669834670749835797 H \cdot 1 \text{ кгс}}{9,80665 H} = 0,18657917533863725889917349 \text{ кгс}$$

It must be especially emphasized that a comparison has been made between the gravitational force on the Moon and the gravitational force on planet Earth, which does not have an air shell, although the acceleration of free fall of bodies on the Moon, which does not have an air shell, is 3.6 times greater than on planet Earth, but the gravitational force between an astronaut and the surface of the Moon are 716 times less than a person to the surface of planet Earth. There are other new laws of physics discovered by A.N. Belashov, who confirm these conclusions.

It should be noted that basically all scientific theories were based on the fact that the primary gravitational field after the big bang appeared, acting equally on all material bodies located in space. This statement is erroneous and contradicts logical thinking. If we talk about a big bang that expands material bodies in outer space, then the gravitational field should, on the contrary, restrain this expansion and act on the principle of compression and retention of material bodies in their orbits. In addition to this statement, the scientific community introduced the “gravitational constant” which, according to modern data, is equal to:

$$G = 6,6720 \cdot 10^{-11} H \cdot M^2 / \text{кг}^2$$

However, there is not and cannot exist a “gravitational constant” in the world, due to the continuous change in the properties, planets and galaxies of our Uni-

verse. You need to know that the gravitational force in the Solar (or other) system will be very different from the gravitational force in the galaxy, and even more so, from the gravitational force in the Universe. In the currently used “gravitational constant” there is no direct relationship between active and passive material bodies. Here, too, there is no direct connection between the location of material bodies in a system (for example, the Solar system), a galaxy, or in the Universe.

For example, according to the law of gravity between two material bodies that are located in the space of the Solar system, we will determine the force of gravity of two material bodies in outer space, which are not affected by the acceleration forces of the free fall of bodies in space.

$$F_g = \frac{[(m_e \cdot g_e) + (m_p \cdot g_p)] \cdot L_M^2}{L_{se} \cdot L_{sp}} = \frac{H \cdot M^2}{M^2} = H$$

$$F_g = \frac{[(1,1379 \cdot 10^{22} \cdot 35,9) + (70 \cdot 0,00)] \cdot 1M^2}{149600000000M \cdot 149600000000M} = 1,829716669834670749835797H$$

where:

F_g - the gravitational force between two material bodies that are located in the space of the Solar system, N

L_{c1} - 149600000000 m

L_{c2} - 149600000000 m

g₁ - 0.00 m/s²

g₂ - 0.00 m/s²

m₁ - 100 kg

m₂ - 70 kg

L_m - 1 m.

After the calculations made, we can conclude that in any moving system there can be nothing permanent. As for the experiments of the English scientist Henry Cavendish, who used torsion balances under terrestrial conditions to determine the gravitational forces between two material bodies, this cannot be interpreted as a way of determining the “gravitational constant” under terrestrial conditions, much less within our entire Universe.

The formula for the force of gravity between two material bodies located in space by Isaac Newton was then interpreted by him as follows: “A particle located outside a spherical surface is attracted to the center of the sphere with a force inversely proportional to the square of its distance to the center of the sphere.”

The law of gravity between two material bodies A.N. Belashova is closer to the greatest discovery of the English scientist and thinker Isaac Newton.

The law of gravitation between two material bodies A.N. Belashova

$$F_g = \frac{[(m_1 \cdot g_1) + (m_2 \cdot g_2)] \cdot L_M^2}{L_{c1} \cdot L_{c2}} = \frac{H \cdot M^2}{M^2} = H$$

The law of gravity between two material bodies Isaac Newton.

$$F = \frac{m_1 m_2}{r^2}$$

If we compare the attraction of two material bodies in outer space and on planet Earth, we will see a big difference in these readings, which does not take into account the law of gravity.

In addition to the newly discovered laws, I put forward a “New Theory of Multifaceted Dependency”, which was formulated as a result of a comprehensive scientific and analytical method of studying the description of the application for invention No. 2005129781 dated September 28, 2005 and the description of the application for invention No. 2012142735 dated October 09, 2012.

A fundamental law has been discovered for determining energy within the various spaces of our Universe, which makes it possible to calculate the stored energy of any material body on our planet, for example, a certain volume of any brand of wood, coal, oil, gas, and so on... The new law completely refutes the statement about the conservation of energy in space of our Universe. See the information and analytical journal “Current Problems of Modern Science”, No. 4 (127) for 2022, pages 30-36. Publishing house “Sputnik +”, Moscow.

The fundamental law for determining the speed of light in the space of our Universe has been discovered, reflecting the large dependence of the movement of the speed of light passing in space on the power of the light radiation source, the diameter of the light flux and the distance from the light radiation source to the final target. The new law takes into account the loss of light flux passing through the substance of space and the acceleration of free fall of bodies in the space of the medium where the light source is moving. The new law completely refutes the assertion that the speed of light is constant. See the journal of current scientific information “Graduate Student and Applicant”, No. 5 (138) for 2023, pages 16-23. Publishing house “Sputnik +”, Moscow.

In conclusion, we can say that any scientific theory that has been put forward by the scientific community must be supported by the known laws of physics, but if there are none, then a new law must be proposed, based on physical principles, which will be quite difficult to question and refute. according to the already existing laws of physics. However, academic science is skeptical about new trends and it is difficult to convince them of this. All specialized scientific journals belong to certain departments; they do not want to introduce confusion into their already known developments that contradict their beliefs. The truth will triumph when approaches to new scientific theories, new technical developments and scientific communities closed to the public that convince everyone that they are right are revised.

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