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THE PHENOMENON OF NANOSTATE IN MATERIAL SCIENCE OF FUNCTIONAL COMPOSITES BASED ON INDUSTRIAL POLYMERS

Abstract: *The conceptual directions of creating functional composites based on polymer matrices for metal-polymer systems are considered. An algorithm for developing a methodology for the implementation of the nanostate phenomenon in materials science and technology of composites and metal-polymer systems is proposed. The methodological principles of the implementation of the nanostate phenomenon in materials science and technology of functional materials based on polymer matrices for metal-polymer systems with enhanced performance parameters are proposed.*

Key words: *nanostate, composite material, polymer matrix, methodological principles, metal-polymer systems.*
Language: *English*
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Introduction

The implementation of the fifth and sixth technological modes in the economic development of

the Belarus economic complex, in accordance with the requirements of the state strategy [1], involves the creation of a domestic material and technological base using convergent technologies [2 - 4]. In the presence of various expert opinions on the effectiveness of convergent NBIC-technologies in the post-industrial economy [3 - 7], it is advisable, based on a systematic approach, to carry out a comprehensive assessment of promising areas of using the existing ideas about the mechanisms of nanostate phenomenon manifestation in functional materials science. In making such an assessment, it is advisable to rely on the classical definition of nanostate, presented by the founder of nanomaterial science P. von Weimarn: "... between the world of molecules (atoms, ions) and microscopically visible particles, there is a special form of matter with a complex of new physicochemical properties inherent in this form – it is an ultrafine or colloidal state that forms when the degree of dispersion (fragmentation) is in the region $(10^5 \div 10^7)$ cm^{-1}, in which the films have a thickness, and the fibers and particles have a diameter across the range (1.0–100) nm" [8]. It seems reasonable and advisable to consider the possible mechanisms for implementing the nanostate phenomenon in the development of composite materials with a certain set of functional characteristics for various practical applications. Of particular interest are functional composite materials based on high molecular weight matrices (polymer, oligomeric, combined) which, due to a combination of operational and technological characteristics and economic parameters, are in some cases a non-alternative solution to the problem of industrial production of a new machines and mechanisms generation, including those implementing the principles of self-organization with external influences [9].

The purpose of this work was to evaluate the effectiveness of various directions of nanostate phenomenon manifestation in the development of compositions and technology of functional composites based on polymer matrices of industrial production.

Results and discussion

A systematic analysis of literature and our studies [10–16] made it possible to characterize the nanostate as a special form of existence of particles or elements of condensed matter, characterized by their activity in the processes of interphase interaction, due to the presence of intrinsic or acquired uncompensated and delocalized charge carriers of various nature with variable mobility and localization under the influence of external factors (temperature, mechanical, wave, friction, electromagnetic, radiation, etc.), which manifests itself in a certain size range, individual for each type of substance.

The proposed content of the definition of nanostate allows us to determine the conceptual directions of creating functional composites based on polymer matrices for metal-polymer systems of various types and purposes. The basic components of these areas, shown in Figure 1, are the foundations of materials science and technology that have formed at present, which can be formulated as several conceptual blocks.

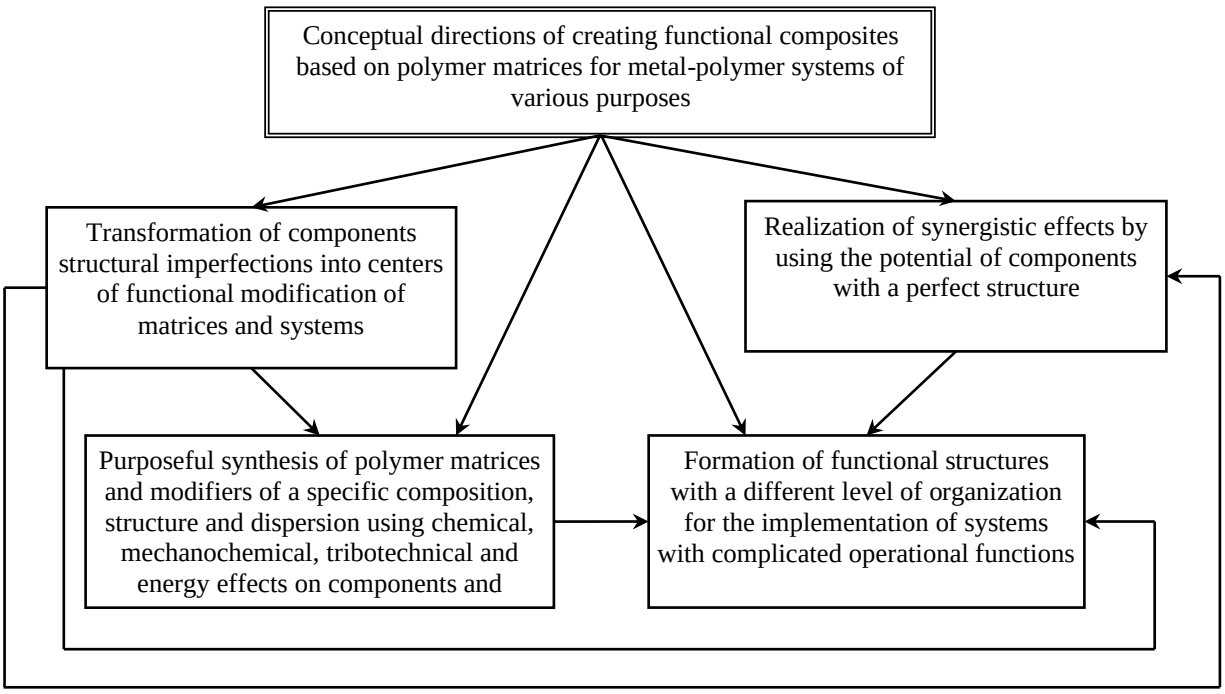

Figure 1 – Conceptual directions for creating functional composites based on polymer matrices for metal-polymer systems

The classical concepts of condensed matter physics and material science about the structural imperfection (defectiveness) of the components of polymer composites [17, 18] make it possible to consider their transformation into centers of functional modification of matrices and systems.

In this approach, it is possible to purposefully introduce into the defective regions of the polymer matrix (which are centers of fracture processes nucleation) of components that cause the formation of a structure with greater resistance to adverse factors (temperature, mechanical, chemical, etc.). In this case, there is possible mutual compensation of structural defects of the matrix binder and functional component (filler, reinforcing, tribotechnical, electric conductive, etc.) with the formation of a system with a synergistic combination of property parameters.

A characteristic example of the validity of this direction are studies carried out by the scientific school of Professor A. Machyulis. [19]. It is obvious that the use of industrial polymer matrices with various levels of structural imperfection of functional components exhibiting signs of nanostate as modifiers will allow develop composite technologies with an optimized structure and higher resistance to operational factors.

A promising conceptual approach to the creation of functional composites based on polymer matrices seems to be providing conditions for the realization of synergistic effects by using the potential of components with a perfect structure. This approach is based on the theoretical and experimentally proven fact of a decrease in the defectiveness of condensed systems upon reaching the dimensional boundaries characteristic of the manifestation of a nanostate. A similar approach can be implemented, for example, in the formation of boundary layers with an optimal structure due to a directed change in the mechanisms of interfacial interactions at the stages of formation and processing of composites [20].

The structural imperfection factor of industrial polymers, manifested in their polydispersity, presence of radical synthesis products, residual amounts of catalysts and monomers, which impedes the realization of potential in functional composites, can in some cases be successfully blocked by targeted synthesis using chemical, mechanochemical, tribotechnical, and energy effects on components and systems for their receipt, processing and operation of products [20].

Analysis of literary sources and our studies clearly indicate the impossibility of achieving optimal parameters of the characteristics of functional composites even when using high-strength components. This effect, called as “structural paradox”, is observed, for example, when reinforcing polytetrafluoroethylene with carbon-containing modifiers – carbon fiber, fullerenes, carbon nanotubes [20]. Therefore, the formation of functional structures based on polymer matrices with various levels of organization seems to be a very promising approach. This approach is implemented in systems with complicated operational functions considered in [9, 16].

The choice of the conceptual direction of creating functional composites based on polymer matrices for metal-polymer systems of various designs is determined by their purpose, technological and economic factors affecting the effectiveness of the decision. At the same time, the expediency of realizing the phenomenon of nanostate of components to form the structure of a composite or system adequate to the intensity of the impact of operational factors is obvious. Regardless of the conceptual direction used, the algorithm of the methodological approach presented in Figure 2 seems reasonable.

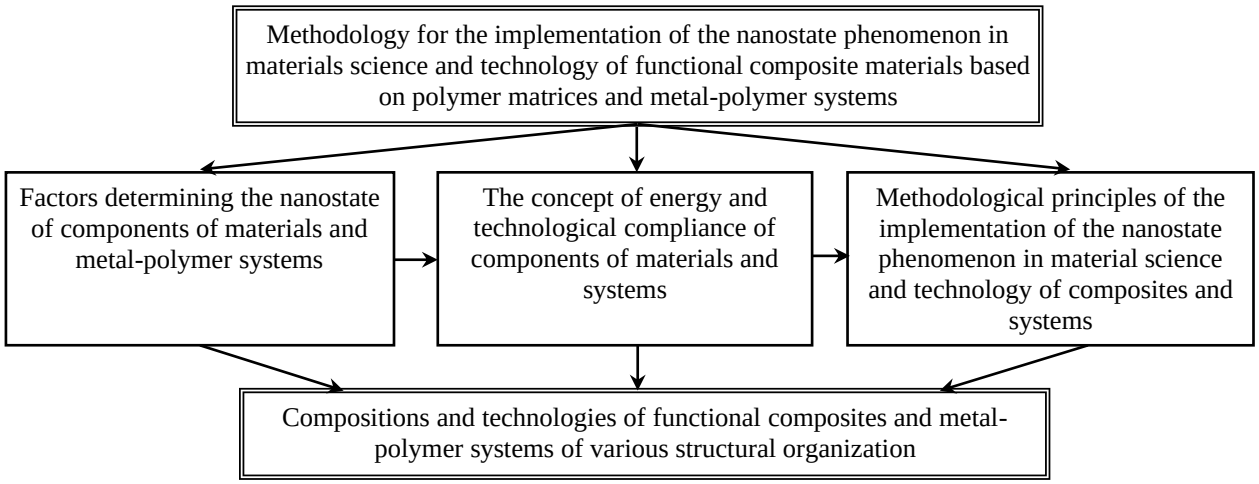

Figure 2 – Algorithm for developing a methodology for the implementation of the nanostate phenomenon in materials science and technology of composites and metal-polymer systems

Studies of the factors that determine the mechanisms of manifestation of the nanostate of the components of materials and systems allow, on the basis of the concept of energy and technological compliance [21], to develop methodological principles for creating functional composites and technologies for their manufacture and processing into products for metal-polymer systems with various levels of structural organization. In developing the principles, we proceeded from the prevailing material, technical, technological and personnel support of the production activities of enterprises of the machine-building complex of Belarus and a number of other states of the post-union space, which is focused mainly on IV technology. The principles proposed in Figure 3 can be implemented in a specific field of nanocomposite materials science –nanocomposites with enhanced performance parameters developed on the basis of polymer matrices of large tonnage production at enterprises in Belarus and other CIS countries.

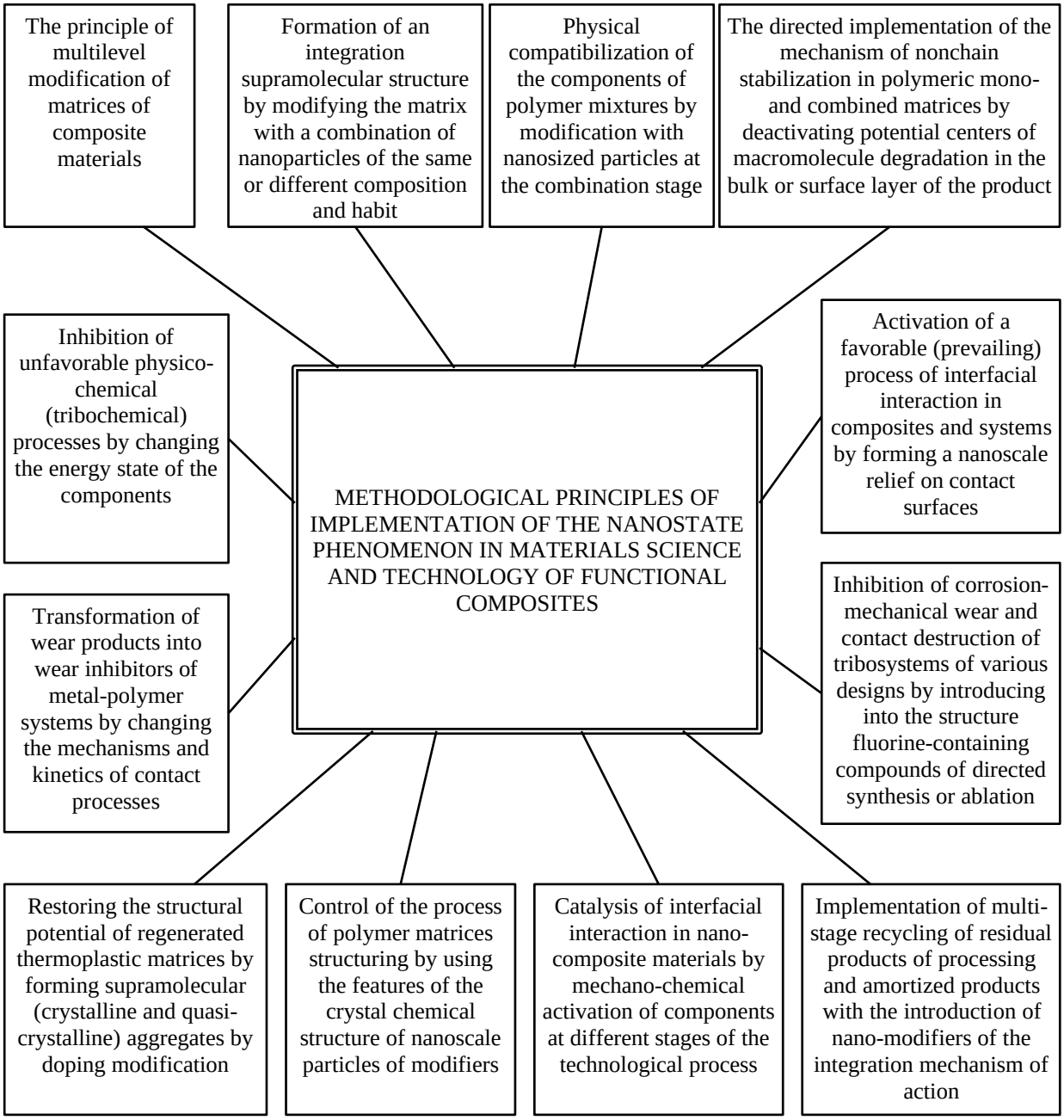

Figure 3 – Methodological principles for the implementation of the nanostate phenomenon in materials science and technology of functional composites based on industrial polymer matrices and metal-polymer systems

The principle of multi-level modification of matrices of composite materials can be implemented by introducing into matrix binder combinations of reinforcing and structural components that form a supramolecular, intermolecular and phase structure of the optimal type and ratio. Inhibition of adverse physicochemical (tribochemical) processes in metal-polymer systems is achieved by changing the energy state of the components. Transformation of wear products of metal-polymer systems into wear inhibitors is possible by changing the mechanisms and kinetics of contact processes.

Doping modification of regenerated thermoplastics with nanosized particles at a content of 0.01 - 1.0 wt. % ensures the formation of supramolecular crystalline and quasi-crystalline aggregates, providing restoration of the structural potential of the material incorporated in the synthesis.

An effective direction for improving the structural parameters of industrial thermoplastics is the introduction into the melt of nanoscale particles of a certain habit – lamellar, spherical, or whisker.

The catalysis of interfacial interaction processes in nanocomposite materials is possible by mechanochemical activation of mixtures of components in the presence of nanoscale modifiers that activate radical transformations with the formation of copolymer products.

Optimization of structural parameters at various levels of organization is possible with multi-stage recycling of residual technological products and amortized products from polymer and composite materials using nanomodifiers of integration action.

The principle of inhibiting corrosion-mechanical wear [21] and contact fracture by introducing into the mixture system nanoscale fluorine-containing ablation or directed synthesis products allows to improve the tribological parameters of metal-polymer conjugations due to the formation of a nanocomposite separation layer.

Formation of nanorelief, which increases the adsorption and mechanical components of the adhesive interaction, is effective with the help of directed energetic effects of a high intensity for manifestation of interfacial processes that ensure the formation of boundary layers of optimal structure in composites containing reinforcing fillers (carbon, glass, and other fibers).

The implementation the principle of non-chain stabilization of polymeric mono- and combined matrices by introducing nanosized components at the plasticization stage and manufacturing products using diffusion technologies makes it possible to obtain nanocomposites for products with increased resistance to thermo-oxidative environments, including tribochemical influences.

An effective principle for the formation of nanocomposites based on mixtures of thermoplastics is physical compatibilization carried out by nanoscale modifiers due to the formation of a spatial network of adsorption-type physical bonds. When a combination of nanosized particles with different habit and temperature range of nanostate manifestation is introduced into the polymer matrix, nanocomposites are formed with an integrated supramolecular structure, which ensures the achievement of increased parameters of deformation-strength, adhesion and tribotechnical characteristics.

Consideration of the structural features of functional composites based on polymer matrices obtained using various methodological principles for the implementation of the nanostate phenomenon is the subject of a special publication.

Testing the developed methodological principles for the implementation of the nanostate phenomenon in materials science and the technology of composites and metal-polymer systems in various versions confirmed their effectiveness and expediency of practical application [13, 16, 20, 22, 23]. It is necessary to emphasize the characteristic feature of the developed methodological principles for creating functional composite materials based on polymer matrices, which consists in orienting them to the existing technological base of domestic industrial enterprises, which is formed on the basis of traditional equipment for producing composites and processing them into products. This aspect not only corresponds to the priority areas of scientific, technical and innovative activity in the Republic of Belarus for 2021–2025 (priority area “Materials science, nanomaterials and nanotechnologies”) and the Strategy “Science and Technologies: 2018–2040” developed by the NAS of Belarus, but also expands the branded assortment and the scope of production of functional nanocomposite materials based on large-capacity polymer matrices produced by domestic enterprises. Thus, the approach to nanomaterials and nanotechnologies as “providing or infrastructural technologies” [6], developing modern materials science and the innovative functioning of the domestic industrial complex, is fully implemented.

Conclusion

A systematic analysis of the development of domestic materials science and technology of functional composites indicates an insufficient level of realization of the potential of industrially produced polymer materials using modern achievements in the physical chemistry of polymers and condensed matter physics.

The conceptual directions of creating functional composites based on industrial polymer matrices for systems with enhanced performance parameters, realizing the nanostate phenomenon of material objects at various stages, are proposed. An algorithm has been developed for the implementation of the nanostate phenomenon in materials science and nanocomposites technology, which forms the

conditions for the energy and technological correspondence of components and the methodological principles for its implementation in materials science of polymer composites. The proposed methodological principles form the basis for expanding the branded assortment and volume of production and application of functional nanocomposite materials with increased performance parameters based on large-capacity industrial polymers.

Acknowledgments

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PROBATIONARY SUPERVISION: CONCEPT, SUPERVISORY REQUIREMENTS, LEGAL CONSEQUENCES, IMPLEMENTATION PROCEDURE

Abstract: *The article considers a new probation institution, the relevance of which is associated with the policy of humanizing criminal punishment, implemented in the current criminal, criminal procedure, criminal executive codes of the Kyrgyz Republic. The problem of limiting the use of imprisonment in the practice of combating crime is very relevant for the Kyrgyz Republic. The maintenance of such a large number of citizens in correctional institutions places a heavy burden on the state budget, hinders the solution of many social problems, and promotes the spread of the customs and traditions of the criminal environment. Issues related to the development of alternative forms of punishment and the expansion of their application, the creation of an effective probation service is another contribution to the successful implementation of judicial reform. The development of a probation service is essential to reduce the amount of torture, inhumane treatment in closed institutions and the rate of recidivism committed by persons who have previously served their sentences.*

Key words: *probation, humanism, reform, probation, supervision, alternative, recurrence, correction of the convict.*

Language: *English*

Citation: Akmatova, A. T. (2020). Probationary supervision: concept, supervisory requirements, legal consequences, implementation procedure. *ISJ Theoretical & Applied Science, 07 (87),* 108-111.

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Introduction

In the context of criminal law reform, a new institution has been introduced in the Kyrgyz Republic - probation, which combines state coercion measures. The new probation law provides for the possibility of a more humane punishment, not related to the deprivation of liberty of persons who committed a minor crime. The idea of the depenalization of criminal punishment, which is one of the directions of the criminal policy of the state in combating crime, is outlined.

A modern understanding of probation did not take shape right away. This institute appeared in England in 1887, in connection with the adoption of the Law "On the test of the first convicts." In 1907, with the adoption of the Law on the Testing of Criminals, this institution was finally formed in English criminal law. Currently, probation rules are consolidated in the criminal justice laws of 1948 and 1967. In addition, in 1965, the Probation Rules were published [1]. In the XX century in the West, this term (from the Latin. Probation ozn. - test) was used as a synonym for conditional conviction along with parole - parole. Similarly, as well as supervision under probation, probation was also understood in Soviet penitentiary science [2]. The 1964 European Convention on the supervision of conditionally convicted or conditionally released offenders also does not apply this concept, limiting itself to the obligations of states to monitor offenders [3].

So, probation is a type of conditional punishment in which a person sentenced to a trial period established by a court is taken under the supervision of special authorities. Probation can be considered as: a type of criminal punishment; crime prevention measure; the system for the execution of alternative sentences; the process of correction of the convict; form of social and legal control. Probation consists in

monitoring the behavior of the person under investigation or convicted, fulfilling the duties assigned to him by the court, with the aim of correcting and resocializing, correcting behavior, as well as preventing him from committing new offenses.

The purpose of the probation is to reduce recidivism and stimulate law-abiding behavior, promote the inclusion of the offender in society, and ensure the safety of society and the state. Typically, probation is provided for crimes of minor gravity and less serious. Probation can be chosen as a measure of responsibility only if the defendant expresses readiness to comply with all the requirements, to comply with all restrictions established by the court.

Already in the second half of the 18th century, in many developed countries of the world the use of imprisonment, especially for a short time, was sharply criticized for the inability to solve the main task of imprisonment for social rehabilitation and correction of offenders. The result of the concern of the world community at the present stage is the emergence of special international standards on legal sanctions; alternative to imprisonment. The UN Standard Minimum Rules for Non-custodial Measures (Tokyo Rules), adopted by the UN General Assembly on December 14, 1990, indicate that "alternatives to imprisonment may be effective means of dealing with offenders in society as" in the interest of of offenders and society. "The guidelines for the re-socialization of offenders are clearly expressed in Recommendation (92) 16 on the European rules on the application of public sanctions and penalties adopted in 1992 by the Council of Europe.

Today, world, and especially European civilizations, see international standards not as alternatives to imprisonment, but as basic penalties not related to deprivation of liberty, which should be applied in the first place. Deprivation of liberty should be resorted to only in exceptional cases, when this is in the interests of the safety of the victim, society and the process of re-socialization of the convicted person. And if the countries of the West already have quite a lot of practical experience in applying punishments without isolation from society, then many countries of Eastern Europe, Central Asia, including Kyrgyzstan, are just beginning to put them into practice. International standards do not offer an exhaustive list of alternative sanctions, but open up opportunities for the individual approach of the legislator in each particular country.

One of the elements of a system of measures not related to deprivation of liberty is probation, its varieties and modifications, as well as probation. As the studies of foreign authors show, it is precisely these institutions that attract the increasing attention of theoreticians and are widely used in the practice of many states. The works of Russian scientists P.I.I. are devoted to the formation and development of the institution of probation abroad. Lublinsky, N.S. Tagantseva A.A. Piontkovsky, N.S. Timashev (end of IX beginning of XX century). A significant contribution to the study of probation was made by Russian scientists M.R. Geta, K.F. Gutsenko, B.C. Krylov, N.N. Polyansky, G.S. Merkulov, V.A. Utkin, N.B. Khutorskaya, V.P. Shupilov N.A. Struchkov, etc.

For example, in America, probation has existed for more than 150 years, and during this time it has undergone a number of significant changes. Under US criminal law, probation is a form of punishment based on conditional conviction and deferral of execution. 1878 was established at the state level of the probation service in the USA. This service appeared in Massachusetts first. Attempts to enact federal probation legislation have been made since 1908, but the corresponding law was adopted only in 1925. The USA is the world leader in terms of numbers 2.2 million people serving sentences in correctional institutions, the total number of convicts in the country, this is a quarter of prisoners of the entire globe, although the US population makes up only 5% of the world's population.

In modern Japan, the probation institute occupies a very worthy place in the system of crime prevention measures. The Japanese probation combines the "western" features and characteristics of national traditions for the prevention of socially dangerous behavior. It seems that the probation institution in Japan currently has strong roots and is inseparable from its legal system. Obviously, the low crime rate in the country largely depends on the successful functioning of social control mechanisms in society. Among these mechanisms, probationary experience is very valuable, in which positive features of development undoubtedly prevail.

And Swedish law provides for probation. Moreover, it has its own characteristic features and is regulated in the UK Criminal Code in great detail. Probation may be assigned as an independent criminal law measure in cases where the court concludes that a fine is not sufficient. At the same time, probation as a set of specific measures may accompany parole.

In the Republic of Moldova, the Law on Probation has been in force since 2008. In early 2016, such a legislative act was adopted in Armenia, and in Ukraine it entered into force in 2015.

According to Article 83 of the Criminal Code of the Kyrgyz Republic "Exemption from punishment using probationary supervision", the court, when imposing a sentence of imprisonment for a term not exceeding five years, taking into account the gravity of the crime, the identity of the perpetrator, his consent to the use of probation and other circumstances of the case, will conclude about the possibility of correction of a convicted person without serving a sentence, may decide to release him from serving a sentence using probation supervision (probation), which is a

compulsory incentive measure of criminal law influence.

Probation does not apply to persons convicted of grave or especially grave crimes, foreign citizens and stateless persons temporarily residing in the Kyrgyz Republic, as well as to persons who have committed an infringement on the sexual inviolability of a minor.

The Criminal Executive Code of the Kyrgyz Republic contains article 165, which establishes probation supervision (probation) as the activity of a probationary body to monitor the execution of convicted duties assigned by the court and their behavior, as well as provide them with a set of social and legal measures developed and implemented individually in relation to a person under probationary supervision, to adjust his behavior in order to correct and re-socialize the convicted person, as well as to prevent him from committing new crimes, misconduct, and other offenses.

To date, Kyrgyzstan in the world prison index is 88 out of 200 (178 convicts per 100 thousand people). According to the general prison rating, Kyrgyzstan takes 92 place (10 thousand 574 convicts) according to the data provided by the State Penitentiary Service of the Kyrgyz Republic dated January 10, 2019 [4].

Probationary supervision is carried out by the probation authority and the command of military units and institutions (in relation to military personnel). During the probationary period, the court, on the recommendation of the probation authority, can completely or partially cancel or supplement the probationary obligations previously established for the convict. Probationary supervision is carried out in respect of clients released by the court from serving a sentence of imprisonment for the period established by a court decision. The term of probation supervision shall be calculated from the day the convicted person is registered with the probation authorities. The territorial probation authorities shall not later than 3 business days from the date of registration of the judicial act, which entered into force in the register of incoming messages, notify the border service of the Kyrgyz Republic of the establishment of restrictions on the departure of the client from the Kyrgyz Republic.

The grounds for lifting the restriction on the client's departure from the Kyrgyz Republic are:

- serving the sentence imposed by court order;
- annulment of the court decision with the termination of the case;
- expiration of probationary supervision;
- exemption from punishment by virtue of an amnesty act;
- a positive decision of the territorial probation authority (at the request of the client) on a short-term trip outside the Kyrgyz Republic due to exceptional personal circumstances (in case of death or serious illness of the spouse, close relative, client's business trip);
- death of a client or the need to treat a client outside of Kyrgyzstan.

Legal consequences of probationary supervision.

1. Upon the expiration of the probationary period, the convict who has fulfilled the supervisory requirements and the probationary duties assigned to him and has not committed a new crime or misconduct shall be deemed to have served his sentence.

2. If the convicted person has violated the supervisory requirements and the probation duties assigned to him two or more times during the year, without justifiable reasons, the probation authority shall submit a submission to the court to cancel the probation supervision.

3. If a convict commits a new crime or misconduct during a probationary period, the court shall punish him in accordance with Section 79 of the Criminal Code based on the aggregate of sentences.

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THE HEALING PROPERTIES OF WILLOW: FROM THE MIDDLE AGES TO THE PRESENT

Abstract: *This article runs about the healing properties of representatives of the genus Salix L., discovered back in the Middle Ages, by the great doctor Avicenna and remains relevant these days. The article also provides information on the amazing properties of willow bark, roots, leaves and flowers containing: phenolic acids, amino acids, ascorbic acid, saponins, essential oils and polysaccharides, which have found application not only in pharmacology and medicine, but also in cosmetology.*

Key words: *genus Salix L., bark, roots, leaves, flowers, medicine, pharmacology.*
Language: *Russian*
Citation: Adigezalova, Z. P. (2020). The healing properties of willow: from the Middle Ages to the present. *ISJ Theoretical & Applied Science, 07 (87),* 112-115.
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ЛЕЧЕБНЫЕ СВОЙСТВА ИВЫ: ОТ СРЕДНЕВЕКОВЬЯ ДО СОВРЕМЕННОСТИ

Аннотация: *В данной статье повествуется о лечебных свойствах представителей рода Salix L., открытых еще в Средневековье великим лекарем Авиценной и остающихся актуальными и по сей день. В статье также приводятся сведения об удивительных свойствах коры, корней, листьев и цветков ивовых, содержащих в себе: фенолокислоты, аминокислоты, аскорбиновую кислоту, сапонины, эфирные масла и полисахариды, нашедших применение не только в фармакологии и медицине, но и в косметологии.*

Ключевые слова: *род Salix L., кора, корни, листья, цветки, медицина, фармакология.*

Введение

Как известно, род Salix L. играет большую роль в растительном мире – это один из наиболее крупных родов флоры. Ива объединяет 600 видов деревьев, кустарников и кустарничков, распространенных на большей части суши. Разнообразие видов, их широкое распространение, обусловили многостороннее хозяйственное применение ивы, так в последние годы особую актуальность приобрело использование ив в фармакологии и медицине.

Интересен тот, факт, что величайший лекарь и целитель своего времени - Абу Али ибн Сина* (980-1037), еще в 1-ой четверти XI века разгадал целебные свойства разных видов Salix L. Например, описывая иву хилаф - Salix aegyptiaca (ива египетская), Авиценна отмечал следующее: «Плод и листья связывают рану без жжения, если сделать лекарственную повязку из свежих листьев ивы, это останавливает кровотечение. Кроме того, плоды и листья ивы служат лекарственной повязкой при ранениях костей. Плоды ивы прикладывают при ударе по глазному яблоку, также он полезен людям, страдающим кровавым поносом.

Камедь ивы (застывший клейкий сок из коры) обладает сильно очищающими и разрежающими свойствами, для получения

* В Европе известный как – Авиценна.

которой, на листьях делают царапины. Камедь используется при слабости зрения.

Соцветия и сок ивы – средство успокаивающее головную боль. Сок, выжатый из листьев ивы, действует, как ни что другое, при лечении гноетечения из уха, его также прикладывают при ударе по глазному яблоку. Кроме того, сок ивы полезен при закупорках в печени и при желтухе.

Даже зола ивы египетской обладает специфическими косметическими свойствами: очень быстро и эффективно сушит и заживляет раны, а в виде мази с уксусом - изводит бородавки и герпес» [2, с. 656].

Гениальный Авиценна описал также лечебное свойство Salix aegyptiaca во время путешествия под палящим солнцем и в борьбе против знойного ветра. «Если кому-нибудь повредит знойный ветер, то ему нужно облить конечности холодной водой и омыть лицо, дать кушанье из овощей с холодными качествами, смочить голову маслом с холодными качествами, вроде розового масла и масла египетской ивы» [1, с. 368].

До нас дошли и заметки величайшего лекаря относительно свойств - ивы гараб - Salix babylonica L. (ивы вавилонской или «плакучей»). Как отмечал сам целитель: «Луб (волокнистая внутренняя часть коры) ивы и ее смола, извлекаемая путем надреза, используются для получения одного из лучших пищевых бавраков (сода). Смола ивы также устраняет помутнение зрения, а луб - обладает эффективным сушащим без жжения свойством. Порошком из коры ивы посыпают порезы и свежие злокачественные раны. Свежая кора ивы с розовым маслом, вскипяченным в корке граната, помогает от боли в ушах. Кору также используют от кровохарканья, а отвар из нее – хорошее обмывание от перхоти.

Выжатый из листьев ивы сок, обладает сушащим, без жжения свойством. Листья ивы, как и кора, применяются для приготовления порошка от порезов и свежих злокачественных ран. Вместе с розовым маслом, вскипяченным в корке граната, выжатый сок листьев ивы капают при ушных болях. При применении во внутрь, выжатый сок ивы изгоняет пиявок, а обливание из настоя ивы – прекрасное средство при подагре.

Сок, выжатый из цветков ивы, как и сок из листьев, обладает сушащим, без жжения свойством, цветки ивы также используются при помутнении зрения, а ее плоды помогают от кровохарканья.

Известны и косметические свойства ивы вавилонской. Так, например, кожура ее корня применялась для приготовления краски для волос, а зола древесины ивы с уксусом, в качестве мази – в борьбе против бородавок» [2, с. 680-681].

Также выдающийся ученый описал целебные свойства сгущенного сока листьев «ивы плакучей», используемого при болях в костях и суставах. Для приготовления лекарства, срывали охапку молодых листьев плакучей ивы, отжимали из них 20 г сока, затем ставили на теплое место, на испарение. Испаряли 2/3 сока, пока не останется приблизительно 6 г сгущенного сока, и принимали с медом 10 дней [3].

И в наши дни интерес к целебным свойствам ивы все также актуален. Так, ивовая кора также может использоваться для получения волокнистой массы, лекарственных веществ, пригодна в фармакологии и в качестве наполнителя при производстве строительных материалов. Как лекарственное сырье кора ивы применяется в Германии, Франции, Польше, Чехии, Словакии, Венгрии и Румынии.

В настоящий момент известно, что в состав ив входят фенолокислоты, аскорбиновая кислота, аминокислоты, сапонины, эфирные масла и полисахариды, которые могут вносить вклад в общий фармакологический эффект [4].

Препараты на основе коры ивы оказывают болеутоляющее, жаропонижающее, противомалярийное, противоревматическое, вяжущее, антибактериальное, антигельминтное, диуретическое, гомеостатическое действие. В сравнении с используемыми в качестве лекарственного сырья листьями и соцветиями кора отличается большей концентрацией действующих веществ: танина, салицина, лютеолина и др. Основным компонентом, снискавшим популярность ивы в медицине, послужил салицин – фенольный гликозид, терапевтическое действие которого основано на окислении в организме салицина в салициловую кислоту. В частности О.О. Хитева приводит следующие сведения о содержании салицина в коре ивы белой – около 0,92%, в коре ивы трехтычинковой – около 0,2%, в коре ивы пурпурной – около 0,81% [5, с. 10].

По требованиям Европейской Фармакопеи минимальное содержание салицилатов в растительном сырье должно составлять не менее 1,5%. Чаще всего в мировой практике в качестве сырьевых растений для извлечения салицина используются ива остролистная (Salix acutifolia Willd) и ива белая (Salix alba L.). Для концентрации салицина в коре характерны различия в зависимости от биологического вида, а в пределах одного вида – от возраста, условий произрастания растений и сезона заготовки сырья, индивидуальных особенностей особей одной популяции [6, с. 30-31].

По результатам исследований российских ученых доказана эффективность использования экстракта коры ивы для разработки на его основе лекарственных средств, обладающих

противовоспалительными, анальгезирующими и жаропонижающими свойствами [7, с. 4]. Эксперименты, поставленные на крысах, группой ученых во главе с В.Е. Погореловым [8, с. 350], показали, что гранулы для приготовления гидрогеля, содержащие экстракт коры ивы, более эффективны при лечении артроза и обладают низкой токсичностью в сравнении с применением глюкозамина сульфата.

Группой немецких ученых были осуществлены клинические испытания на людях, установившие, что использование экстракта коры ивы в терапевтической дозе приводит к значительно более низким побочным эффектам, чем это наблюдается после применения обезболивающих доз синтетических салицилатов. В Германии препараты, содержащие экстракт коры ивы, применяются при лечении болезненных ревматических заболеваний человека, таких как артрит и боли в спине. Фармакологические исследования показали, что их клиническая эффективность основана не только на действии салицина, но и комплекса других биологически активных веществ [6, с. 32].

К настоящему времени в коре различных видов ивы идентифицированы ряд флавоноидов и установлена их химическая структура. Представители классификационных подгрупп флавоноидов встречаются во многих видах ивы. Представителем флавонов в иве является лютеолин, который обнаружен в коре Salix purpurea, листьях Salix acutifolia, Salix caprea, Salix acutifolia, Salix alba, Salix triandra, Salix vestita, Salix berberifolia, Salix myrtilloides, Salix saxatilis, Salix pyrolifolia. Еще одним представителем флавонов является апигенин, обнаруженный и количественно определенный в листьях Salix saxatilis и Salix recervigemmis. Известно, что флавоноиды обладают желчегонным действием, которое возрастает в ряду флавоны, халконы, флаваноны, флавонолы. Флавоноиды обладают выраженным противоаллергическим и противоязвенным эффектом. Доказано, что такие флавоны как диосметин и его гликозиды (капреозид и саликаприозид), обнаруженные в иве козьей, обладают венотонизирующей активностью и применяются при варикозном расширении вен, флебитах и геморрое, а также в гинекологической практике [9, с. 45-46].

Кору ивы козьей рекомендуют в качестве перспективного лекарственного растительного сырья, содержащего проантоцианидины, которые, как известно, обусловливают противовоспалительное и антиоксидантное действие. Листья же и соцветия, а в особенности мужские, накапливающие значительные количества производных флавона и флавонола, могут быть источником получения лекарственных средств с кардиотоническим и венотонизирующим действием [10, с. 184-186].

Таким образом, практически все компоненты фито-массы представителей вида рода Salix L. начали интенсивно использоваться в современной зарубежной медицине и фармацевтике. На наш взгляд, большое разнообразие видов ив, произрастающих на территории нашей страны, способствует возможности дальнейшего всестороннего изучения и исследования химического состава, фармакологической и медицинской активности представителей вида рода Salix L. и в Узбекистане, с целью замены многих синтетических компонентов современных лекарственных средств – натуральными. Тем более, что еще 1000 лет назад, чудотворные действия ивы были собраны, изучены, и так блистательно расписаны выходцем из Средней Азии, величайшим лекарем своей эпохи – Авиценной.

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THE INSTITUTION OF SENTENCING UNDER THE NEW CRIMINAL LAW OF THE KYRGYZ REPUBLIC

Abstract: *For the efficient and systematic formation of a legal state in the Kyrgyz Republic, in which the rule of law would be the main principle, the optimal functioning of criminal law is necessary as one of the conditions. The full implementation of the ideas of humanism and justice in the process of sentencing has been and remains one of the main tasks of criminal law and judicial activity. It is in the punishment imposed by the court in each specific criminal case, as the mirror reflects the level of legal and moral development of society, its attitude to the person's personality, the degree of respect for her rights, the prevailing ideas about the priority forms of crime prevention, the role and possibilities of the court in regulating criminal -legal conflict, and social relations in general. Sentencing is a special stage that is central to the administration of justice.*

Key words: *Punishment, socialization, aggravating circumstances, alleviating circumstances, special rules for sentencing, principle of absorption, principle of partial or full addition of sentences, sentencing.*

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Introduction

The issue of sentencing is quite relevant not only at present, but also in any period of the historical cycle, because determining the guilt of a person in a crime and assigning punishment for this act is a very complicated and contradictory assignment of reason. For the correct application of the sanction against the guilty person, one must have all the information about the identity of the offender and the circumstances of the crime. Therefore, criminal law has developed the concept of sentencing.

Punishment - a measure of state coercion, shall be imposed by a court verdict, which applies to a person found guilty of a crime, and consists in the deprivations and restrictions of the rights and freedoms of that person provided for by the Criminal Code of the Kyrgyz Republic.

Sentencing is a criminal law institution that governs the rules for choosing a specific punishment applicable to the person who committed the crime, giving instructions on the size and terms of the punishment being chosen [1]. Sentencing is a special stage that is central to the administration of justice. Indeed, in imposing a sentence, the court decides what measure of state coercion and on what scale corresponds to the circumstances of the case, whether it is sufficient to achieve the goals of punishment enshrined in the law. It is through criminal punishment that the assessment of the deed by the person found guilty of an offense is expressed, which is expressed in the necessary and sufficient restriction of the legal status of the guilty.

Therefore, the law establishes the general principles of sentencing, that is, certain criteria (requirements) by which the court should be guided in deciding whether to apply the appropriate state coercive measure. Undoubtedly, each criminal law institution contains categories and concepts, without a deep and comprehensive study of which it is impossible to comprehend it. In relation to the institution of sentencing, these are the ambiguously understood general principles of sentencing.

The definition of punishment shows that it can only be imposed by a court sentence. That is, the

legislator imposes an obligation on the court to choose a measure of punishment that would correspond to the nature and degree of public danger of the crime committed and the identity of the perpetrator.

The application of criminal legal means to persons found guilty of committing crimes does not have the goal of excluding them from society, but rather their re-socialization, their correction and re-education, the formation of a useful member of the society that takes an active part in building a legal civil society.

The criminal policy of the state proceeds from the fact that the perpetrators of crimes can, despite the severity of the crime committed, return to an active public life and become the builders of a new society, as well as the fact that there are no incorrigible criminals, but there are not recovered criminals. The issues of criminal punishment for many years remain in the focus of attention not only of representatives of science and practitioners of the investigation, court and the penitentiary system, but also of society as a whole. Punishment, both potential and real, is one of the leading means of state criminal policy, a powerful legal tool in the fight against crime, and in many ways ensures the fulfillment of the objectives of the criminal law. It is the punishment that recognizes the role of the primary means of implementing criminal responsibility. The practice of sentencing is of the greatest importance for all types of law enforcement.

The Criminal Code of the Kyrgyz Republic has a special 12-chapter for sentencing. Article 72 of the Criminal Code of the Kyrgyz Republic enshrines the general principles of criminal punishment, which, when imposing a sentence, the court must take into account that the punishment is adequate to the degree of guilt and the degree of harm caused by the act, taking into account the warning purposes of the punishment. These are legal principles enshrined in criminal law that determine the decision-making mechanism of a court when choosing a specific type and amount of punishment imposed on a person who has committed a crime. Following these principles allows a person to be sentenced to just punishment and ensures that the goals of punishment are achieved [2].

In most countries of the world, the following general principles of sentencing are used [3]:

The principle of the lawfulness of punishment: the punishment imposed should be within the limits of the sanction of the article of criminal law establishing responsibility for the crime committed, and when choosing a specific punishment measure, the provisions of the general part of criminal law should be taken into account.

The principle of individualization of punishment: the appointment of punishment, the maximum appropriate severity of the specific crime committed, the identity of the offender who committed it (including from the position of possible correction), other mitigating and aggravating circumstances.

The principle of saving criminal repression: the court selects the least severe punishment sufficient to achieve the goals of bringing a person to criminal liability.

Aggravating circumstances are legal facts and conditions that require a stricter sentence to be imposed on the perpetrator because they negatively characterize his personality or increase the degree of public danger of the act [4]. Aggravating circumstances may be specific to a specific act (qualifying features of a crime) or be fixed in the general part of the criminal law and apply to all crimes. The imposition of punishment, taking into account aggravating circumstances, makes it possible to individualize it and thereby is one of the guarantees for imposing a fair punishment. Such circumstances usually include, for example, the repeated commission of a crime by a person who has previously committed a crime, the group method of committing a crime, etc. [5].

According to Article 83 of the Criminal Code of the Kyrgyz Republic, when sentencing, circumstances aggravating the punishment recognize:

1) commission of a crime by a group of persons or a group of persons by prior conspiracy;

2) the commission of a crime motivated by racial, ethnic, national, religious or interregional hostility (hatred);

3) infliction of grievous harm by a crime;

4) the commission of a crime against a knowingly minor, minor, obviously disabled person, an elderly person or a person in a helpless state;

5) the commission of a crime against a woman, obviously known to the perpetrator in a state of pregnancy;

6) the commission of a crime against a person who is in material, official or other dependence on the perpetrator;

7) the incitement to commit a crime of a person who could not be aware of his action (inaction) or lead it due to mental illness, temporary mental disorder, dementia or other painful state of the psyche, as well as the use of such a person to commit a crime;

8) commission of a crime with particular cruelty over the victim;

9) the commission of a crime in a state of emergency or martial law or in conditions of public disaster;

10) commission of a crime in a generally dangerous way;

11) commission of a crime by a person who is intoxicated. The court has the right, depending on the nature of the crime, not to recognize this circumstance as an aggravating punishment.

When sentencing, mitigating circumstances shall recognize:

1) sincere repentance or active assistance in solving the crime;

2) voluntary compensation for damage caused or elimination of the damage caused;

3) the commission of a crime due to a combination of difficult personal, family, economic or other circumstances;

4) the commission of a crime by virtue of material, official or other dependence;

5) commission of a crime by minors;

6) the commission of a crime by a woman in a state of pregnancy.

The court also takes into account all extenuating circumstances when sentencing. Mitigating circumstances are legal facts and conditions that make it possible to impose a less severe punishment on the perpetrator because they positively characterize his personality or reduce the degree of public danger of the act [6]. Mitigating circumstances may be specific to a particular act (privileging signs of corpus delicti) or be fixed in the general part of the criminal law and apply to all crimes. The imposition of punishment, taking into account extenuating circumstances, allows it to be individualized, and thus is one of the guarantees for the imposition of a fair punishment. Mitigating circumstances usually include, for example, the commission of a crime for the first time due to a combination of difficult life circumstances, the juvenile age of the offender, confession and assistance to the investigation, etc. [7]

According to Article 83 of the Criminal Code of the Kyrgyz Republic, when sentencing, circumstances mitigating the punishment recognize:

1) sincere repentance or active assistance in solving the crime;

2) voluntary compensation for damage caused or elimination of the damage caused;

3) the commission of a crime due to a combination of difficult personal, family, economic or other circumstances;

4) the commission of a crime by virtue of material, official or other dependence;

5) commission of a crime by minors;

6) the commission of a crime by a woman in a state of pregnancy [8].

Special rules for sentencing Criminal law may provide for special situations when a sentence is imposed subject to special rules. These are the rules that apply only if there are circumstances enshrined in the criminal law. Special rules develop or specify the general principles of sentencing and apply along with them. So, articles 76-81 of the Criminal Code of the Kyrgyz Republic provide for all the special rules for sentencing.

For example, special addition rules can be punishments when a person consecutively commits several crimes (sentencing in the aggregate of sentences) [9].

In the aggregate of crimes, punishment is assigned for each article separately, and then for the aggregate. At the same time, additional penalties are imposed on each article, which may be added up or absorbed. In aggregate, no additional punishment may be imposed that is not applied under any article included in the aggregate. The primary and secondary punishment are independent and are executed independently. When imposing a sentence of imprisonment, the term of the sentence shall be indicated for each article. The type of correctional facility (prison, colony) and the type of regime of the colony are indicated only when sentencing is taken in aggregate. When assigning correctional labor, their term and percentage of deductions are indicated for each article separately and then for the aggregate.

There are two principles of sentencing in the aggregate: the principle of absorption and the principle of partial or complete addition of sentences. The principle of absorption means that more severe punishment absorbs less severe; in aggregate, a more severe punishment is imposed, while a less severe one is not actually taken into account and does not exert an effect on the total sentence. The principle of partial addition of punishments means that part of a less severe punishment joins a more severe punishment; as a result, the aggregate punishment is assigned in a larger amount than strict punishment, but in less than the amount of punishment. The principle of complete addition of sentences means the summation of all punishments included in the totality.

The principle of complete addition of sentences cannot be applied if the amount of sentences exceeds the maximum amount that can be assigned in accordance with the instructions of the General Part of the Criminal Code.

Partial addition of punishments is allowed even when the term of accumulated punishments allows their complete addition to be applied. When assigning punishment for the aggregate of crimes, additional punishments may be added to the main punishments. In case of complete or partial addition of sentences, the final additional punishment may not exceed the maximum term or amount provided for this type of punishment in the corresponding article of the General Part of the Criminal Code. If, after passing a sentence, it is established that the person committed another crime before being sentenced, then the sentence shall be imposed according to the same rules [10].

At the same time, the moment of sentencing is important, and not its entry into legal force. In this case, the punishment shall be imposed according to the rules set forth above, but the punishment served by the first sentence shall be set off in the final punishment. In the situation under consideration, the sentence imposed for the aggregate of crimes cannot be lower than the sentence imposed for the first sentence. The sentence must indicate that the part of

the sentence served on the previous sentence shall be counted in the term of serving the sentence.

If in a similar situation the person was sentenced conditionally on the first sentence, and on the second sentence to a real sentence, the real sentence should absorb the suspended sentence; addition of these measures is not allowed, because the convicted person conditionally did not violate the condition of not applying real punishment.

If after conviction it is established that the perpetrator also committed other crimes, some before the sentence and others after, then the punishment is assigned separately for crimes committed before the previous sentence, then for the totality of crimes, taking into account the punishment imposed by the previous sentence.

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LABOR MARKET OPTIMIZATION MODELS

Abstract: *The article discusses the effective use of economic and mathematical methods in the field of rural employment in labor-surplus regions. A large place in the work belongs to the development of a criterion for the optimality of the labor market and limitations in the model. The main focus is on optimizing the supply and demand of labor in rural areas.*

Key words: *rural labor market, supply and demand of labor, objective function, optimality conditions.*

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ОПТИМИЗАЦИОННЫЕ МОДЕЛИ РЫНКА ТРУДА

Аннотация: *В статье рассматриваются вопросы эффективного использования экономико-математических методов в области занятости сельского населения в трудоизбыточных регионах. Большое место в работе занимает разработка критерия оптимальности рынка труда и ограничений в модели. Главное внимание уделено на оптимизацию спроса и предложения рабочей силы на сельских месностях.*

Ключевые слова: *сельский рынок труда, спрос и предложение рабоочей силы, целевая функция, условия оптимальности.*

Введение

Одним из важных вопросов в научном исследовании социально-экономических явлений является обеспечение достоверности, прозрачности и полноты источников информации. Эконометрические исследования, проводимые с целью изучения ретроспективного и перспективного состояния спроса и предложения рабочей силы на рынке труда, предусматривают применение экономико-математичсеких методов и моделей, котроые обеспечают надежность и достоверность аналитической информации.

В научных исследованиях и экономической литературе представлено множество подходов по регулированию спроса и предложения рабочей силы на рынке труда, а также теоретических и практических аспектов решения вопросов занятости населения и снижения безработицы [3,5,6,11,13].

По мнению Смирнова М.М. в процессе оптимизации рынка следует уделить внимание на факторы, влияющие на дисбаланс спрос и предложения на рабочую силу на рынке труда [6]. Спрос определяется потребностями первичных структурных звеньев экономики в найме определенного количества работников необходимой квалификации для производства товаров и услуг в соответствии с платежеспособным спросом. Предложение рабочей силы качественно и количественно изменяется в зависимости от возрастной структуры населения, профессиональной и общей подготовки и т.д. Эконометрическое изучение рынка труда в работах Бодрова А.Н. рассматривается во взаимосвязи с вопросами качества предложения рабочей силы и спроса на них со стороны хозяйствующих субъектов [5].

В разработках отечественных ученых

следует отметить комплексные оптимальные модели сельского рынка труда на примере Самаркандской области Холмуминова Ш.Р. [12], оптимизационные модели предложения рабочей силы на рынке труда Ташпулатова А. [7], а также модели развития и совершенствования инфраструктуры сельского рынка труда Арабова Н [1] .

В рассмотренных научных подходах, посвященных моделям регулирования спроса и предложения рабочей силы, недостаточно глубоко и полно освещены проблемы оптимального моделирования рынка труда на уровне отдельного региона. На наш взгляд, оптимизационные модели спроса и предложения рабочей силы сельского рынка труда следует рассматривать в комплексе со следующими элементами: модели координации спроса и предложения на рабочую силу; модели рациональной занятости и эконометрические модели прогнозирования безработицы в сельской местности [9] .

Эконометрические модели снижения уровня несоответствия спроса и предложения рабочей силы требуют разработки целевых функций в двух различных направлениях, в зависимости от поставленной задачи:

1) минимизировать спрос и предложение на рабочую силу в сельскохозяйственном производственном секторе рынка труда;

2) максимизировать спрос и предложение на рабочую силу в других отраслях и секторах из сектора сельскохозяйственного производства.

Мы считаем целесообразным использовать второй метод, который предполагает повышение уровня воспроизводства и использования трудовых ресурсов при разработке моделей оптимальности, регулирующих спрос и предложение на рабочую силу для сельской местности. Потому что в любой экономической системе вопрос все более эффективного использования имеющихся ресурсов в условиях ограниченной доступности ресурсов и растущих потребностей является одной из важнейших задач, стоящих перед государством и обществом. В качестве критерия оптимальности при составлении экономико-математических моделей развития сельского рынка труда ставится задача максимизации спроса и предложения на рабочую силу во всех отраслях и секторах зонального производства и сферы услуг.

В частности, в качестве критерия оптимальности (целевой функции) используется максимизация количества рабочих мест в отраслях обрабатывающей промышленности, сферы услуг и личной трудовой деятельности.:

$$F = \sum_{\mu=1}^{\Omega}\sum_{j=1}^{J}\left(n_{\mu j}(t)\cdot x_{\mu j}(t) + \overset{\vee}{n}_{\mu j}\cdot \overset{\vee}{x}_{\mu j}(t)\right) \to \max \qquad (1)$$

где: $n_{\mu j}(t), \overset{\vee}{n}_{\mu j}(t)$ - норматив работников сотрудников μ -й квалификации $j-$ й отрасли на действующих и вновь вводимых предприятиях по секторам экономики, чел.;

$x_{\mu j}(t)$, $\overset{\vee}{x}_{\mu j}(t)$ - количество работников соответствующей квалификации в t-м году.

Необходимые условия и ограничения:

1. Создание условий для эффективной работы существующих рабочих мест:

$$\sum_{\mu=1}^{\Omega} b_{\mu j}(t)\cdot x_{\mu j}(t) \le \Phi_j(t) \qquad (2)$$

где: $b_{\mu j}(t)-$ затраты на содержание существующего рабочего места в t-периоде, тыс.сум;

$x_{\mu j}(t)$ - общее количество доступных рабочих мест μ -й квалификации $j-$ й отрасли в исследуемом периоде;

$\Phi_j(t)$ - общая стоимость затрат, связанных с содержанием основных фондов в исследуемом периоде, в тыс.сум.

2. Создание новых рабочих мест:

$$\sum_{\mu=1}^{\Omega} G_{яиу.\mu j}(t)\cdot \overset{\vee}{x}_{\mu j}(t) = I_{яиу.j}(t) + KR_{яиу.j}(t) \qquad (3)$$

где: $G_{яиу.\mu j}$ - объем капитальных вложений, затраченных на создание рабочих мест в отраслях сельского хозяйства, в тыс. сум.;

$\overset{\vee}{x}_{\mu j}(t)$ - количество вновь созданных рабочих мест в отраслях сельского хозяйства, соответственно, в Т;

$I_{яиу.j}(t)$ - объем инвестиций, направленных на создание новых рабочих мест, в тыс. сум.;

$KR_{яиу.j}(t)$ - объем кредитов, выделяемых на создание новых рабочих мест, в тысячах сумов.

1. Расширение занятого населения надомным трудов в сельской местности:

$$\sum_{\mu=1}^{\Omega} n_{k\mu j}^{c(2)}(t)\cdot x_{\mu j}^{c(2)}(t)\cdot k_{см.\mu j}^{c(2)}(t)\le Фk_{j}^{c(2)}(t) \qquad (4)$$

где: $n_{k\mu j}^{c(2)}(t)$ - норматив надомных работников на рабочее место в секторах обрабатываюшей промышленности;

$x_{\mu j}^{c(2)}(t)$ - количество работников, занятых надомным трудом, чел.;

$k_{см.\mu j}^{c(2)}(t)$ - коэффициент сменности использования основных фондов;

$Фk_{j}^{c(2)}(t)$ - общая количество квотируемых рабочих мест для надомников, чел..

4. Повышение материальной заинтересованности работников:

$$\sum_{\mu=1}^{\Omega}\sum_{j=1}^{J}\sum_{\psi=1}^{\Psi}\left(\partial_{\psi\mu j}(t)\cdot x_{\mu j}(t)+\overset{\vee}{\partial}_{\psi\mu j}(t)\cdot \overset{\vee}{x}_{\mu j}(t)\right) > IB(t) \qquad (5)$$

где: $\partial_{\psi\mu j}(t), \overset{\vee}{\partial}_{\psi\mu j}$ — доходы работников ψ-го вида соответственно на действующих и вновь создаваемых рабочих местах, в тыс.сум;

$IB(t)$ - минимальная величина потребительской корзины в стране в t-м периоде, в тыс.сум.

5. Условие неотрицательности переменных:

$$x_{\mu j}(t)\ge 0;\ \overset{v}{x}_{\mu j}(t)\ge 0. \qquad (6)$$

Предложенная модель имеет важное значение для получения достоверной информации по спросу рабочей силы на предприятиях перерабатывающей промышленности, сельского хозяйства, сферы услуг и индивидуальной трудовой деятельности.

В следующем этапе в качестве критерия оптимальности принимается целевая функция, обеспечивающую наибольший объем предложения рабочей силы.

$$F=\sum_{j=1}^{J}\sum_{\beta=14}^{75}\sum_{\psi=1}^{\Psi}\left(K_{\psi\beta j}(t)\cdot y_{\psi\beta j}(t)+\hat{K}_{\psi\beta j}(t)\cdot \hat{y}_{\psi\beta j}(t)\right)\to \max \qquad (7)$$

где: $K_{\psi\beta j}(t)$ ва $\hat{K}_{\psi\beta j}(t)$ - коэффициент обеспеченности действующих и вновь создаваемых рабочих мест соответствующей квалификации;

$y_{\psi\beta j}(t), \hat{y}_{\psi\beta j}(t)$ – количество сельского населения, соответственно занятых и незанятых в отраслях экономики, тыс.чел.

Для достижения этой цели необходимо выполнение следующих условий и ограничений:

1. Перераспределение занятого населения по отраслям экономики:

$$\sum_{\beta=18}^{60}\sum_{\gamma=1}^{7} g_{\beta\gamma j}(t)\cdot y_{\beta\gamma j}(t)=G_{j}(t) \qquad (8)$$

где: $g_{\beta\gamma j}(t)$ – коэффициент, отражающий удельный вес работников, желающих сменить место работы;

$G_{j}(t)$ - общее количество работников, перераспределяемых по отраслям экономики.

2. Перераспределение незанятого населения по отраслям экономики:

$$\sum_{\beta=18}^{60}\sum_{\gamma=1}^{7}\hat{g}_{\beta\gamma j}(t)\cdot \hat{y}_{\beta\gamma j}(t)=\hat{B}_{j}(t);\ j=\overline{1,J} \qquad (9)$$

где: $\hat{g}_{\beta\gamma j}(t)$ – коэффициент, отражающий доли безработных с учетом уровня образования и возраста;

$\hat{B}_{j}(t)$ - общее количество незанятого общественным трудом населения, в тыс.чел.

3. Организация переподготовки безработных желающих трудоустроиться в сельской местности за счет средств Фонда занятости населения:

$$\sum_{\beta=18}^{60}\sum_{\gamma=1}^{7}\hat{p}_{\beta\gamma j}(t)\cdot \hat{y}_{\beta\gamma j}(t)=P_{мс.\gamma}(t) \qquad (10)$$

где: $\hat{p}_{\beta\gamma j}$(t)- стоимость переобучения одного безработного, в тыс. сумов;

$\hat{y}_{\beta\gamma j}(t)$ - сведения о численности неработающего населения с разбивкой по уровню образования и возраста, чел.;

$P_{мс.\gamma}(t)$ - сумма средств Фонда занятости населения на перевоспитание безработных, в тыс. сум.

4. Снижение уровня текучести работников:

$$\sum_{\beta=1}^{60}\sum_{\gamma=1}^{7}\sum_{c=1}^{4} n_{\beta\gamma j}(t)\cdot y_{\beta\gamma j}(t) \le \sum_{c=1}^{4} N_j(t) \qquad (11)$$

где: $n_{\beta\gamma j}$ (t) –коэффициент текучести по отраслям экономики;

$y_{\beta\gamma j}(t)$ - количество занятого населения соответствуюшего образования и возраста;

N_j (t) –норматив текучести работников по секторам экономики.

5. Повышение материальной заинтересованности занятого и незанятого населения:

$$\sum_{\beta=14}^{75}\sum_{j=1}^{J}\sum_{\gamma=1}^{7}\left(\partial_{\beta j\gamma}(t)\cdot y_{\beta j\gamma}(t)+\hat{\partial}_{\beta\gamma j}(t)\cdot \hat{y}_{\beta j\gamma}(t)\right) > \hat{IB}(t) \qquad (12)$$

где: $\partial_{\beta j\gamma}(t)$ ва $\hat{\partial}_{\beta j\gamma}$ - сумма дохода на душу занятого и незанятого, в тыс.сум.;

$\hat{y}_{\beta\gamma j}(t)$ - количество незанятого населения соответствующего образования и возраста;

$\hat{IB}(t)$ - минимальная величина потребительской корзины в стране в t-м периоде, в тыс.сум.

6. При условии, что неизвестные параметры не отрицательны:

$$y_{\beta j\gamma}(t)\ge 0;\ \hat{y}_{\beta j\gamma}(t)\ge 0. \qquad (13)$$

После этого составляется рациональная модель занятости, в которой выражается оптимальная структурная структура занятости сельского в отраслях экономики.

Первоначально составляется целевая функция, которая обеспечит наибольший доход занятого сельского населения:

$$Y=\sum_{j=1}^{J}\sum_{\beta=14}^{75}\sum_{\psi=1}^{\Psi}\left(\partial_{\psi\beta j}(t)\cdot y_{\psi\beta j}(t)+\hat{\partial}_{\psi\beta j}(t)\cdot \hat{y}_{\psi\beta j}(t)\right)\to \max \qquad (14)$$

где: $\partial_{\psi\beta j}(t)$, $\hat{\partial}_{\psi\beta j}(t)$ - доход на душу занятого и незанятого населения в сельской местности, в тыс.сум.;

$y_{\psi\beta j}(t), \hat{y}_{\psi\beta j}(t)$ – количество занятого и незанятого сельского населения, тыс.чел.

На следующем этапе с учетом вышеприведенных оптимизационных моделей составляется рациональная модель занятости, в которой выражается оптимальная структурная структура занятости сельского в отраслях экономики. В данной модели применяется целевая функция, которая обеспечит наибольший доход занятого сельского населения:

$$Y=\sum_{j=1}^{J}\sum_{\beta=14}^{75}\sum_{\psi=1}^{\Psi}\left(\partial_{\psi\beta j}(t)\cdot y_{\psi\beta j}(t)+\hat{\partial}_{\psi\beta j}(t)\cdot \hat{y}_{\psi\beta j}(t)\right)\to \max \qquad (15)$$

Для достижения целевой функции требуется выполнение неекторых условий и ограничений, таких как соответствие предложения рабочей силы к требованиям и условиям рабочего места, соответствия ноых вновь создаваемых рабочих мест в сельской местности количеству незанятого населения и т.д.

Данная модель позволяет определить перспективные направления развития отраслей и сфер экономики, которые обеспечат рациональную занятость сельского населения.

На следеющем этапе, после разаработки экономико-математических моделей, для обработки и получения данных о рынке труда следует разработать и применить соответствующее программное обеспечение

Предлагаемые экономико-математические модели были использованы нами при анализе и оценке состояния сельского рынка труда в трудоизбыточном регионе Узбекистана. В

результате разработаны рекомендации по развитию экономически составляющих сельского рынка труда на уровне Ферганской области. Особое внимание уделено к повышению уровня квалификации и образования предложения рабочей силы в условиях роста иностранных инвестиций в реальный сектор экономики, динамичного развития сферы услуг и туризма в сельской местности.

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TRAINING OF HIGHER EDUCATION PEADGOGICAL CADRES IN UZBEKISTAN DURING THE INDEPENDENCE YEARS: PROBLEMS AND SOLUTIONS

Abstract: *This article discusses the system of training teachers with higher education in Uzbekistan during the years of independence, the importance of teachers in the socio-economic and cultural development of Uzbekistan, the positive impact of reforms in the education system in recent years. It is reported that measures have been taken to create the best possible conditions for students to study in a number of higher education institutions.*

Key words: *Market economy, higher education, teachers, pedagogical staff, institutes, universities, knowledge, problems, shortcomings, solutions, research, international cooperation, achievements.*

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Introduction

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Relevance. In connection with the transition to a market economy in Uzbekistan during the years of independence, the training of teachers in accordance with the new socio-economic conditions has become a requirement of the times. In this regard, the following words of the President of the Republic of Uzbekistan Sh.M.Mirziyoev should be quoted: “It should be noted that the development of the higher education system in our country is also a priority. Along with new higher education institutions, branches of prestigious foreign universities are being opened, quotas for admission to higher education institutions are being increased, and part-time departments are operating in many areas ”[1].

2. Methods and level of study: Conclusions based on historical-comparative and generalized analysis, objectivity, scientific, historical approach, systematization form the methodological basis of research.

3. Research results:

Teachers are an important link in the socio-economic and cultural development of any country. Attention to teachers in the community helps to determine the state of cultural development in a particular country. "As we think about solving the complex and important issues facing us in today's rapidly changing life, we are once again convinced that their solution lies in education, in shaping the worldview of young people on the basis of modern knowledge, high spirituality and enlightenment. We will do it, ”says Sh.M.Mirziyoev [2, 448].

The higher education system of Uzbekistan in the first period of independence faced a number of difficulties and problems. In particular, there are 14 pedagogical or language pedagogical institutes in the country, and serious reforms have been carried out in this area. In connection with the transformation of pedagogical institutes in the provinces into universities in 1992, there were some problems in the training of teachers and educators for schools and educational institutions [3, 88]. There has been a process of declining pedagogical training of students in regional universities.

In the early years of independence, curricula could not completely get rid of ideological biases. In addition, the curriculum does not pay enough attention to the subjects that teach the spiritual and moral foundations, economic, legal, aesthetic knowledge.

Also, higher education institutions did not have the independence to organize the educational process and international relations. Research institutions, industry and social institutions in various fields have been largely uninvolved in the training process.

One of the biggest problems in the higher education system was the shortage of young scientists among the scientific and pedagogical staff. “Doctors of science under the age of 40 accounted for 0.9 percent of the total number of doctors of science in the country's universities, and 79 percent for those aged 50 and over. The average age of those approved for the degree of Doctor of Science was 50, and the average age of Candidates of Science was 36 ”[4].

There are specific socio-economic reasons for this, primarily due to the declining interest of young people in science in the context of market relations. Because science required a great deal of self-sacrifice from man. The above-mentioned problems and shortcomings in the higher education system relate to the early stages of sector reform. Many of them are finding their solution today.

In recent years, reforms in the education system in Uzbekistan have had a positive impact on the training of teachers. Today, teaching staff in Uzbekistan is mainly carried out in more than 20 higher education institutions. The National University of Uzbekistan, Andijan, Fergana, Namangan, Samarkand, Bukhara, Karshi and Termez state universities, Tashkent State Pedagogical University, Kokand, Navoi, Jizzakh and Nukus pedagogical institutes play a significant role in this.

Tashkent State Pedagogical University was founded in 1998 on the basis of the Pedagogical Institute named after Nizami, and annually trained thousands of personnel in educational institutions of the Republic. For example, in 2006 alone, 13,753 students studied at the university [5, 382].

Pedagogical universities were established mainly on the basis of pedagogical institutes. For example, Andijan, Fergana, Namangan, Urgench, Bukhara, Karshi, Termez state universities are among them. They were granted university status in 1992 [6, 16].

At the Navoi State Pedagogical Institute, attention was paid to the training of teachers who will teach in Uzbek, Kazakh, Russian and English languages, which are unique to the Kyzylkum region. Therefore, the staff of the institute has established relations with pedagogical higher education institutions in neighboring countries. The issue of training teachers to teach in the national language in the region has always been a topical issue [7].

During the years of independence, the institute has trained specialists in chemistry and ecology, biology and life sciences, physics and astronomy, the idea of national independence, the foundations of law and spirituality, physical education, music education, based on the needs of teachers with higher education.

In 2003, the Navoi State Pedagogical Institute increased the number of faculties to 7 and the number of departments to 25. Education at the institute was conducted in 15 full-time and part-time bachelor's degrees in Uzbek, Kazakh and Russian languages. During this period, the institute began training staff in 3 master's specialties. In 2003, the number of students at the institute was 5,200, and the number of professors and teachers was 308. Of these, 15 were doctors and professors, and 58 were candidates of science and associate professors.

Termez State University plays an important role in the training of teachers in Uzbekistan. For many years, Termez State University has a special status and reputation as the only higher education institution in the region. In addition to the annual supply of specialists to various sectors of the regional economy, the University has done a great job in providing the oasis educational institutions with teaching staff. The university had all the opportunities to train highly qualified specialists. There are about 500 professors and teachers in 13 faculties and 55 departments of the university. In the 1990/91 academic year, M.A. T. There is a Termez State Pedagogical Institute named after Oybek, where a total of 7167 students (both pedagogical and part-time) studied [8, 346]. In 1992, the institution granted university status.

In 1999, 11 teachers from the university participated in the competition of the "Teacher" Foundation. Three of them were awarded fund grants. Two of them are N. Alimkulova and A. Khudoykulov in the field of pedagogy, A. Rahmonkulov had the opportunity to study abroad in the field of history. English Department Student A. Abdunazarov successfully passed the ACCELS competition and studied at the University of Wesconsin, USA. University professors participated in international conferences in France and China with their presentations on various important issues.

Professors and talented students of the university have established scientific cooperation with universities in many central cities of Russia, international scientific organizations of the United States, French scientists, Turkish researchers, as well as scientists and students of Ukrainian and Kazakh universities. These collaborations have contributed not only to major scientific research, but also to the strengthening of friendship and cooperation between peoples. For example, researchers of the Faculty of History in collaboration with scientists from the French Research Center, Osaka University, Japan, Institute of Archeology of the Academy of Sciences of Uzbekistan successfully continued research on

"The cities of Termez and Bactria Tokharistan" [9, 13].

Many scientific works have been created and published in a short period of time. In particular, Professor E. Y. Turaev was awarded the International Soresh Prize for his innovation in science as "Turaev Seryogin effect". The two-volume book "Memory" about the soldiers of Surkhandarya who died in World War II was created in collaboration with the Republican Council of Veterans and scientists of Termez State University. Bunda Q. A. Avliyoqulov, H. Kichkilov. B. Yoriev and others took an active part. Doctor of Historical Sciences, Professor S. N. Tursunov and candidate of historical sciences T. R. “Unforgettable Courage” dedicated to the courage of the people of Surkhandarya region during the war years, Professor R.A. Kulmatov's works "Distribution of toxic elements in the rivers of the Aral Sea basin and the laws of reclamation" were published [8, 347].

Termez State University has become one of the scientific centers where a number of international scientific conferences are held. In May 1995, in cooperation with the International Association of People's Teachers, the I International Symposium on Folk Pedagogy "Zarautsoy-95" was held, and in 1998, the II International Symposium "Zarautsoy-98". The collection of reports made at the symposium was published in Uzbek, Russian, German and Tajik languages. The organization of these conferences, the preparation, editing and publication of books of scientific lectures is carried out directly by academician B. It was initiated and led by Kadyrov. In December 1995, at the initiative of scientists from Termez State University and the Institute of Archeology of the Academy of Sciences of Uzbekistan, international scientific conferences on "Urban culture of Bactria - Tokharistan" were organized by the Commonwealth and other foreign scientists. , 347].

The university has trained specialists and teachers in various fields. The university team tried to shape in all of them, first and foremost, the scholarly thinking potential. Because the prestige of higher education is determined primarily by its scientific potential. Science is first acquired, mastered, and then various miracles are created on its basis. The growth of scientific and creative levels of professors and teachers at the university has always been in the center of attention. Teachers published about 500 scientific articles a year in the central and regional press. They received several patents each year for their inventions created for practice. Talented students also took an active part in the research work of professors and teachers. In 2002, 118 gifted students participated in research [9, 13].

Karshi State University also plays an important role in the training of pedagogical staff in Uzbekistan. Karshi State Pedagogical Institute was granted university status on February 28, 1992. The University (QarSU) has provided the entire Kashkadarya region with highly educated specialists in various fields. In 1995, the university had 4,574 students and 485 teachers. The university had 48 departments in 28 specialties [10, 78].

Karshi State University has cooperated with a number of universities and research centers of the republic, including the University of Manchester in the UK, the University of Edinburgh, the University of Cambridge, Uludag University, Zaveburg in Austria, Delhi University in India and the Technical University in Germany.

University professors and students won various competitions and won the right to internships and study at foreign universities. English teachers A. Alikulov and I. Jumanovs at Cambridge University, T.C. Gafforova was an intern at Bilston College, England. The winner of the competition announced by the Republican Foundation "Umid" Guzal Rasulova studied at the University of New York, USA, a student of the Faculty of Foreign Languages Sabir Rajabov studied at the University of Delhi, India. In September 1998, the University hosted a seminar of European experts on the TACIS program.

During the years of independence, more than 450 professors and teachers of the university, along with students, continued research work on various topics in a number of areas. There are 18 doctors of sciences, professors, 165 candidates of sciences, associate professors, 185 teachers in the existing 48 departments of Karshi State University. In 1997, 20 scientists and in 1998, 26 scientists participated in international conferences. In 1998, professors and teachers published 35 textbooks and manuals. In addition, in 1996, 1997, 1998, university scientists received patents for 2 invention proposals each year. The postgraduate department has been functioning at the university since 1993 [11, 133-134].

The scientific team of Karshi State University received a grant to participate in the EU project "Tempus-TASIS" in 1992-1999. In 1999-2001, the university organized 32 national scientific and practical conferences with universities in Russia, Lithuania, Kazakhstan, Kyrgyzstan, Belarus, Ukraine, Turkmenistan, Turkey and Azerbaijan. In the first 10 years of independence, university scholars have published more than 30 textbooks, 35 monographs, more than 250 manuals and programs. From 1997 to 2000, 19 talented students of the university participated in the competition of the "Umid" Foundation, and 3 students were awarded grants [11, 133-134], [12].

The Kokand State Pedagogical Institute has also consistently implemented reforms in the education system during the years of independence. In 2007, 5,600 students studied at 7 faculties of the Kokand State Pedagogical Institute. They were taught by more than 420 professors and teachers. In order to further develop the educational process, the scientists of the

institute paid special attention to the creation of textbooks, manuals and lecture notes [13].

From the 2007-2008 academic year, students of the institute moved to study in one shift. This allowed them to do more research, enough time to practice in the library. The institute has a modern sports palace and various science clubs. The newly established Information Resource Center, equipped with state-of-the-art computers, provides an opportunity for young people to get acquainted with e-learning literature and learn foreign experience in their specialties. students who completed the course also received a certificate in computer specialization.

Of course, the prestige of higher education is determined by its scientific potential. To create various miracles and discoveries, you must first acquire knowledge. During 2005-2006, 12 candidate and 3 doctoral dissertations were defended at the institute [13].

Special attention was paid to the training of scientific personnel at the Nukus State Pedagogical Institute named after Ajiniyaz. In 2007, 17 doctors of sciences, about 107 candidates of sciences, as well as several professors and associate professors taught students at the institute. Scientists such as B.Jallibekov, B.Allamuratov, A.Pakhratdinov, M.Tileumuratov, U.Dospanov, G.Asenov, S.Pirnazarov were elected academicians of international academies [14].

At the same time, a number of professors and teachers of the institute were awarded state prizes. In particular, Ilya Dilmanov, a senior lecturer at the Department of Uzbek Philology of the Institute, Candidate of Philological Sciences, was awarded the Medal of Fame for his selfless work on the occasion of the 15th anniversary of independence of the Republic of Uzbekistan. He was also awarded the degree of Doctor of the International Academy of Sciences. In 2006 alone, 15 teachers defended their dissertations.

Scientists of pedagogical institutes regularly published pamphlets and monographs, scientific articles. Newspapers and magazines have also been set up in institutes in this area. For example, the Nukus State Pedagogical Institute published the magazine "Science and Society" and the newspaper "Nukus Pedagogical Institute". In addition, the institute had dozens of clubs, the ensemble "Tomaris", a student theater studio established at the institute. Creative teams became known not only within the institute, but throughout Uzbekistan. They participated in various competitions and won prizes.

The students of the institute took an active part in the annual competition for the State Prize named after Zulfiya among talented girls. For example, in 2006 Yulduz Kalandarova, a student of the Faculty of History and Geography of the Nukus State Pedagogical Institute, took part in the competition and successfully passed all the stages. The achievements of the institute in the field of sports were also noteworthy. In 2006, he became a world and Uzbek champion in various sports. In particular, Jamshid Kamalov, a student of the Faculty of Physical Education of the Institute, won the international tournament in Muay Thai in Tashkent and became a world champion [14].

4. Conclusions

In short, the reforms in the education system in Uzbekistan in the early years of independence were closely linked with the training of teachers. One of the most serious problems was the provision of secondary schools in the country with teaching staff. Although some efforts were made by the government to address the problem in the early years of independence, the goal was not achieved due to a shortage of knowledgeable, experienced staff. Pedagogical institutes such as Kokand, Nukus and Navoi play a certain role in the training of teachers in Uzbekistan. Measures have been taken to create the best possible conditions for students to study at these educational institutions.

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LASER-ENHANCED IONIZATION SPECTROMETRY OF ATOMS BY THE LASER EVAPORTIONS OF SAMPLE

Abstract: *This work is dedicated to investigation of laser evaporation of samples in flame. Double volume nitrogen laser (λ=337,1nm, τ=8ns, E=20mJ) was used in the experiment. Objects of analysis were high purity GaAs, rocks and aqueous solutions of Al, Na. Two excitation schemes for the atoms Al, Na were realized in the flame of acetylene-N_20 and propane-butane-air respectively. Laser evaporations of samples was suggested from graphite rod groove. Optimum disposition of laser beam and discharge of burning gas and oxidant is found for atoms Al and Na in proportion 1:6 and 1:28 respectively. The detection limits of Al and Na in aqueous solutions were $8 \cdot 10^{-7}$ % and $1 \cdot 10^{-7}$ % respectively.*

Key words: *laser evaporation, flame, double volume, nitrogen laser, burning gas, acetylene propane-butane-air.*

Language: *English*

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Introduction

Creation of laser with the tunable frequency of radiation led to discovery of new fields of science. Laser resonance ionization spectrometry (RIS) of atoms in vacuum, laser optogalvanic spectrometry in electric gas-discharge (LOGS) or laser-enhanced ionization (LEI) spectrometry is such a field. Last time investigation by the LEI was carried out in following atomizers: the flame atomizer in atmospheric pressure, rod-flame system, lasers ablation in flame, the electro-thermal atomizer in the inert medium [1-4]. The high selectivity of the method opens wide possibilities of its application to analyze the objects of the complicated composition in the field of geology, medicine, etc. Owing to the high selectivity of the method its use is perspective in electronics, in controlling the material purity.

Idea of the method.Under the action of the laser radiation free atoms of analyte are selectively excited into the high-lying electronic states followed by the collision ionization in a flame or by the collision photoionization, (Fig. 1). This ionization is monitored by applying an electric field. The formed charged particles create the current pulse carrying the information of element content in the analyzed specimen.

The many physical methods are used in the atom-spectroscopy and laser analytical spectroscopy for

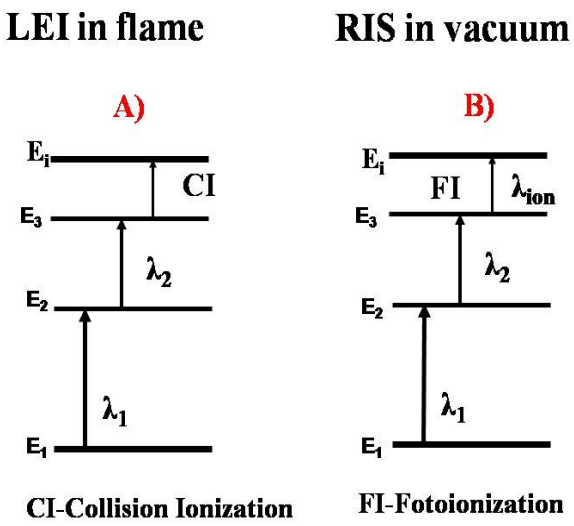

Fig. 1. Idea of the method

determination of spectral parameters, quantitative and qualitative analysis of the studied atoms. The spectral parameters may be served for optimization of the spectrometer with the aim of increase of analytical signals. At laboratory of laser spectroscopy of Samarkand State University for this aim we created laser photo ionization and atom-ionization spectrometers. This spectrometers work synchronic in regime of the atomic beam in vacuum and in regime of the flame in atmosphere pressure. It present we have investigated high excitation Rydberg and auto-ionization states Au, Pt, Hg, Zn, Cd, In, Al, Ga, Ta elements. In the results of study of this elements we exactly determined ionization limit, quantum defects, main quantum numbers, effective schemes of excitation, evaporation velocity, and disposition of effective Rydberg and **auto**ionization states [1-13]. Investigation of Rydberg and autoionizing states of NaI and AlI are not only of significance in the atomic spectroscopy but also of great practical value in laser-analytical spectroscopy.

Moreover scientific investigation are carried out method of laser-enhanced ionization [LEI] spectroscopy or atom-ionization [AI] spectroscopy. Last time, investigation by the LEI was carried out in following atomizers: the flame atomizer in atmospheric pressure, rod-flame system, laser ablation of samples in flame, the electro thermal atomizer in the inert medium [8-13]. The high selectivity of the method gives possibilities of its application to analyze the objects of the complicated composition in the field of geology, medium. Also use of this method is perspective in microelectronics, in controlling purity materials. Contents Au, Pt, Cr, Co, Ni, Mn, Na, Cs, Ca of elements were determined in high-purity substances, chemical reagents, technological solvents and natural objects [3-5].

The present work was dedicated to laser evaporation of samples in flame. We suggested laser evaporation of solid and liquid samples from graphite rod groove by the method LEI. It has been applied for determination of contents Al and Na in the samples GaAs and trapp.

Preparing standard aqueous. Standard solvents of Al by solving lg of metallic Al in 30 ml of diluted 1:1 HC1, and dipping Pt rod cover in order to speed up the process. Than it was diluted with de-ionized water (up to 11, for obtaining Al solution of 1 mg/ml).

Standard solution of Na were prepared by solving NaCl powder being measured on analytical scales in bi-distillated water. In order to get 1% of the solution it was diluted with 100 ml of deionized water.

Experimental. The scheme of an atomic ionization spectrometer is shown in Fig.4 and has been described earlier [3,13]. It is composed of pumping lasers – an excimer laser or a double beam nitrogen laser (λ=337 nm), two tunable dye lasers, an atomization-ionization system, and a registration system. The dye lasers were tuned in the range 270 nm -900 nm; pulse energy was 2 mJ in visible and 100 μJ in UV region; line width: 0.3-0.9 cm^{-1} , spectral contrast- 10^5. The free atoms of the element to be determined were obtained by air pressure nebulization of the sample into a slot burner flame. Acetylene-air flames were used in these studies. The sample was consumed at a rate of 1.5 ml\min with a nebulization efficiency of 13%. The signal was detected with a water-cooled collector placed in the flame with a negative potential (1.5kv) relative to the burner head.

Optical-scheme experimental device is presented on the Fig.2. A double beam nitrogen laser with energy of pulse 20 mJ. We used for evaporation of sample from graphite rod groove. Atomic transitions were excited by radiation of laser on dye, which being pumped by radiation of double volume Nitrogen laser. Output energy of dye laser is 150 μJ; and width of generation line is -0,8cm^{-1}. Laser rays

were directed on flame. Due to a double beam nitrogen laser focusing on the center of the groove substance is evaporated. The formed vapours interacts with resonance radiation of dye laser. Ions formed under effect of laser rays collected between parallel electrodes. One of those electrodes was earthed and the other had potential of - 1,3kV. Current pulse of charge particles was measured after passing low frequency filters and amplified signal came to stroboscope integrator. Averaged signal registered by digital voltmeter

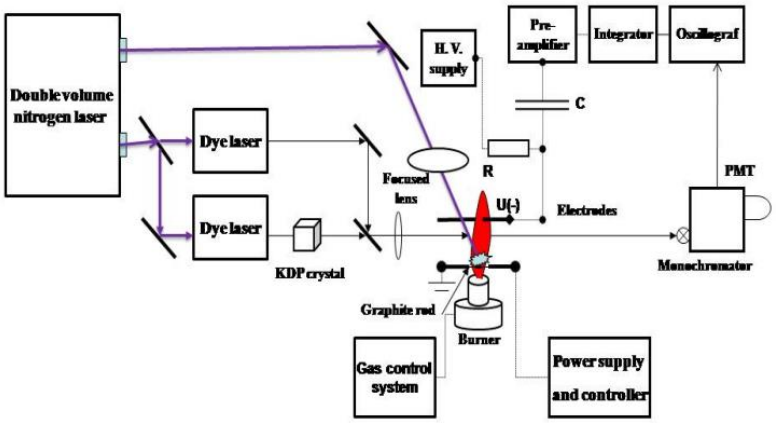

Fig.2. Block diagram of the LEI spectrometer with the laser evaporation sample

Discussion.

Working out of the method of determinations in standard water solvents was carried out in flame of ***propane***-butane-air. Ionization signal from sodium in the flame reached maximum value of proportion of ***propane***-butane of 0.211/min and air of 1,81/min (Fig.3).

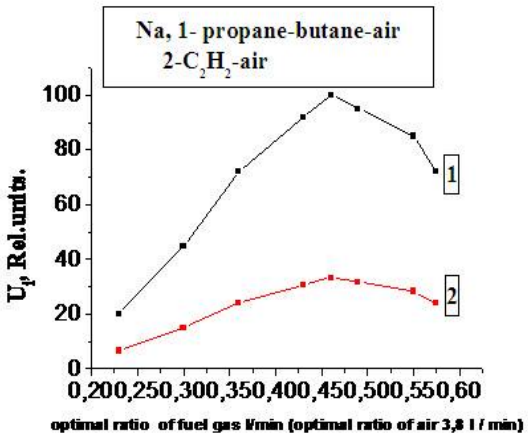

Fig.3. Depends of ionization signal of sodium in the flame reached maximum value

Two step scheme of excitation from ground state was used (Fig.4). Well known resonance line of Na was used in all spectral methods [6]:

$3s\ ^2S_{1/2}\ \lambda_1$=589,0 nm →$3p\ ^2P_{1/2}\ \lambda_2$ =568,8 nm $4d\ ^2D_{5/2}$

Output energy of dye laser of first step was E_1=100μJ, second step - 120μJ. Dye Rodamin-6J was used for the purpose. Two step schemes of Aluminum excitation were realized (Fig.6). Excitation scheme of Aluminum has the following stages:

$3p\ ^2P_{3/2}\ \lambda_1$ =396,l nm →$3s\ ^2S_{1/2}\ \lambda_2$=555,7 nm $4p\ ^2P_{1/2}$

The two step scheme has not been described so far in references. At second step determination accuracy turned out to be 100 time bigger than it was obtained according to the known schemes described in [12]. In order to get maximum effectiveness of atomization dependence value of aluminum signal on type of flame (acetylene-air, acetylene-nitrogen oxide) and proportions of burning gas and oxidant. Results of the investigation are presented fig.5. Ionized signal of Al in flame of acetylene-air depended on proportions of burning gas and oxidant and reached maximum value at 1:6. When nitrogen oxide was used instead of air component, signal increased 8 times. Dependence of ionized signal on composition of flame and temperature obviously connected with low atomization of Al compounds in flame.

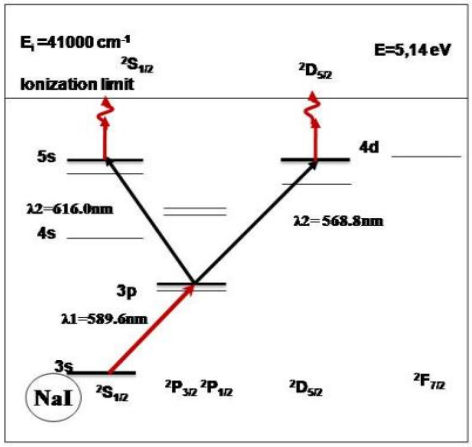

Fig.4. Two step scheme of excitation of sodium

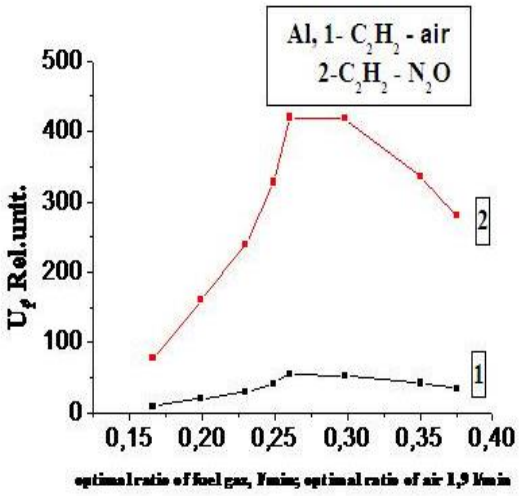

Fig.5. Depends of ionization signal of aluminum in the flame reached maximum value

A double beam nitrogen laser was used for evaporation of sample from graphite groove into flame, and by means of the delay shaper N_2-laser was started for dye-laser pumping. Pulse- recurrence frequency of N_2 laser is (5-10) Hz. Distance between pair of pulses was changed on the internal 1-10ms. Radiation of a double beam nitrogen laser being for sample evaporation, was focused with lens of F=10cm (focus distance) on to the center of the groove.

It was supposed, that first pulse of a pair evaporates sample from the groove, and formed vapours of the substance moves with speed of passing through flame. On 3 cm height from the groove it interacts with radiation of dye-laser, which was started by second pair of pulses.

Registration system was switched on synchronically with second pair of pulses. After focusing of a double beam nitrogen laser laser rays on flame, big background signal was observed. The signal saturates the registration system. Due to pulse delay we were able to change distance between pulses in a pair from 1 till 10ms. Energy of evaporating laser pulse is E=10mJ.

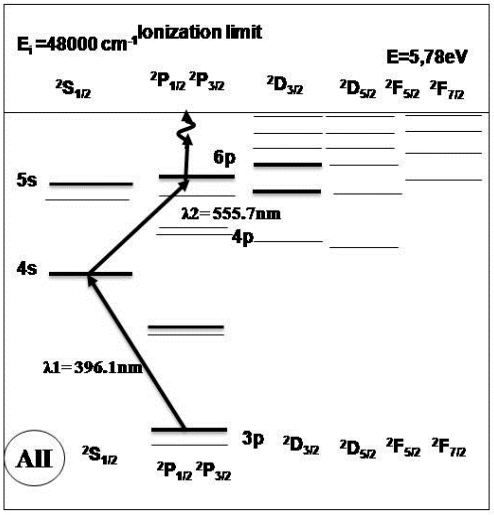

Fig.6. Two step scheme of excitation of aluminum

At first we tried to analyze small pieces of Al, but under effect of focused rays the dose went up. That is why bigger piece of Al was analyzed and ionization signal was registered.

Experiments were carried out in GaAs crystals and solvents of GaAs. So liquid solvents of GaAs with concentration of 10 g per liter were analyzed. Excitation of Al and Na atoms was provided according to double stage scheme of excitation. Contents of Na and Al in GaAs in system of graphite rod flame were determined. The amount of Na and Al are $2.7 \cdot 10^{-2}$ % and $1.7 \cdot 10^{-2}$ % respectively.

Stable signal of 10 mV during some laser pulses from Na was obtained in 10 µl of GaAs solvent of concentration 10 g/1, signal decreased until noise level. Resonance signal was not observed to tune out from wavelength of dye-laser. Due to absence of standard samples for GaAs,, 30 g/1 of trapp solvent with concentration of Na - 2,49% was used. Analytical signal in case, with 30 g/1 trapp solvent on the rod was 3000 mV. Results of the analysis are presented on table.

Generally, the atomic ionization spectrometry is yet of little use in practice but continues to be developed and has its potentials. As with other laser-based techniques, a hindering factor relates to a slow progress in the development of tuneable lasers that cannot yet support in practice the multielement analysis. High susceptibility of the ionization degree to the matrix composition presents another serious drawback of this technique. A fundamental possibility of the absolute analysis is one of the potentially important merits of the atomic ionization technique. An absolute number of the collected electrons (charge) is equal to the absolute number of the analyte atoms, the 100% ionization of which can be easily achieved in the analytical volume limited by the intersection area of the laser beams, while a correction for the non-selective background is obtained by tuning the laser over the full profile of the analytical absorption line. It is necessary to know either the atomized mass or the degree of sample vaporization, as well as the dinamics of vapour transport. These parameters can be estimated using mathematical models.

Table. Real sample analysis by the laser evaporations in flame

Analyze	Sample	Solution, 1 g/l Content 10^{-2}%	Solid Sample Content 10^{-2}%	Detection limit in water solution 10^{-7}%
Al Na	**GaAs**	1,9±0,1 2,9±0,3	1,5±0,2 2,5±0,4	8 1
Na	**Rocks** **(trapp)**	Solution, 30 g/l 2,49%		

Conclusion.

The method of laser evaporation of samples from graphite rod groove in flame is one of the new and perspective direction of investigation of chemical elements. The method requires improvement of optimization of analysis conditions.

Basis for using the method and its preferences among the other methods are the following:

The methods allow to work with micro samples, does not require much time and can provide reproductive results. Relative standard deviation of the obtained results of ionization signals does not exceed 0.05 in wide range of elements concentration values.

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DENOTATIONAL AND CONNOTATIONAL MEANINGS OF 来 [LÁI] VERBS IN CHINESE AND THEIR EXPRESSION IN UZBEK

Abstract: *Describing the semantics of a verb is a much more difficult task. Because the content of the verb depends in many ways on its distribution. With this in mind, verbs are classified according to the direction of their meaning and the presence or absence of subject-objects with which they interact, and their number, if any.*

Chinese language researchers classify action verbs as part of a group of action verbs. These verbs can appear in a sentence as an independent verb predicate or as an additional part of speech as a modifier or directional morpheme.

These are simple verbs that represent 来 [lái] kelmoq (to come) and 去 [qù] ketmoq (to leave) directions of action. They form compound verbs with the same meaning. The verb 来 kelmoq (to come) is used when the action is directed to the speaker (or object), and the verb 去 ketmoq (to leave) is used if the action is directed away from the speaker (or object). Orientation, in turn, can be set by the object or subject: when the orientation is clearly indicated in the sentence - the object, if not specified - by the subject.

Verb 来 [lái] is included in the group of basic simple action verbs in Chinese. 来 [lái] can be used in plural and independent verbs, auxiliary verbs and auxiliary words. The peculiarity of the semantics of the verb 来 [lái] kelmoq (to come) is that it determines not only the orientation or direction of the action, but also the point of the message, who (or what) describes the situation.

The article examines the semantic features of the verbs of 来 [lái] directions of action and identifies the Uzbek equivalents in the process of translation. Based on the materials in Liu Shushiang's book "现代汉语八百词. 吕叔湘" (800 words in modern Chinese), the models of 来 [lái] verbs as independent and auxiliary verbs are analyzed. The similarities and differences between the 来 [lái] verbs in Chinese and the verb "kelmoq" (to come) in Uzbek are described.

Key words: *action-direction verb, predicate, additional grammatical meaning, denotational meaning, conational meaning, directional meaning, auxiliary verb, modifier.*

Language: *English*

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Introduction

The lexical-semantic group of action verbs is available in all languages. In Chinese, a verb is multifaceted in terms of meaning and syntactic function: it can perform both a predicative function and a grammatical meaning at the same time. In some cases, it can be a modifier, an auxiliary verb. In doing so, they point to the direction of the leading verb. In Uzbek, auxiliary verbs also add meaning to the preposition; meaning can sometimes refer to the direction of movement, speed, duration, and so on. The article examines the independent and auxiliary verb features of 来 [lái] action verbs and identifies the Uzbek equivalents during the translation process.

The main findings and results

Materials from Liu Shushiang's book "现 代 汉 语 八 百 词. 吕 叔 湘" (800 words in modern Chinese) [1, p.345-347] were used as a source for the study. In some places, the dictionary "Large Sino-Russian Dictionary" [2, p. 246] was used.

In particular, in the book "Initial course of the Chinese language" co-authored by T.P. Zadoenko and Juan Shuin, it is stated that in Chinese, along with the content of the action, there are verbs that express its direction [2, p. 246].

These are divided into two groups. The first group includes 7 verbs denoting movement in space: 进 – *kirmoq (to inter)*, 出 – *chiqmoq (to go out)*, 下 – *tushmoq (to fall down)*, 上 - *ko'tarilmoq (to rise)*, 回 – *qaytmoq (to come back)*, 过 - *kesib o'tmoq (to cross)*, 起 – *ko'tarilmoq (to ascend)*. In the second group, 2 verbs 来 - *kelmoq (to come)* and 去 – *ketmoq (to leave)* denoting action directed to the speaker are recorded [2, p. 246].

来 [lái] *kelmoq (to come)* and 去 [qù] *ketmoq (to leave)* are simple verbs that indicate the direction of movement. They form compound verbs with the same meaning [3, p. 97-105]. If the action is directed at the speaker (or object), the verb来 *kelmoq (to come)* is used, and if the action is directed away from the speaker (or object), the verb 去 *ketmoq (to leave)* is used. For example:

学 生 们 **来** 了 [Xué sheng men **lái** le] *O'quvchilar* ***keldi.*** *– Students* ***came****.* (move towards the speaker - here).

学 生 们 **去** 了 [Xué shēng men **qù** le] *O'quvchilar* ***ketdi.*** *– Students* ***left****.* (The movement is in the opposite direction from where the speaker is standing - there).

Orientation can be determined either by subject or object: if orientation is clearly shown in a clause, it is chosen by the object; otherwise, the orientation is determined by the subject.

The meanings of the verbs 来 [lái] *kelmoq (to come)* as independent verbs are explored below.

Application of 来 [lái] in the function of the independent verb.

1. In the function of 来 [lái] independent verbs, it means an action directed to the place where the speaker is standing or from where the speaker is standing; it can be used with auxiliary words such as 了 le and 过 guò. The following is an analysis of some of the models involving 来 [lái].

A) Noun (place, time) + 来 [lái] + noun (subject of action) model.

In this model, the number is usually placed before the second horse. 来 [lái] verbs in such sentences are given in Uzbek by *kelmoq (to come)* verb. For example:

远 处 **来** 了 一 条 小 船 [Yuǎn chù **lái** le yītiáo xiǎochuán] *Olisdan bir kichik qayiq* ***(suzib) keldi.*** *- A small boat was* ***coming (sailing)*** *from a far.*

昨 天 **来** 过 三 个 人 [Zuótiān **lái** guò sān gèrén] *Kecha uch kishi* ***kelgan*** *edi. – Three man* ***came*** *yesterday.*

In the former example, proper noun of place and, in the latter, proper noun of time is used.

B) Noun (subject of action) +来 [lái] + noun (object of action) model.

The difference between this model and model (A) is that before 来 [lái] comes the subject of motion and after 来 [lái] the object of motion, not the place or adverbal noun.

In this model, too, a number can be used before the second noun. The 来 [lái] verbs in such sentences are given in Uzbek by the verbs *kelmooq (to come)* and *yubormoq (to send)*. For example:

他 **来** 过 两 封 信 [Tā **lái** guò liǎng fēng xìn] *U ikkita xat* ***yuborgan*** *edi. – He* ***sent*** *two letters.*

In Chinese, there are actually 寄 [jì] verbs for the act of sending a *letter (pochta yubormoq*) or mail *(xat)*.

In the 来 [lái] verbs in the example, along with the meaning *yubormoq (to send)*, the meaning of direction to the speaker is also preserved. The meaning of the 寄 [jì] verbs is abstract.

有 的 班 级 班 长 自 己 **来** 了，有 的 只～了 个 代 表 （=派 来 了 一 个 代 ） [Yǒu de bānjí bānzhǎng zìjǐ **lái** le, yǒu de zhǐ ~le gè dàibiǎo (=pài láile yīgè dàibiǎo)] *Ba'zi guruh sardorlari o'zlari* ***kelishdi****, ba'zilari esa o'z nomlaridan vakil* ***yuborishdi*** *(= kimnidir vakil qilib yuborish). - Some group leaders* ***came*** *in personally, while others* ***sent*** *representatives on their own behalf (= to send someone as a representative).*

In the example, the meaning of *kimnidir o'z o'rniga yuborish (to send some else on behalf)* given by the verb 来 [lái], because the direction, that is, the arrival of a representative in a certain place.

C) Noun (subject of action) +来 [lái] + noun (place) model.

In this model, unlike the models (A), (B), the place name comes after the 来 [lái] verbs (来 北 京, 来 这 儿). It uses the subject of the action and the noun before the 来 [lái] verbs (老 郑 明 天 来). 来 [lái] verbs are given in Uzbek by the verb *kelmoq to come*. For example:

老 郑 明 天 **来** 北 京 [Lǎo zhèng míngtiān **lái** Běijīng] *Laojeng ertaga Pekinga* ***keladi.*** *– Laojeng will* ***come*** *to Pekin tomorrow.*

我 **来** 这 儿 看 看 [Wǒ lái zhèer kàn kàn] *Men bu yerga ko'rib ketgani keldim.- I came here to see.*

D) 来 [lái] + noun, model.

1. This model is usually used in the form of commands or requests, expressed in Uzbek by the verb *keltirmoq (to bring)*:

来 人, 快 **来** 杯 水 [**Lái** rén, kuài **lái** bēi shuǐ] *Odam **keldi**, tezroq suv **keltiring**.- The man **came**, **bring** water as soon as possible.*

来 一 碗 肉 丝 面 [**Lái** yī wǎn ròu sī miàn] *Bir kosa go'shtli ugra **keltiring**.- **Bring** a bowl of meat noodles.*

In the examples, the meaning of the action of the 来 [lái] verbs in relation to the speaker is observed. In the first example, the verb 来 [lái] is used twice in two different senses: 来人 man came, 来杯水 bring water.

2. The occurrence of the verb 11 problem, event, etc., the assignment of any task is expressed in the Uzbek language by the verbs *yuz bermoq (to occur), kelmoq (to come), yuklatmoq (to load):*

任 务 **来** 了，要 努 力 完 成 [Rènwù **lái** le, yào nǔlì wánchéng] *Topshiriq **yuklatildi (berildi)**, uni muvaffaqiyat bilan bajarish lozim. - The task has been **assigned (given)**, it must be completed successfully.*

你 们 的 支 援 **来** 得 很 及 时 [Nǐmen de zhīyuán **lái** dé hěn jíshí] *Sizlarning ko'magingiz ayni vaqtida **keldi**. - Your help **came** just in time.*

In the first example, *the task is assigned (given),* and in the second example, *the help* verbs also have a directional meaning specific to the 来 [lái] verbs.

3. The verb 来 [lái] comes in place of certain verbs and means to perform the action they signify; it can be used in conjunction with auxiliary words such as了 le and 过guò.

Translated into Uzbek based on the content of the spoken text. For example:

你 拿 那 个，这 个 我 自 己 **来**（=自 己 拿）[Nǐ ná nàgè, zhège wǒ zìjǐ **lái** (=zìjǐ ná)] *Sen anavini **ol**, bunisini men o'zim **olaman**. - You **take** that, I'll **take** this.*

In fact, the second part of the Chinese sentence does not use the verb 拿 [ná] *kelmoq (to take)*, but 来 [lái] serves as 拿 [ná] *olmoq (to take)* in this sentence.

唱 得 太 好 了，再 **来** 一 个（=再 唱 一 个）[Chàng dé tài hǎole, zài **lái** yīgè (=zài chàng yīgè)] *Juda yaxshi kuylading, **yana bitta kuylay qol**.- You sang so well, **sing one more.***

老 头 儿 这 话 **来** 得 痛 快（=说 得 痛 快）[Lǎotóu er zhè huà **lái** dé tòngkuài (=shuō dé tòngkuài)] *Qariya bu gapni xursand bo'lib **aytdi**. - The old man **said** it happily.*

In the above sentences, 来 [lái] is used instead of the verbs in parentheses to express their meaning.

The use of 来 [lái] as an auxiliary verb.

A) Verb + 来 [lái] + noun, model.

The horse in this model usually refers to the object or subject and time of action. It comes after 来 [lái] prepositional verbs in a sentence and adds an additional meaning to it: the action is directed to where the speaker is standing. It is translated into 来 [lái] Uzbek languages based on the meaning of the leading verb used in the sentence. For example:

一 架 飞 机 从 远 处 **飞 来** [Yī jià fēijī cóng yuǎn chù **fēi lái**] *Bir samolyot uzoqdan **uchib keldi.** - A plane **flew** in the distance.*

In the example, the main action is the verb *uchmoq (to fly)*, and the verb *kelmoq (to come)* adds an additional direction. 来 [lái] is a direct part of the verb飞 [fēi] because飞 [fēi] means *uchmoq (to fly),* and 来 [lái] indicates its direction to the subject.

In addition, the verb 来 [lái] is related to the 从 [cóng] auxiliaries (meaning to stand at a certain distance). This is evident in the从…来 – *dan kelmoq (to come from)* structure. Thus, 来 [lái] verbs are morphologically a component of a word and syntactically a component of a grammatical structure.

他 给 我 **送 来** 一 部 希 腊 神 话 [Tā gěi wǒ **sòng lái** yī bù "xīlà shénhuà"] *U menga "Grek mifologiyasi" filmini **sovg'a qildi**. - He **gave me** the film "Greek mythology".*

In the example, 送 [sòng] *hadya qilmoq (to donate), sovg'a qilmoq (to present)* of the 送 来 [sòng lái] verbs are the prepositional verbs, and the verb indicates that the gift has reached the speaker.

我 **借** 了 几 本 小 说 **来** [Wǒ **jiè**le jǐ běn xiǎoshuō **lái**] *Men bir nechta romanlarni **o'qishga (ijaraga) oldim**. - I took some novels to **read (for rent).***

The verb 借 [jiè] actually means *ijaraga olmoq (to rent), qarzga olmoq (to borrow)*. The Uzbek language does not say that *I borrowed or rented a book,* so it is appropriate to translate this verb as *o'qishga oladim (I took to read).*

那 些 资 料 今 天 **拿 得 来 拿 不 来**？[Nàxiē zīliào jīntiān **ná de lái ná bù lái**?] *Anavi materiallarni bugun **olib kelish kerakmi yo yo'qmi**? - **Should I bring those materials** today **or not**?*

In Chinese, between 得 [de] compound verbs, it usually means that there is an opportunity to perform an action, and 不 [bù] means that there is no opportunity. These words add an additional modal meaning to the verb.

四 面 八 方 都 传 **来** 了 喜 讯 [Sì miàn bā fāng dōu **chuán lái** le xǐxùn] *Har tomondan xushxabarlar **aytilmoqda**. - The gospel is being **preached** from all sides.*

The meaning of the verb 传 [chuán] is *xabar bermoq (inform), tarqalmoq (to spread),* which indicates that the gospel is spreading everywhere.

前面走来一群学生 [Qiánmiàn **zǒu lái** yīqún xuéshēng] *Oldinda bir to'da o'quvchilar **yurib kelishmoqda**. - A group of students is **walking** ahead.*

The 走来 [zǒu lái] verbs in the example have 走 [zǒu] *piyoda yurmoq (to walk)* and 来 [lái] *kelmoq(to come)* components.

Apparently, in Chinese, it expresses the meaning of 来 [lái] directions and adds additional meaning to the leading verb. In this case, 来 [lái] verbs are translated into Uzbek directly from the meaning of the leading verb.

B) Verb + 得 [de] (不 [bù]) + 来 [lái], model.

This pattern of verb combinations indicates whether or not an action can be performed. Used with fewer verbs like 谈 [tán], 合 [hé], 处 [chù]. For example:

他们俩很谈得来 [Tāmen liǎ hěn **tán dé lái**] *Ular ikkovi juda **chiqishadi** (gaplari hamisha bir joydan chiqadi). - They both **get on well** (their words always are in harmony).*

The 谈得来 verb in the example means *gaplasha oladi (can talk)*, that is, that the action can be performed, that two people can have a conversation, that they can come to an agreement.

这个歌我唱不来 [Zhège gē wǒ **chàng bù lái**] *Bu qo'shiqni men **kuylay olmayman**. - I **can't sing** this song.*

这道题我做得来 [Zhè dào tí wǒ **zuò dé lái**] *Bu mummoni men **hal qila olaman**.- I **can handle** this problem.*

In the examples, 不 [bù] actions between the prepositional verb and 来 [lái] verbs indicate that it is not possible to perform (唱不来), and 得 [de] indicates that there is a possibility (做得来). In these examples, *kelmoq (to come)* meanings of 来 [lái] verbs are not preserved.

C) Verb 1 and verb 2, model.

The verbs in this model are the same verb, coming in the form of a compound (phrase) and signifying the repetition of an action, the continuation of an organ. In this case, the verb combinations are translated into Uzbek based on the spoken text:

孩子们在操场上跑来跑去 [Háizimen zài cāochǎng shàng **pǎo lái pǎo qù**] *Bolalar sport maydonchasida **u yoqdan bu yoqqa yugurib yurishardi*** (跑来跑去*yugurib borish, yugurib kelish*). *- The kids were **running back and forth** on the sports field (跑来跑去to run, to come running).*

想来想去，也想不出个好办法来 [**Xiǎng lái xiǎng qù**, yě xiǎng bù chū gè hǎo bànfǎ lái] ***Shuncha o'ylasam** ham yaxshi bir yechim topa olmayapman. - I can't think of a better solution.* (想来想去 - think about (something) carefully, especially before making a decision or reaching a conclusion)

D) The verb 来 [lái] comes after the 说 [shuō], 看 [kàn], 听 [tīng], 想 [xiǎng], 算 [suàn] verbs and adds additional meaning to these verbs. Verb combinations serve as introductory words, expressing different attitudes of the speaker to the content of individual parts of speech or the whole sentence: Such as, 看来 [kàn lái] *ko'rinishidan (in appearance), nazarimda (I suppose)*, 说来 [shuō lái] *gapiradigan bo'lsak (speaking of)*, 想来 [xiǎng lái] *o'ylashimcha (I think)*, 听来 [tīng lái] *eshitishimcha (I hear)*, 算来 [suàn lái] *hisobga olsak (taking into account)*.

You can replace 来 [lái] verb with 起来 [qǐlái] verb:

说来话长 [**Shuō lái** huà cháng] ***Gapirsa**, gap ko'p. - Too long **to tell** (It is impossible to say in two words)*

这个人看来年纪不小了 [Zhège rén **kàn lái** niánjì bù xiǎole] *Bu kishi **ko'rinishidan** yoshi kichik emas. - This person is not too young **in appereance.***

他的话听来很有道理 [Tā dehuà **tīng lái** hěn yǒu dàolǐ] *Uning gapida jon borga o'xshaydi. - It sounds like a lot.*

春节想来你们一定过得非常愉快 [Chūnjié **xiǎng lái** nǐmen yīdìngguò dé fēicháng yúkuài] ***Nazarimda,** Chunjie bayramini juda yaxshi o'tkazgansizlar. - **I think** you had a great Chunjie holiday.*

算来时间已经不短了，快有十年了 [**Suàn lái** shíjiān yǐjīng bù duǎnle, kuài yǒu shí niánle] ***O'ylab qarasak**, ko'p vaqt o'tibdi, o'n yilcha bo'lib qoldi. – **I think**, it's been a long time coming, ten years.*

In the Chinese examples and their Uzbek translation, the meaning of the verb来 [lái] is not preserved.

Conclusion

1. In Chinese, the lexeme来 [lái] is ambiguous and is used in speech as an independent verb, auxiliary verb and auxiliary verb. The article analyzes the models of using the verb as an independent and auxiliary verb:

As an auxiliary verb of 来 [lái]:

Noun (place, time) + 来lai + noun (subject of action); noun (subject of action) + 来lai + noun (object of action); noun (subject of action) + 来lai + noun (place); 来 [lái] + noun; 来 [lái] + verb; verb (purpose) + 来 [lái]; 来 [lái] + 成 [chéng] / 得/不了 [dé/bù liǎo];

As an auxiliary verb:

Verb + 来 [lai] +noun; verb + 得 [de] (不 [bu]) + 来 [lái]; verb₁ and verb₂; verbs 说 [shuō], 看 [kàn], 听 [tīng], 想 [xiǎng], 算 [suàn] + 来 [lái].

2. The semantics of the verbs 来 [lái] in Chinese and in Uzbek are characterized by the fact that the direction of action is directed to the end point of the action, that is, regardless of how the action is determined by the leading meaning of the verb (by the subject / by object) represents the directional motion.

3. 来 [lái] verb in Chinese differs from the verb *kelmoq (to come)* in Uzbek in the following features:

a) expresses the following meanings: *biron kimsa yoki narsaning kutilmagan vaziyatda paydo bo'lishi, yuzaga kelishi - the sudden appearance of someone or something; biron bir ishni bajarishga kirishmoq, boshlamoq – to start to do something; biron bir ishni qilmoq - to do any work; olib kelmoq, keltirmoq – to bring; uzatmoq (taom va sh.k.) – to pass; jalb qilmoq- to involve, chaqirmoq – to call, taklif qilmoq – to invite*;

b) The meanings of the verb 来 [lái] *yubormoq (to send), yuz bermoq (to occur), yuklamoq (to load)* are not expressed in the Uzbek language by the verb *to come* (他 来 过 两 封 信; 任 务 来 了).

c) comes in place of certain verbs (in the second part of a sentence) and means to perform the action they signify (你 拿 那 个，这 个 我 自 己 来（=自 己 拿）.

They are translated into Uzbek by verbs from other semantic layers, depending on the meaning expressed in the spoken text.

4. The semantic field of the verb 来 [lái] direction of action is much wider: it can be used as an independent and auxiliary verb, as well as in its own and figurative meanings, as well as in the functions of auxiliary words. It is necessary to study the expression of the meanings of l in the spoken text in the Uzbek language.

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QR – Issue QR – Article

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THE SOCIAL ENTREPRENEURSHIP - A NEW FORM OF BUSINESS IN UZBEKISTAN

Abstract: *The article analyzes the essence and the global experience of the development of social entrepreneurship and also provides conclusions on the promotion of social entrepreneurship in Uzbekistan.*

Key words: *social entrepreneurship, social enterprise, social entrepreneur, social sphere.*

Language: *English*

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Introduction

Periodically arising global financial and economic crises lead to the conclusion that the purely market or administrative approaches to managing the socio-economic development of the state are ineffective. This dictates the importance of focusing on the socio-market model of economic development, the need for social partnership as a way of engagement between the state, business and societies in the form of non-profit organizations.

Today, such a new form of business as social entrepreneurship is gaining popularity in the global economy. The main goal of this type of entrepreneurship is to obtain social benefits, rather than maximizing profits.

The activities of these enterprises are aimed at providing social services, creating jobs for vulnerable groups.

A social enterprise - is a private organization; it is not a governmental organization and is not controlled by the state. This form of entrepreneurship is particularly relevant in the context of the global economic crisis caused by the pandemic, as the forced closure of enterprises and organizations had a negative impact on employment and reduced the standard of living of the population.

Approaches to the typology of social entrepreneurship and social enterprises have been ongoing all the time since the first studies of this phenomenon appeared. Kim Alter (founder and director of a small company for the promotion of research and practice of social entrepreneurship from Washington) proposed the most detailed and systematic typology of social enterprises, which is presented in the table below.

Table 1. The models of social entrepreneurship

	Pure Philanthropic	Hybrid	Pure Commercial
Motives	Goodwill	Mixed motives	Self-interest
Methods	Mission driven	Determined by a combination of mission and market	Market-driven

Goals	Social value creation o	Social and economic value creation	Economic value creation
Destination of revenue	Aimed directly to the implementation of the mission (determined by law or organizational policy)	Reinvested for the implementation of the mission, or for operating expenses, and / or held to expand the business (may be partially distributed among participants)	Distributed to shareholders and owners

Source: (Alter K., 2007, p. 13), as adapted from (Dees et al. 2001, Davis & Etchart, 1999).

The organization led by K. Alter offers the following working definition of a social enterprise: "A social enterprise is any business enterprise created for social purposes and to create social value, designed to mitigate or reduce a social problem or market failures, functioning on the basis of financial discipline, innovation and business practices established in the private sector[1][1, p.13]

For the first time the term "social entrepreneur" began to be used in the 60s of the XX century in the UK. This term was used more widely in the 70-80s thanks to the founder of the non-profit organization "Ashoka: Innovators for the Society", William Drayton. [2, p. 3]

Professor and successful manager Drayton came to the big business of the United States with a revolutionary ideology and ethics for its time. In particular, Drayton actively promoted the ideas of environmental protection. For 1981, the Ashoka budget was $ 50,000, and according to data for 2010-2011, the Ashoka Fund had its own assets of more than $ 85 million.

"Ashoka" supports social entrepreneurs at three levels:

- provides financial and professional assistance;
- brings together communities of social entrepreneurs to interact, help each other and bring their ideas to a higher level. Captures and promotes best practices.
- contributes to the creation of the infrastructure and financial systems necessary to support and grow the civil sector and to spread social innovation on a global scale.

Nowadays, the legal concept of "social entrepreneurship" is not clearly fixed in the current legislation of the Republic of Uzbekistan. However, certain acts of the President of the Republic of Uzbekistan provided appropriate privileges and preferences, including tax and customs, for the development and support of such areas as non-governmental preschool education, production of goods and equipment for people with disabilities, as well as medical and industrial activities for people suffering from mental disorders.

What are the features of world experience in supporting social entrepreneurship?

The US government provides assistance in the development of social entrepreneurship primarily in the following five areas:

- stimulation of social innovation;
- creating favorable conditions for the development of social initiatives;
- recognition and encouragement of successful social initiatives;
- assistance in the dissemination and development of successful social initiatives;
- dissemination of information on the effectiveness of social entrepreneurship.

In Europe, due to the established reliable social protection of the population, social entrepreneurship developed a bit later. One of the leading countries that supported social entrepreneurship at the state level was Italy. Here, the status of a social cooperative was assigned to enterprises that meet the following conditions:

- limited distribution of profits, consistent with the social statutory goals of the organization,
- development of own assets,
- at least 30% of the cooperative members should be included in the category of disadvantaged people (long-term unemployed, low-income people).

The law also marks the industries in which social cooperatives were supposed to operate: social security, healthcare, education, ecology, science, culture, social tourism and others. An analysis of trends in the development of legislation allows us to conclude that in Western Europe social enterprises are created, as a rule, in the legal form of a non-profit association (chosen in countries where the legal definition of a non-profit association gives some preferences when selling goods and services) or a cooperative (chosen in those countries where non-profit associations are in a more difficult situation, for example, in Spain, Finland, Sweden).

Moreover, unlike the countries of America, cooperatives pursuing social goals and creating new jobs are considered social enterprises.

[1] Alter K., 2007, p. 13, as adapted from (Dees et al. 2001, Davis & Etchart, 1999)

In Asia, the most well-known organization in the field of social entrepreneurship is Grameen Bank, founded by Muhammad Yunus. A feature of the bank is that it provides loans to the poorest segments of the population.

Currently, Grameen bank has a worldwide network (more than 50 partners in 22 countries), which has helped to provide assistance to approximately 11 million people in Asia, Africa, the Americas, and the Middle East.

Muhammad Yunus, Nobel Peace Prize Laureate, has also created a company that provides communication services to the poor.

In South Korea, where tens of thousands of people are already involved in social entrepreneurship, regulations governing their activities have been adopted, and the government is pursuing an active support policy, allocating a grant of 30 thousand US dollars annually for the development of one business.

As mentioned earlier, unfortunately, in Uzbekistan, social entrepreneurship has not yet received proper attention from a legal point of view. Nevertheless, there are certain developments. For example, the Decree of the President of the Republic of Uzbekistan dated March 16, 2018 provides for the creation on the territory of psychiatric institutions of the Republic of Karakalpakstan, regions and Tashkent on the terms of a public-private partnership of medical production enterprises for occupational therapy, training for new professions and subsequent recruitment of persons with mental disorders at these enterprises including disabled people. From July 1, 2018 to January 1, 2023, these medical and manufacturing enterprises are exempted from paying land tax, corporate income tax and property tax, as well as a uniform tax payment.

By a decree of the President of the Republic of Uzbekistan dated April 5, 2018, non-public preschool educational institutions created on the basis of public-private partnerships were exempted from the corresponding customs and tax payments.

As well as Presidential orders of the Republic of Uzbekistan dated June 11 and 20, 2018 provided benefits to certain categories of business entities that manufacture and maintain prosthetic and orthopedic products, rehabilitation equipment, publish books and other printed publications in Braille, educational and fiction books for children with disabilities. The same documents provided benefits to those with at least 30 percent of the staff working under an employment contract consists of persons with disabilities, single persons with dependent children under 16 years of age, or children with disabilities, persons released from the penal establishments, victims of human trafficking, graduates of general secondary, secondary special and professional educational institutions, from the date of graduation of which less than three years have passed and graduates of the “Mehribonlik” houses who have not reached 30 years.

By the Decree of the President of the Republic of Uzbekistan dated August 23, 2019, privileges were granted to legal entities, the only participants of which are public associations of persons with disabilities, in the total number of which persons with disabilities make up at least 50 percent and the payroll fund for people with disabilities is at least 50 percent of the total payroll.

In the context of the coronavirus epidemic and declared quarantine, the population of Uzbekistan has shown a healthy example of cohesion. Many people took an active part in supporting lonely old people, people with disabilities, low-income families. This once again shows the potential for the development of social entrepreneurship in our country, which is a stimulating tool for combating unemployment, as well as for the production of socially useful goods and services.

Given the above, it would be useful to perform a number of tasks:

- development and improvement of the legislative and regulatory framework to create conditions for eliminating administrative interference and ensuring freedom of social entrepreneurship;
- improving the efficiency of the use of allocated financial resources by reducing interest rates on loans, expanding the list of financial products in regional microfinance and guarantee organizations, increasing the maximum microloan size, reducing requirements for potential borrowers and the loan portfolio of regional microfinance organizations;
-promote the advancing of social entrepreneurship, especially among young people, persons with disabilities and other socially vulnerable segments of the population;
- providing advice and information on the benefits of social entrepreneurship;
- encouraging public procurement from social enterprises;
- creating an enabling environment for the efficient conduct of social business by organizing training courses for socially oriented entrepreneurs.

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QR – Issue QR – Article

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INCREASING THE STRENGTH OF ALUMINUM ALLOYS

Abstract: *the article deals with the main properties of aluminum alloys, methods of strengthening aluminum alloys, mechanisms of strengthening aluminum, deformation strengthening of aluminum, plastic deformation of aluminum, the most common types of heat treatment of aluminum alloys. Hardening of aluminum-based alloys by cold deformation. Characteristics and performance characteristics of the aluminum alloys used, the composition of special aluminum alloys, the concentration and properties of added alloying elements in aluminum alloys. Welding of aluminum alloys.*

Key words: *Performance qualities, metal hardening, deformation hardening, plastic deformation, production processes, aluminum alloys, multicomponent alloys, hardening by heat-hardening, structural materials, mechanical properties, concentration, properties, alloying elements.*

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ПОВЫШЕНИЕ ПРОЧНОСТИ АЛЮМИНИЕВЫХ СПЛАВОВ

Аннотация: *в статье рассмотрены основные свойства алюминиевых сплавов, методы упрочнения алюминиевых сплавов, механизмы упрочнения алюминия, деформационное упрочнение алюминия, пластическая деформация алюминия, самые распространенные виды термической обработки алюминиевых сплавов. Упрочнение сплавов на основе алюминия методом холодного деформирования. Характеристика и эксплуатационные качества используемых алюминиевых сплавов, состав специальных алюминиевых сплавов, концентрация и свойства добавляемых легирующих элементов в алюминиевых сплавах. нагартовка алюминиевых сплавов.*

Ключевые слова: *Эксплуатационные качества, упрочнения металла, деформационное упрочнение, пластическая деформация, производственные процессы, алюминиевые сплавы, многокомпонентные сплавы, упрочнение методом нагартовки, конструкционный материалы, механические свойства, концентрация, свойства, легирующие элементы.*

Введение

В последние годы был предложен новый подход, позволяющий добиться значительного увеличения прочности алюминиевых сплавов при сохранении высокой электропроводности.

Чистый алюминий – мягкий и пластичный.

Чистый алюминий, с содержанием алюминия 99,8 %, в отожженном состоянии имеет предел текучести менее 20 МПа (2 кГ/мм^2) и относительное удлинение более 40 %. Чтобы сделать такой алюминий пригодным для применения в качестве конструкционного материала к нему применяют различные методы упрочнения. [1].

Три механизма упрочнение алюминия

Сущность упрочнения металла заключается в том, что в его решетку тем или другим образом вводятся препятствия для движения дислокаций.

Для алюминия эффективными являются три основных механизма упрочнения это:

- деформационное упрочнение (наклеп, нагартовка);
- упрочнение за счет образования твердого раствора легирующего элемента в алюминии (закалка);
- упрочнение в результате выделения в алюминии вторичных фаз (старение).

В свою очередь, алюминиевые сплавы могут классифицироваться по преобладающему механизму их упрочнения. [1].

Деформационное упрочнение алюминия

Дислокации двигаются по наиболее плотно упакованным плоскостям атомной решетки. Эти плоскости называются плоскостями скольжения. Так как кристаллическая решетка алюминия является гранецентрированной кубической, то у него имеется четыре эквивалентных плоскости скольжения с тремя направлениями скольжения каждая. Это дает в сумме 12 систем скольжения. В зависимости от преобладающего напряженного состояния обычно активными являются несколько систем скольжения. Поэтому при деформации алюминия постоянно происходит взаимодействие дислокаций различных плоскостей скольжения. В результате этого формируются плотные клубки дислокаций, которые представляют собой препятствия для дальнейшего движения дислокаций. Около этих препятствий возникают поля интенсивных локальных напряжений. Этот механизм работает для всех металлических сплавов, которые подвергаются пластической деформации.

Деформационное упрочнение путем холодной прокатки, волочения или растяжения является эффективным способом повышения прочности алюминиевых сплавов, которые не поддаются термическому упрочнению. [1].

Пластическая деформация алюминия

Все металлы и алюминий тоже - имеют кристаллическую атомную решетку. Пластическая деформация металлов происходит за счёт существованию в их атомной решетке линейных дефектов – дислокаций. Пластическая деформация происходит путем движения этих дислокаций, так, например, как показано на рисунке.

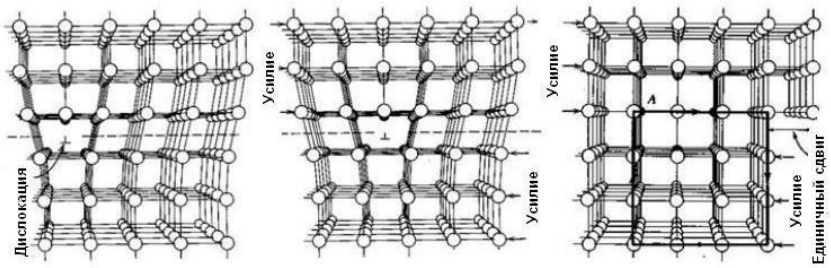


Рисунок 1.- Пластическая деформация путем движения дислокации через атомную решетку пластичного металла

Упрочнение алюминия путем добавления дополнительных компонентов (легирования).

Алюминий, для того чтобы использовать, должен отвечать требованиям по прочности. Насчитывают около 300 вариаций сплавов алюминия с другими элементами.

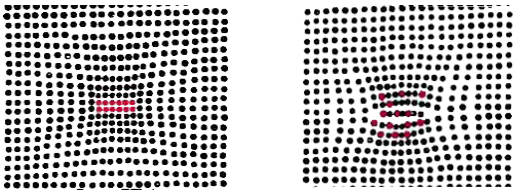
Алюминиевые сплавы с различными химическими компонентами применяют для деталей конструкций и силовых элементов. Все эти сплавы разделяют на деформируемые и литейные. Деформируемые алюминиевые сплавы делятся на сплавы, которые подвергаются термической обработке (упрочняемые) и те, которые по своим свойствам подвергаться ей не могут (не упрочняемые). К первым относятся многокомпонентные сплавы, в основе которых помимо алюминия и магния присутствуют либо кремний, либо медь, либо цинк. Ко вторым относят технический алюминий и двухкомпонентные (на основе алюминий-марганец и алюминий-магний) сплавы.

Каждый из легирующих элементов имеет свои специфические свойства: марганец и магний повышают механические свойства, а также марганец улучшает антикоррозионные свойства, а магний уменьшает массу сплава, однако при очень большом содержании может снизить величину модуля упругости. Медь чаще всего применяется в дуралюминах (группе высокопрочных сплавов из алюминия) и значительно повышает прочность, но понижает пластичность и антикоррозионные свойства. Медь советуют добавлять вместе с магнием. Кремний придает жидко текучесть, легкоплавкость, однако также уменьшает пластичность. Цинк хорошо упрочняет алюминий, его также советуют добавлять вместе с магнием. Помимо вышеперечисленных элементов, в сплавы в виде легирующих добавок вводятся хром, ванадий, титан, цирконий, и пр.

Все тройные и многокомпонентные алюминиевые сплавы имеют более-менее определенный химический состав. Просто легированные сплавы, как правило, не используются при изготовке конструкций. Их составляющие компоненты подобраны главным образом для того, чтобы получить эффективный состав упрочняющих фаз, который после подвергания специальной термической обработке позволил бы как можно больше повысить прочность сплава и сохранить при этом хорошие технологические свойства. Способность к прессованию, прокатке, сварке, резке и стойкости против коррозии. Закалка изделий с последующим старением (отпуском является специальным способом термической обработки, которая придает сплаву больше прочности

Также многокомпонентные сплавы могут упрочняться методом нагартовки.

Нагартовка или деформационное упрочнение - это важный технологический процесс, которые применяют для увеличения прочности и/или твердости металлов и сплавов, которые не могут быть упрочнены термической обработкой. Эта технологическая обработка включает изменение формы изделия методами холодной пластической деформации, то есть ввода в металл механической энергии [3,6]. В результате этой обработки металл становится прочнее тверже, но теряет пластичность, как показано на рисунке 1.



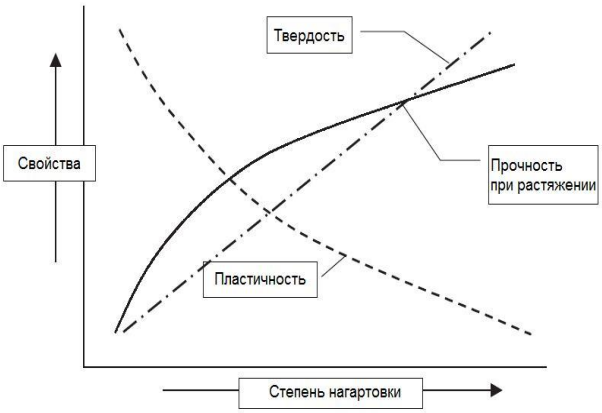


Рисунок 2. - Влияние степени нагартовки на прочность, твердость и пластичность металлов.

Упрочнение алюминия путем термической обработки.

Самыми распространенными видами термической обработки являются отжиг, отпуск (старение), закалка и термическая обработка вместе с другими видами воздействий - механическими, химическими, ударными, ультразвуковыми.

Отжиг. Во время отжига отсутствуют фазовые превращения, и зависимо от начального состояния металла и нужных качеств может происходить в виде рекристаллизации, гомогенизации и возврата (отжига) для снятия остаточных напряжений. Сплавы подвергают отжигу с целью переведения структуры металла из неустойчивого состояния в устойчивое, однородное, которое характеризуется мелкозернистостью. [4].

Во время отжига почти восстанавливаются имевшиеся до деформации или старения физические и механические свойства. Однако при этом уменьшается прочность и увеличивается пластичность и ударная вязкость. Это используют во время технологических операций по изготовлению алюминиевых конструкций с применением отдельных термообрабатываемых сплавов.

Закалка. Так называют процесс, применяющейся к сплавам, которые в твердом состоянии проходят фазовые изменения. Эти процессы способствуют увеличению прочности. Они основываются на том, что при нагревании сплава выше предельной линии растворимости и ниже температуры солидуса наблюдается *а* - твердый раствор. При воздействии нормальных температур он неустойчив и в процессе старения из него выделяются элементы, которые в комплексе с алюминием образуют химические соединения - упрочнители.

Старение закаленных сплавов алюминия.

После закалки алюминиевого сплава следует старение, когда сплав выдерживают при комнатной температуре несколько суток (естественное старение) или в течение 10 — 24 ч

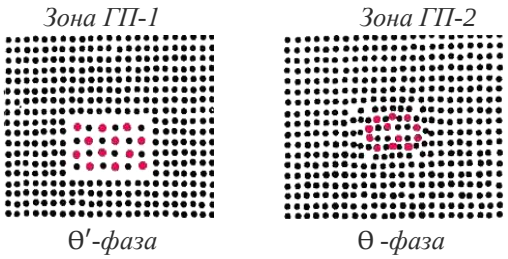


Рисунок 3.- Схема выделения избыточных фаз твердого раствора при старении: а – зоны ГП – 1; б – зоны ГП -2; в – Ѳ' – фаза ; г - Ѳ – фаза (CuAl2).

при повышенной температуре (искусственное старение). В процессе старения происходит распад пересыщенного твердого раствора, что сопровождается упрочнением сплава.

Распад пересыщенного твердого раствора, в решетке которого атомы меди располагаются статистически равномерно, происходит в несколько стадий в зависимости от температуры и продолжительности старения. При естественном (при 20°С) или низкотемпературном искусственном старении (ниже 100 - 150°С) не наблюдается распада твердого раствора с выделением избыточной фазы; при этих температурах атомы меди перемещаются только внутри кристаллической решетки *α*-твердого раствора на весьма малые расстояния и собираются по плоскостям {100} в пластинчатые образования или диски - зоны Гинье - Престона (ГП-1). Зоны ГП-1 в сплавах Al-Cu протяженностью 1- 10 нм и толщиной 0,5-1 нм более или менее равномерно распределены в пределах каждого кристалла. Концентрация меди в зонах ГП-1 меньше, чем в $CuAl_2$ (54%). Если сплав после естественного старения кратковременно (несколько секунд или минут) нагреть до 230 - 270 °С и затем быстро охладить, то упрочнение полностью снимается и свойства сплава будут соответствовать свежезакаленному состоянию. Это явление получило название возврата после старения. Разупрочнение при возврате связано с тем, что зоны ГП-1 при этих температурах оказываются нестабильными и поэтому растворяются в твердом растворе, а атомы меди вновь более или менее равномерно распределяются в пределах объема каждого кристалла твердого раствора, как и после закалки. При последующем вылеживании сплава при комнатной температуре вновь происходит образование зон ГП-1 и упрочнение сплава.

Однако после возврата и последующего старения ухудшаются коррозионные свойства сплава, что затрудняет использование возврата для практических целей.

Длительная выдержка при 100°С или несколько часов при 150°С приводит к образованию зон Гинье- Престона большей величины (толщина 1 - 4 нм и диаметр 20 - 30 нм) с упорядоченной структурой, отличной от α-твердого раствора. Концентрация меди в них соответствует содержанию ее в $CuAl_2$.

Такие зоны в сплавах Al - Cu принято называть ГП-2. С повышением температуры старения процессы диффузии, а, следовательно, и процессы структурных превращений протекают быстрее. Выдержка в течение нескольких часов при высоких температурах (150- 200°С) приводит к образованию в местах, где располагались зоны ГП-2, дисперсных (тонкопластинчатых) частиц промежуточной θ'-фазы, не отличающейся по химическому составу от стабильной θ-фазы ($CuAl_2$), но имеющей отличную кристаллическую решетку. θ'-фаза частично когерентно связана с твердым раствором.

Повышение температуры до 200 - 250°С приводит к коагуляции метастабильной фазы и к образованию стабильной θ-фазы, имеющей с матрицей некогерентные границы. Таким образом, при естественном старении образуются лишь зоны ГП-1. При искусственном старении последовательность структурных изменений в сплавах Al-Cu можно представить в виде следующей схемы: ГП-1 → ГП-2 → θ' →θ. [4,6].

В упрочнении сплавов зоны Гинье - Престона играют решающую роль: чем устойчивее зоны, тем стабильнее свойства сплава. На устойчивость зон оказывают влияние многие факторы: соотношение размеров атомов матрицы и легирующих компонентов, входящих в зоны, степень искажения кристаллической решетки матрицы при образовании зон.

Однако это не означает, что одно образование «на месте» переходит в другое. Возможно, что возникновение последующего образования или фазы происходит после растворения исходного.

Эта общая схема распада пересыщенного твердого раствора в сплавах Al-Cu справедлива и для других сплавов. Различие сводится лишь к тому, что в разных сплавах неодинаков состав и строение зон, а также образующихся фаз.

Для стареющих алюминиевых сплавов разных составов существуют и свои температурно-временные области зонного

(образование ГП-1 и ГП-2) и фазового (θ' и θ-фаз) старения.

Величина упрочнения при закалке и старении зависит от природы фазы упрочнителя, размеров их частиц, количества их и распределения. Наибольшее упрочнение сплавов достигается благодаря MgZn2, Mg2Si и S-фазы (Al2CuMg), имеющих сложную структуру и состав, отличный от α-твердого раствора. [8,11].

После зонного старения сплавы чаще имеют повышенный предел текучести и относительно невысокое отношение σ0,2/σв (≤0,6—0,7), повышенную пластичность, хорошую коррозионную стойкость и низкую чувствительность к хрупкому разрушению. Это объясняется тем, что дислокации при деформации пересекают зоны, не создающие значительного сопротивления начальным деформациям. Отсутствие границы раздела между зонами ГП-1 или ГП-2 с матричной фазой определяет хорошее сопротивление коррозии.

После фазового старения отношение $\sigma_{0,2}/\sigma_в$ повышается до 0,9- 0,95, а пластичность, вязкость, сопротивление хрупкому разрушению и коррозии под напряжением снижаются. В этом случае при деформации дислокации огибают частицы метастабильных фаз, образуя многочисленные дислокационные петли и отдельные скопления. Как следствие этого, сопротивление начальным деформациям повышается, а пластичность уменьшается. В процессе коагуляции образовавшихся фаз (коагуляционное старение) прочностные свойства на начальной стадии сначала возрастают, достигая максимального значения, а затем снижаются. Пластичность, вязкость и сопротивление коррозии возрастают.

Старение (отпуск). Это название важной производственной операции, во время которой кристаллическая решетка приводится в более устойчивое состояние. Тонкие пластинчатые образования, выделяющиеся в процессе старения, носят название зоны Гинье-Престона. Это зоны, где наблюдается повышенная концентрация растворенного компонента. Они располагаются внутри кристалла. В зависимости от того, при какой температуре происходит процесс отпуска, различают естественное и искусственное старение (отпуск). При естественном старении продукты выдерживаются при низких и нормальных температурах, и искусственное предполагает повышение температуры до 432-473 К.

Прочность, получаемая путем естественного отпуска, набирается за 5-7 суток. Сроки отпуска при искусственном старении зависят от состава сплава и требований к нему. Время выдержки при нагреве составляет от 15 до 200 минут и колеблется в зависимости от максимальной толщины требуемого профиля. Время выдержки при нагреве составляет от 15 до 200 минут и колеблется в зависимости от максимальной толщины требуемого профиля.

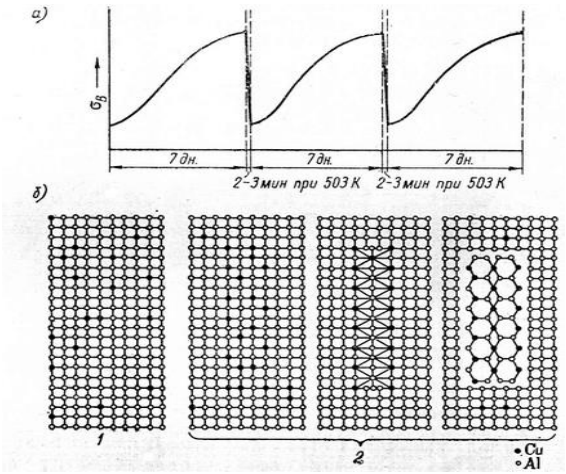


Рисунок 4- Влияние термообработки на прочность и структуру упрочненного алюминия а -кривые старения дуралюмина после возврата к свежезакаленному состоянию; б- схема образования зон Генье-Престона: 1- свежезакаленное состояние; 2- состаренное состояние.

Нагрев (термообработка) изделий происходит в электрических вертикальных печах, имеющих круглое или прямоугольное сечение камеры. Под этими печами находятся баки со средой, в которой металлические профили поддаются обработке.

На рисунке наглядно представлено влияние термообработки на прочностные и структурные параметры упрочненного алюминия.

Исходя из того, в каком режиме и каким способом алюминиевые профили и листы подвергались термической обработке, они обозначаются следующими буквами: отожженные - М, закаленные и естественно состаренные - Т, закаленные и искусственно состаренные - Т1. Горячепрессованные профили и горячекатаные листы специальной буквой не обозначаются.

Упрочнение сплавов на основе алюминия методом холодного деформирования.

При использовании способа холодного деформирования нагартовка осуществляется путем прокатки через валики. Разрушение межкристаллических прослоек и запрессовывание нагартовкой усадочных пор и пузырей, которое происходит в результате холодного деформирования, обеспечивает более плотный контакт внутри кристаллитов.

От степени нагартовки зависит, насколько повышается прочность сплава, и как уменьшаются его пластические свойства. [5,6].

Этот способ повышения механической прочности получил широкое распространение при работе с не упрочняемыми сплавами на основе алюминий-магний, которые, как понятно по их названию, не поддаются термической обработке, о которой шла речь в начале статьи. Наиболее эффективным считается упрочнять такие сплавы после обжатия на 20%.

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ASSOCIATION OF DIABETIC RETINOPATHY WITH INCREASED BLOOD LEVEL OF HbA_{1c}

Abstract*: *Objective: *To determine frequency of diabetic retinopathy associated with high level of glycosylated hemoglobin HbA_{1c} in blood.*

Design & duration: *This is a cross sectional study of observational type completed in eight months duration.*

Setting: *Study was conducted at ophthalmology department of Bahawal Victoria Hospital Bahawalpur.*

Patients & methods: *Diabetic patients presenting to out-patient door of ophthalmology department of study hospital were selected via non probability consecutive sampling technique. Sample size was calculated using WHO sample size calculator. Retinal examination was done in all patients. Those having retinopathy in study group were put into separate group. Blood level of HbA_{1c} was tested in all cases of study group. Frequency of proliferative and non-proliferative diabetic retinopathy was determined. Consent was taken from all cases in study group and from ethical committee of the study institution as well. Chi square test was applied. P-value less than 0.05 was taken significant.*

Results: *Total 180 diabetic patients were studied out of them 58.3% were male and 41.7% were female. Mean age of patients was 51±11.3 years. Mean HbA_{1c} level was 8.3±1.6. Proliferative retinopathy was observed in 36.2% and non-proliferative retinopathy was seen in 63.8% out of total 47 cases with retinopathy.*

Conclusion: *Diabetic retinopathy is associated with high blood level of glycosylated hemoglobin and non-proliferative retinopathy is more common than proliferative retinopathy.*

***Key words*:** *Diabetes, Retinopathy, Glycosylated hemoglobin.*

***Language*:** *English*

Citation: Chaudhry, B. R., Balouch, A. R., & Hassan, M. J. (2020). Association of diabetic retinopathy with increased blood level of HbA_{1c}. *ISJ Theoretical & Applied Science, 07 (87),* 151-154.

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Introduction

Diabetes mellitus is a most common metabolic disease affecting every organ system of the body and having high prevalence in our population putting huge burden on healthcare system.[1] It is a hidden chronic disease which becomes obvious via polyurea, polydipsia and peripheral numbness.[2,3] In type-2 diabetes cells become unresponsive to insulin hence creating resistance against insulin and in the result blood glycemic level is increased. This leads to long

term complications like neuropathy, retinopathy and microvascular disease etc. Out of them diabetic retinopathy is a common complication leading to blindness ultimately.[4,5] According to a report 30% of diabetics develop retinopathy and 2% of them develop blindness if not treated well. There are two types of retinopathy, proliferative and non-proliferative retinopathy. In proliferative retinopathy microaneurysms are formed.[6,7] While in non-proliferative type there is tendency to develop intra retinal hemorrhages with advancing disease. According to American diabetic association glycosylated hemoglobin is a gold standard investigation to diagnose patients with diabetes mellitus.[8]

PATIENTS AND METHODS

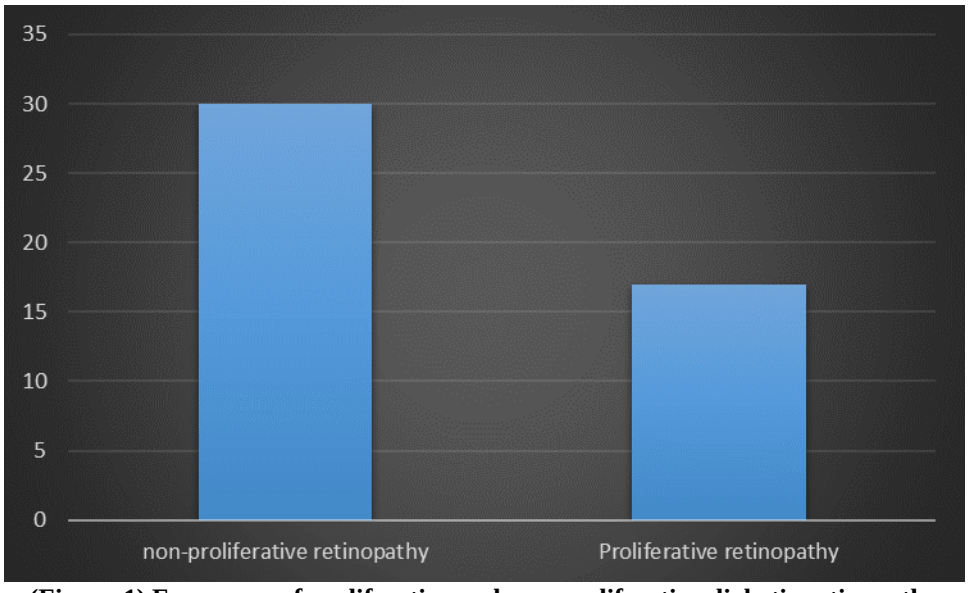
It is a cross sectional study of observational type. Study was started in October 2019 and completed after eight months in May 2020. It was conducted in ophthalmology department of Bahawal Victoria Hospital Bahawalpur. Inclusion and exclusion criteria were defined for selection of cases. Patients having co-morbid conditions, already having any other disease of eye or HbA_{1c} level less than 6.5% were excluded from the study. Diabetic patients presenting to out-patient door of ophthalmology department of study hospital were selected via non probability consecutive sampling technique. Sample size was calculated using WHO sample size calculator. Retinal examination was done in all patients. Those having retinopathy in study group were put into separate group. Blood level of HbA_{1c} was tested in all cases of study group. Frequency of proliferative and non-proliferative diabetic retinopathy was determined. Consent was taken from all cases in study group and from ethical committee of the study institution as well. Chi square test was applied. P-value less than 0.05 was taken significant. Data was analyzed using SPSS software version 21.

RESULTS

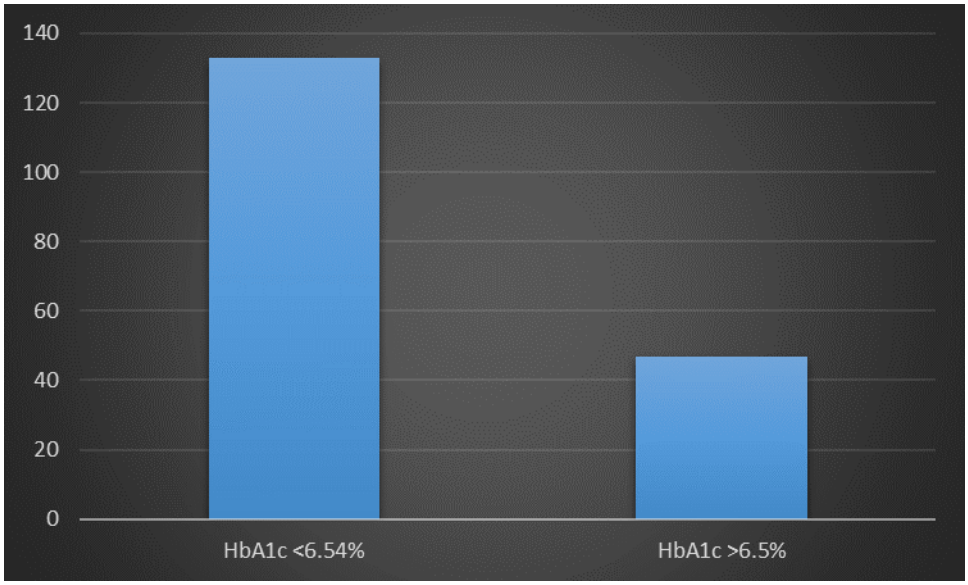
Total 180 diabetic patients were studied out of them 105(58.3%) were male and 75(41.7%) were female. Mean age of patients was 51±11.3 years. Mean HbA_{1c} level was 8.3±1.6. Proliferative retinopathy was observed in 17(36.2%) and non-proliferative retinopathy was seen in 30(63.8%) out of total 47 cases with retinopathy. There were 13(72%) cases with age <20 years, 25(13.9%) cases between 21-30 years, 74(41.1%) between 31-40 years and 68(37.8%) between 41-50 years of age.

(Table-1) Frequency of diabetic retinopathy in various age groups

Age (years)	Number of patients (N)	Diabetic retinopathy	
		Yes	NO
<20	13 (7.2%)	3 (23.1%)	10 (76.9%)
21-30	25 (13.9%)	6 (24%)	19 (76%)
31-40	74 (41.1%)	20 (27%)	54 (73%)
41-50	68 (37.8%)	18 (26.5%)	50 (73.5%)



(Figure-1) Frequency of proliferative and non-proliferative diabetic retinopathy



(Figure-2) Frequency of patients having serum level of HbA_{1c} more or less than 6.5%

DISCUSSION

Diabetes mellitus is a most common metabolic disease which affects almost every system of the body and have many complications with high morbidity and mortality rate.[9-11] Type-2 diabetes is more common than type-1. In type-2 diabetes mellitus insulin resistance develops in the patient leading to high blood level of HbA_{1c}. Hyperglycemia leads to retinopathy, most common complication of diabetes.[12,13] Retinopathy if untreated can lead to permanent blindness. Previous literature reported that prevalence of diabetes mellitus among people older than 20 years were around 171 million all over the world, that is much high number. Diabetes mellitus is a most common metabolic disease affecting every organ system of the body and having high prevalence in our population putting huge burden on healthcare system.[14] It is a hidden chronic disease which becomes obvious via polyurea, polydipsia and peripheral numbness. In type-2 diabetes cells become unresponsive to insulin hence creating resistance against insulin and in the result blood glycemic level is increased.[15] It leads to long term complications like neuropathy, retinopathy and microvascular disease etc. Out of them diabetic retinopathy is a common complication leading to blindness ultimately.[16,17] Total 180 diabetic patients were studied out of them 105(58.3%) were male and 75(41.7%) were female. Mean age of patients was 51±11.3 years. Mean HbA_{1c} level was 8.3±1.6. Proliferative retinopathy was observed in 17(36.2%) and non-proliferative retinopathy was seen in 30(63.8%) out of total 47 cases with retinopathy. It is a cross sectional study of observational type. Study was started in October 2019 and completed after eight months in May 2020. It was conducted in ophthalmology department of Bahawal Victoria Hospital Bahawalpur. Inclusion and exclusion criteria were defined for selection of cases. Patients having co-morbid conditions, already having any other disease of eye or HbA_{1c} level less than 6.5% were excluded from the study. Diabetic patients presenting to out-patient door of ophthalmology department of study hospital were selected via non probability consecutive sampling technique. Sample size was calculated using WHO sample size calculator. Retinal examination was done in all patients. Hasan et al didi similar study on 159 patients and concluded that those having HbA_{1c} >8% were having more complications than those having HbA_{1c} <8%.[18]

CONCLUSION

Retinopathy is a very common complication of diabetes mellitus leading to blindness. Diabetic retinopathy is associated with high blood level of glycosylated hemoglobin and non-proliferative retinopathy is more common than proliferative retinopathy. Early detection of retinopathy and good glycemic control can reduce this complication and blindness can be prevented.

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MORTALITY OF ACUTE INFERIOR WALL MYOCARDIAL INFARCTION WITH AND WITHOUT ATRIOVENTRICULAR BLOCK

Abstract*: *Objective: *To determine mortality rate associated with inferior wall myocardial infarction with or without atrioventricular block.*

Design & duration: *This is a cohort study completed in duration of six months.*

Setting: *Study was conducted in Cardiology ward of Bahawal Victoria Hospital Bahawalpur*

Patients & methods: *Patients presenting to the study hospital with inferior wall myocardial infarction combined with or without atrioventricular block. Inclusion and exclusion criteria were made for selection of patients. Sample size calculated using WHO sample size calculator. Non-probability consecutive sampling technique was used. Level of significance was 5%. P-value less than 0.05 was considered statistically significant. Consent was taken from all cases for including their data in the study. Permission was also taken from ethical review board committee. Chi square test was applied. SPSS software version 20 was used for analyzing data. Results were calculated in the form of percentage, frequency, means and standard deviation.*

Results: *Total 160 cases were studied. They were divided into two groups. Patients with inferior wall MI having atrioventricular block as well were placed in group-A. Other patients with inferior wall MI without AV block were placed in group-B. Mean age was 53±7.8 years. There were 43.3% male and 57.6% female patients. Majority of cases (66.7%) were above 50 years of age. Mortality in group-A was 18.3% and in group-B 11.7%.*

Conclusion:*Inferior wall myocardial infarction complicated with atrio-ventricular block has high mortality rate as compared to MI without AV block.*

Key words*: Myocardial Infarction, Atrioventricular block, Mortality.*

Language*: English*

Citation: Akbar, S., Shafqat, B., & Abbasi, B. (2020). Mortality of acute inferior wall myocardial infarction with and without atrioventricular block. *ISJ Theoretical & Applied Science, 07 (87),* 155-159.

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Scopus ASCC*: 2700.*

Introduction

Decrease in blood flow in coronary arteries causes acute coronary syndrome. Despite advanced management and developed medical field still acute coronary syndrome is leading cause of mortality. Annually one million people die in Pakistan due to ACS. It is because of increasing prevalence of risk factors of ischemic heart disease. Thrombotic

occlusion of coronary arteries results in St-segment elevation in MI, which is main sign seen on ECG in such patients. Complications of MI are ischemia, arrhythmia and thromboembolic changes. Conduction defect in AV block along with MI is associated with high mortality rate. Usually observed conduction defects after MI are Atrioventricular nodal block of 1st, 2nd and 3rd degree. Complete Av block complicates inferior wall MI in 11-15% cases. It occurs in conditions like atrial fibrillation, cardiogenic shock and ventricular infarction.Previously mortality of MI with Av block has not been studied. This study has been conducted to evaluate prognosis of MI with AV block. This will help in early recognition of disease and to treat it immediately, hence mortality rate can be reduced.

PATIENTS AND METHODS

This is a cohort study started in January and completed after six months in June 2020. Study was conducted in Cardiac department of Bahawal Victoria Hospital Bahawalpur. Patients presenting to the study hospital with inferior wall myocardial infarction combined with or without atrioventricular block. Inclusion and exclusion criteria were made for selection of patients. Sample size calculated using WHO sample size calculator. Non-probability consecutive sampling technique was used. Level of significance was 5%. P-value less than 0.05 was considered statistically significant. Consent was taken from all cases for including their data in the study. Permission was also taken from ethical review board committee. Chi square test was applied. SPSS software version 20 was used for analyzing data. Results were calculated in the form of percentage, frequency, means and standard deviation.

Sampling Technique: Non-probability consecutive sampling

Inclusion Criteria

Age 20-70 years

Either sex

Patient presenting in 12 hours of signs symptoms

Inferior wall MI with AV block, and without AV block

Exclusion Criteria

Clinical features of cardiogenic shock

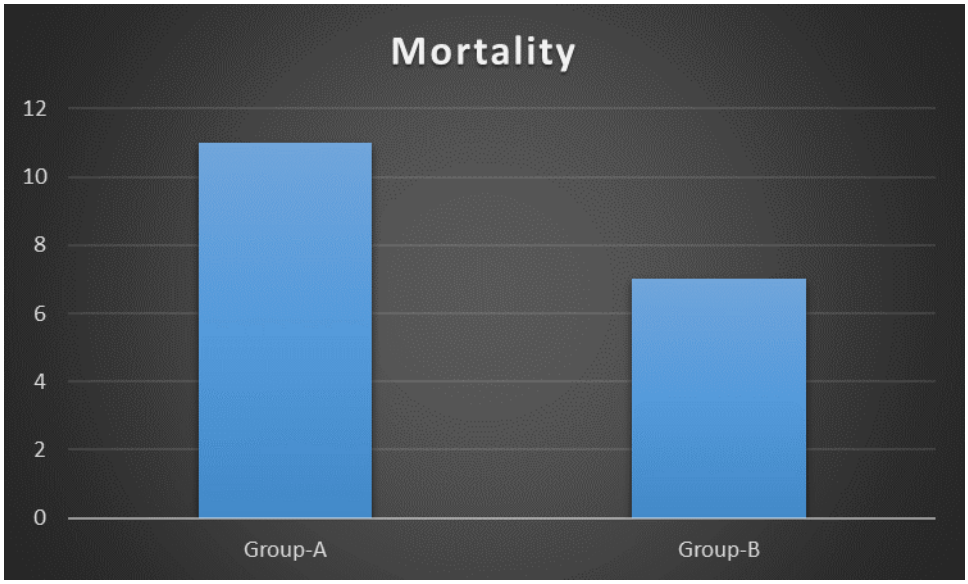
Mechanical features of MI developing in patients like ventricular septal rupture, acute MR, and ventricular wall rupture.

Patients not thrombolysed

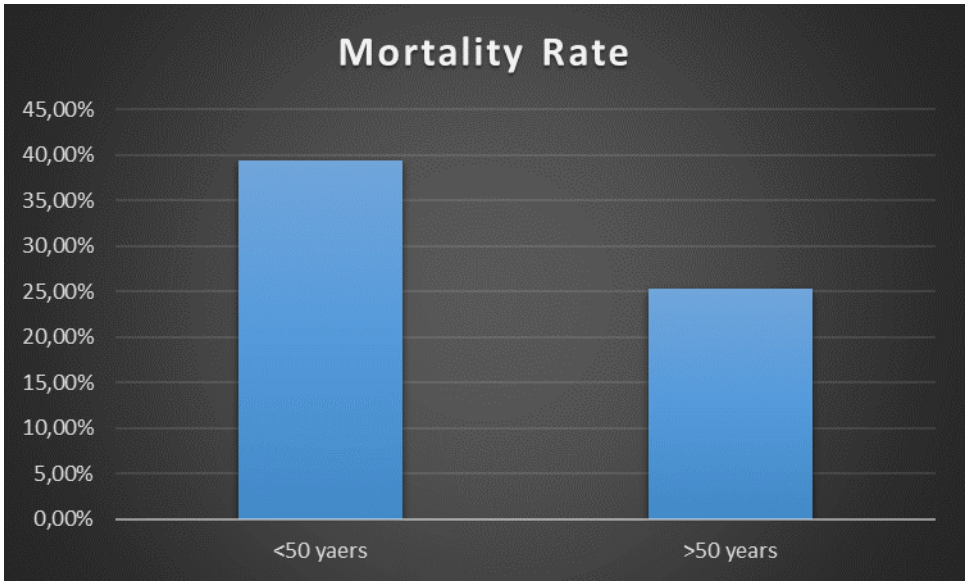
Patients with co-morbidities like renal failure or liver failure etc.

RESULTS

Total 160 cases were studied. They were divided into two groups. Patients with inferior wall MI having atrioventricular block as well were placed in group-A. Other patients with inferior wall MI without AV block were placed in group-B. Mean age was 53±7.8 years. There were 52(43.3%) male and 68(57.6%) female patients. Majority of cases 80(66.7%) were above 50 years of age. Mortality in group-A was 11(18.3%) and in group-B 7(11.7%). There were total 40 cases between 20-50 years of age including 22 in group-A and 18 from group-B. Out of 22 from group-A 5(22.7%) died and out of 18 from group-B 3(16.7%) died. Similarly 6(15.8%) out of 38(63.3%) cases from group-A and 4(9.5%) out 42(70%) cases from group-B died.



(Figure-1) Group wise distribution of mortality rate



(Figure-2) Age wise distribution of mortality rate

(Table-1) Characteristics of patients in study group. (n=120)

Characteristics	Group-A (n=60)	Group-B (n=60)
Age <50 years >50 years	22(36.7%) 38(63.3%)	18(30%) 42(70%)
Gender Male Female	 28 (46.7%) 32 (53.3%)	 24(40%) 36(60%)
Mortality Yes No	 11(18.3%) 49(81.7%)	 7(11.7%) 53(88.3%)

DISCUSSION

Now a day medical field has been much developed. Modern techniques and cardiac interventions have reduced mortality rate to much extent. PCI is now being practiced in developing countries as well, reducing complications related o MI. AV conduction block is a complication of MI. Mortality associated with AV after MI in hospital admitted patients in Pakistan has never been studied before. Purpose of this study is to determine mortality rate associated with MI and AV block. Total 160 cases were studied. They were divided into two groups. Patients with inferior wall MI having atrioventricular block as well were placed in group-A. Other patients with inferior wall MI without AV block were placed in group-B. Mean age was 53±7.8 years. There were 52(43.3%) male and 68(57.6%) female patients. Majority of cases 80(66.7%) were above 50 years of age. Mortality in group-A was 11(18.3%) and in group-B 7(11.7%). There were total 40 cases between 20-50 years of age including 22 in group-A and 18 from group-B. This is a cohort study started in January and completed after six months in June 2020. Study was conducted in Cardiac department of Bahawal Victoria Hospital Bahawalpur. Patients presenting to the study hospital with inferior wall myocardial infarction combined with or without atrioventricular block. Inclusion and exclusion criteria were made for selection of patients. Sample size calculated using WHO sample size calculator. Non-probability consecutive sampling technique was used. Level of significance was 5%. P-value less than 0.05 were considered statistically significant. How AV block increases mortality rate has not been studied still. AV block are associated with large ischemic areas of heart resulting in heart failure and increasing mortality rate.

CONCLUSION

Inferior wall myocardial infarction complicated with atrio-ventricular block has high mortality rate as compared to MI without AV block. Early diagnosis and prompt treatment can prevent AV block and can reduce mortality rate.

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INVESTIGATION OF A BOUNDARY-VALUE PROBLEM FOR A THIRD ORDER PARABOLIC HYPERBOLIC EQUATION IN THE FORM $\left(b\frac{\partial}{\partial y}+\mathrm{c}\right)(Lu)=0$

Abstract: *In the present paper in a pentagonal domain a boundary-value problem was set and investigated for a third order parabolic hyperbolic equation in the form* $\left(b\frac{\partial}{\partial y}+\mathrm{c}\right)(Lu)=0$ *. Unique solvability of the considered problem was proved by the method of construct solution and also by methods of integral equations and differential equations, method of continuity.*

Key words: *Differential equation, method of constructing solutions, method of continuity, boundary-value problem, parabolic hyperbolic type, unique solvability, pentagonal domain.*

Language: *English*

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Introduction

Currently, research is actively developing non-classical equations of mathematical physics, in particular, equations of mixed, composite and mixed-composite types. One of the main reasons for this process is the appearance of applied applications of boundary value problems posed for such equations.

It is known that mixed equations of the second order of an elliptic-hyperbolic type were originally studied. Fundamental research on such equations was started in the 1920s by the Italian mathematician Tricomi [1] and was developed by Gellerstedt [2], A.V. Bitsadze [3], K.I. Babenko [4], I.L. Karol [5] , F.I. Frankl [6], M.M.Smirnov [7], M.S. Salakhitdinov [8], etc.

The main part

Studies of the equations of elliptic-parabolic and parabolic-hyperbolic types of the second order began in the 50-60s of the last century. In 1959, I.M. Gelfand [9] pointed out the need for a joint consideration of equations in one part of the parabolic region and the other part of the hyperbolic region. He gives an example related to the motion of a gas in a channel surrounded by a porous medium: in a channel, the gas motion is described by the wave equation, outside it by the diffusion equation. Then, in the 70-80s of the twentieth century, research began on the equations of the third and high orders of the parabolic-hyperbolic type. Boundary-value problems for such equations were posed and studied for the first time by T.D.Dzhuraev [10] and his students [11], [12], [18].

Over the past time, studies on boundary value problems for equations of the third and higher orders of parabolic-hyperbolic type have developed in a broad sense, and are currently expanding in the directions of complication of equations and their areas of consideration, as well as generalizations of the equations problems considered for them (for example, see [15], [16], [17] and others)

In the present work a boundary-value problem will be set for a third order parabolic-hyberboloc equation

$$\left(b\frac{\partial}{\partial y}+c\right)(Lu)=0 \qquad (1)$$

in a pentagonal domain G of the plane xOy, where $b, c \in R$, $G = G_1 \cup G_2 \cup G_3 \cup J_1 \cup J_2$,

$$G_1 = \{(x,y) \in R^2 : 0 < x < 1,\ 0 < y < 1\},$$

$$G_2 = \{(x,y) \in R^2 : -1 < y < 0,\ -1 - y < x < y + 1\}$$

$$G_3 = \{(x,y) \in R^2 : -1 < x < 0,\ 0 < y < 1\},$$

$$J_1 = \{(x,y) \in R^2 : y = 0,\ 0 < x < 1\},$$

$$J_2 = \{(x,y) \in R^2 : y = 0,\ -1 < x < 1\}$$

$$Lu = \begin{cases} u_{xx} - u_y, & (x,y) \in G_1, \\ u_{xx} - u_{yy}, & (x,y) \in G_i \quad (i = 2,3), \end{cases}$$

We will study the following problem for the equation (1):

Problem 1. Find a function $u(x,y)$, with properties: 1) continuous in the closed domain $\overline{D}$ and in the domain $G \setminus J_1 \setminus J_2$ has continuous derivatives which is participating in equation (1), here u_x and u_y are continuous in G up to the bound of the domain G, which is shown in boundary condition; 2) satisfies equation (1) in the domain $G \setminus J_1 \setminus J_2$; 3) satisfies the following boundary - value conditions:

$$u(1,y) = \varphi_1(y), \quad 0 \le y \le 1; \qquad (2)$$

$$u(-1,y) = \varphi_2(y), \quad 0 \le y \le 1; \qquad (3)$$

$$u|_{BC} = \psi_1(x), \quad 0 \le x \le 1; \qquad (4)$$

$$u|_{DF} = \psi_2(x), \quad -1 \le x \le -1/2; \qquad (5)$$

$$\left.\frac{\partial u}{\partial n}\right|_{BC} = \psi_3(x), \quad 0 \le x \le 1; \qquad (6)$$

$$\left.\frac{\partial u}{\partial n}\right|_{DC} = \psi_4(x), \quad -1 \le x \le 0; \qquad (7)$$

4) satisfies the following glying conditions on the line of type changing:

$$u(x,+0) = u(x,-0) = T(x), \quad -1 \le x \le 1; \qquad (8)$$

$$u_y(x,+0) = u_y(x,-0) = N(x), \quad -1 \le x \le 1; \qquad (9)$$

$$u_{yy}(x,+0) = u_{yy}(x,-0) = M(x), \quad -1 < x < 1; \qquad (10)$$

$$u(+0,y) = u(-0,y) = \tau_3(y), \quad 0 \le y \le 1; \qquad (11)$$

$$u_x(+0,y) = u_x(-0,y) = \nu_3(y), \quad 0 \le y \le 1. \qquad (12)$$

where φ_i and $\psi_j \left(i = \overline{1,2}; j = \overline{1,4}\right)$ are given sufficiently smooth functions, $\tau_i, \nu_i (i = 1,2,3), \mu_1, \mu_2$ are temporarily unknown but smoothly functions, $n -$ is internal normal of $x + y = -1 \quad (DC)$ or $x - y = 1 \quad (BC)$, $F(-1/2, -1/2)$. Together with the introduced notations (8) - (12) the following notation are used as well:

$$T(x) = \begin{cases} \tau_1(x), \ if \ 0 \le x \le 1, \\ \tau_2(x), \ if \ -1 \le x \le 0; \end{cases}$$

$$N(x) = \begin{cases} \nu_1(x), \ if \ 0 \le x \le 1, \\ \nu_2(x), \ if \ -1 \le x \le 0; \end{cases}$$

$$M(x) = \begin{cases} \mu_1(x), if \ 0 < x < 1, \\ \mu_2(x), if \ -1 < x < 0, \end{cases}$$

$u(x,y) = u_j(x,y), (x,y) \in G_j \ (j = \overline{1,3})$, where it is assumed that $\tau_1(0) = \tau_2(0)$, $\nu_1(0) = \nu_2(0)$.

Theorem. If $\varphi_1, \varphi_2 \in C^3[0,1]$, $\psi_1 \in C^3[0,1]$, $\psi_2 \in C^3[-1,-1/2]$, $\psi_3 \in C^2[0,1]$, $\psi_4 \in C^2[-1,0]$, and the agreeing conditions $\varphi_1(0) = \psi_1(1)$, $\psi_2(-1) = \varphi_2(0)$, $\psi_4'(0) = \psi_3'(0)$ are fulfilled then the problem 1 will have unique solution. For this aim based on introduced.

Proof. We will prove the theorem by the method of construct solution. notations, we will rewrite equation (1) as

$$u_{1xx} - u_{1y} = \omega_1(x) e^{-\frac{c}{b}y}, \ (x,y) \in G_1; \qquad (13)$$

$$u_{ixx} - u_{iyy} = \omega_i(x) e^{-\frac{c}{b}y}, \ (x,y) \in G_i \quad (i = 2,3), \qquad (14)$$

where $\omega_i(x) \ \left(i = \overline{1,3}\right)$ are unknown and should be defined functions but we will assume that they are sufficient smooth functions.

Firstly we will carry on investigation in the domain G_2. A solution of the equation (14) $(\text{for } i = 2)$, satisfying conditions (8), (9), is represented in the form

$$u_2(x,y) = \frac{1}{2}\left[T(x+y) + T(x-y)\right] + \frac{1}{2}\int_{x-y}^{x+y} N(t)\,dt - \frac{1}{2}\int_0^y e^{-\frac{c}{b}\eta} d\eta \int_{x-y+\eta}^{x+y-\eta} \omega_2(\xi)\,d\xi \qquad (15)$$

Substituting (15) into conditions (6) and (7), after some computations we get

$$\omega_2(x) = -\sqrt{2}\psi_3'(x) e^{\frac{c}{b}(x-1)}, \ 0 \le x \le 1, \qquad (16)$$

$$\omega_2(x)=\sqrt{2}\psi_4'(x)e^{-\frac{c}{b}(x+1)},\ -1\le x\le 0. \qquad (17)$$

Substituting (15) into condition making some transformations (4), we get

$$T'(x)+N(x)=\alpha_1(x),\ -1\le x\le 1, \qquad (18)$$

where $\alpha_1(x)=\psi_1'\left(\frac{x+1}{2}\right)-\int_0^{(x-1)/2}e^{-\frac{c}{b}\eta}\omega_2(x-\eta)\,d\eta$.

In case $-1\le x\le 0$ equation (18) has the form

$$\tau_2'(x)+\nu_2(x)=\alpha_1(x),\ -1\le x\le 0. \qquad (19)$$

Further, substituting (15) in the condition (5), after some computations, we come

$$\tau_2'(x)-\nu_2(x)=\delta_1(x),\ -1\le x\le 0, \qquad (20)$$

where

$$\delta_2(x)=\psi_2'\left(\frac{x-1}{2}\right)-\int_0^{-(x+1)/2}e^{-\frac{c}{b}\eta}\omega_2(x+\eta)\,d\eta.$$

Form (19) and (20) we will find functions $\tau_2'(x)$ and $\nu_2(x)$ as follows

$$\tau_2'(x)=\frac{1}{2}\left[\alpha_1(x)+\delta_1(x)\right],$$

$$\nu_2(x)=\frac{1}{2}\left[\alpha_1(x)-\delta_1(x)\right]. \qquad (21)$$

Integrating the first equality of (21) from -1 to x, we obtain

$$\tau_2(x)=\frac{1}{2}\int_{-1}^{x}\left[\delta_1(t)+\delta_2(t)\right]dt+\psi_2(-1).$$

In case $0\le x\le 1$ equation (18) has the form

$$\tau_1'(x)+\nu_1(x)=\alpha_1(x),\ 0\le x\le 1. \qquad (22)$$

Now, in the domain G_1 we rewrite equation (1) in the form

$$bu_{1xy}-bu_{1yy}+cu_{1xx}-cu_{1y}=0.$$

Passing to the limit in the last and equation (22) $(i=2)$ for $y\to 0$, we get

$$b\nu_1''(x)-b\mu_1(x)+c\tau_1''(x)-c\nu_1(x)=0,\ 0\le x\le 1, \qquad (23)$$

$$\mu_1(x)=\tau_1''(x)-\omega_2(x). \qquad (24)$$

Eliminating functions $\nu_1(x)$ and $\mu_1(x)$ from (22), (23) and (24), then integrating from 0 to Z receive resulting equation after that changing z by x, we arrive equation

$$\tau_1''(x)+\left(1-\frac{c}{b}\right)\tau_1'(x)-\frac{c}{b}\tau_1(x)=\alpha_2(x)+k_1,\ 0\le x\le 1 \qquad (25)$$

where $\alpha_2(x)=\alpha_1'(x)+\frac{1}{b}\int_0^x\left[b\omega_2(t)-c\alpha_1(t)\right]dt$ and k_1 is unknown constant.

For solving equation (25) we will consider the following cases: 1°. $c\ne 0$, $c\ne -b$; 2°. $c=-b$; 3°. $c=0$.

Let's consider case 1°. (25) under conditions

$$\tau_1(0)=\frac{1}{2}\int_{-1}^{0}\left[\delta_1(t)+\delta_2(t)\right]dt+\psi_2(-1)$$

$$\tau_1'(0)=\frac{1}{2}\left[\alpha_1(0)+\delta_1(0)\right],\ \tau_1(1)=\varphi_1(0), \qquad (26)$$

We get

$$\tau_1(x)=\frac{b}{b+c}\int_0^x\left[e^{\frac{c}{b}(x-t)}-e^{t-x}\right]\alpha_2(t)\,dt+\frac{bk_1}{b+c}\left[\frac{b}{c}\left(e^{\frac{c}{b}x}-1\right)-\left(1-e^{-x}\right)\right]+k_2e^{\frac{c}{b}x}+k_3e^{-x}$$

where

$$k_2=\frac{b}{2(b+c)}\left\{\int_{-1}^{0}\left[\alpha_1(t)+\delta_1(t)\right]dt+2\psi_2(-1)+\alpha_1(0)+\delta_1(0)\right\}$$

$$k_3=\frac{b}{2(b+c)}\left\{\frac{c}{b}\int_{-1}^{0}\left[\alpha_1(t)+\delta_1(t)\right]dt+\frac{2c}{b}\psi_2(-1)-\alpha_1(0)-\delta_1(0)\right\}$$

$$k_1=\left[\frac{b}{c}\left(e^{\frac{c}{b}}-1\right)-\left(1-e^{-1}\right)\right]^{-1}\cdot\left\{\frac{b+c}{b}\left[\varphi_1(0)-k_2e^{\frac{c}{b}}-k_3e^{-1}\right]-\int_0^1\left[e^{\frac{c}{b}(1-t)}-e^{t-1}\right]\alpha_2(t)\,dt\right\}$$

Now, we consider 2° case. In this case equation (25) has the form

$$\tau_1''(x)+2\tau_1'(x)+\tau_1(x)=\alpha_2(x)+k_1,\ 0\le x\le 1.$$

By solving this equation under conditions (26), we obtain

$$\tau_1(x)=\int_0^x(x-t)e^{t-x}\alpha_2(t)\,dt+k_1\left(1-e^{-x}-xe^{-x}\right)+\left(k_2+k_3x\right)e^{-x}$$

where

$$k_2=\frac{1}{2}\int_{-1}^{0}\left[\alpha_1(t)+\delta_1(t)\right]dt+\psi_2(-1),$$

$$k_3=\frac{1}{2}\left[\alpha_1(0)+\delta_1(0)\right]+k_2,$$

$$k_1=\frac{1}{e-2}\left[\varphi_1(0)e-k_2-k_3-\int_0^1(1-t)e^t\alpha_2(t)\,dt\right].$$

Finally, we consider the last 3°case. In this case equation (25) after integrating from 0 to x, has the form

$$\tau_1'(x)+\tau_1(x)=\alpha_3(x)+k_1x+k_2,\ 0\le x\le 1,$$

where $\alpha_3(x)=\int_0^x\alpha_2(t)dt$ and k_2 is temporarily unknown constant.

Solution of the last equation satisfying conditions (26) is represented as

$$\tau_1(x)=\int_0^x e^{t-x}\alpha_3(t)dt+k_1\left(x-1+e^{-x}\right)+k_2\left(1-e^{-x}\right)+k_3e^{-x},$$

where

$$k_3=\frac{1}{2}\int_{-1}^{0}\left[\alpha_1(t)+\delta_1(t)\right]dt+\psi_2(-1),$$

$$k_2=\frac{1}{2}\left[\alpha_1(0)+\delta_1(0)\right]+k_3,$$

$$k_1=\varphi_1(0)e-k_2(e-1)-k_3-\int_0^1 e^t\alpha_3(t)dt\cdot$$

Now, we consider the domain D_3. Passing to the limit for the equations we find(15) $(i=3)$ in (15) $(i=2)$ $y\to 0$, we get

$$\omega_3(x)=\omega_2(x),\ -1\le x\le 0\cdot$$

Now, we will consider the following auxiliary problem:

$$\begin{cases}u_{3xx}-u_{3yy}=\omega_3(x)e^{-\frac{c}{b}y},\\ u_3(x,0)=\tau_2(x),\ u_{3y}(x,0)=\nu_2(x),\quad -1\le x\le 0,\\ u_3(-1,y)=\varphi_2(y),\ u_3(0,y)=\tau_3(y),\ 0\le y\le 1.\end{cases}\tag{27}$$

We will look for solution of the problem in the form

$$u_3(x,y)=u_{31}(x,y)+u_{32}(x,y)+u_{33}(x,y),\tag{28}$$

where $u_{31}(x,y)$ is a solution of the problem

$$\begin{cases}u_{3xx}-u_{3yy}=0,\\ u_3(x,0)=\tau_2(x),\ u_{3y}(x,0)=0,\quad -1\le x\le 0,\\ u_3(-1,y)=\varphi_2(y),\ u_3(0,y)=\tau_3(y),\ 0\le y\le 1;\end{cases}\tag{29}$$

$u_{32}(x,y)$ is a solution of the problem

$$\begin{cases}u_{3xx}-u_{3yy}=0,\\ u_3(x,0)=0,\ u_{3y}(x,0)=\nu_2(x),\quad -1\le x\le 0,\\ u_3(-1,y)=0,\ u_3(0,y)=0,\ 0\le y\le 1;\end{cases}\tag{30}$$

$u_{33}(x,y)$ is a solution of the problem

$$\begin{cases}u_{3xx}-u_{3yy}=\omega_3(x)e^{-\frac{c}{b}y},\\ u_3(x,0)=0,\ u_{3y}(x,0)=0,\quad -1\le x\le 0,\\ u_3(-1,y)=0,\ u_3(0,y)=0,\ 0\le y\le 1.\end{cases}\tag{31}$$

We will find solution of the problems (29)- (31) by the method of continuity. They are respectively has the forms:

$$u_{31}(x,y)=\frac{1}{2}\left[T_2(x+y)+T_2(x-y)\right],\tag{32}$$

$$u_{32}(x,y)=\frac{1}{2}\int_{x-y}^{x+y}N_2(t)dt$$

$$u_{33}(x,y)=-\frac{1}{2}\int_0^y e^{-\frac{c}{b}\eta}d\eta\int_{x-y+\eta}^{x+y-\eta}\Omega_3(\xi)d\xi,$$

Where

$$T_2(x)=\begin{cases}2\varphi_2(-1-x)-\tau_2(-2-x),\ -2\le x\le -1,\\ \tau_2(x),\ -1\le x\le 0,\\ 2\tau_3(x)-\tau_2(-x),\ 0\le x\le 1;\end{cases}\tag{33}$$

$$N_2(x)=\begin{cases}-\nu_2(-2-x),\ -2\le x\le -1,\\ \nu_2(x),\ -1\le x\le 0,\\ -\nu_2(-x),\ 0\le x\le 1;\end{cases}\tag{34}$$

The first two conditions of problem (31) are fulfilled automatically. By satisfying the third condition, we get relation

$$\int_0^y e^{-\frac{c}{b}\eta}\Omega_3(y-1-\eta)d\eta=-\int_0^y e^{-\frac{c}{b}\eta}\Omega_3(\eta-1-y)d\eta\cdot$$

After some simplification and computations, we get

$$\Omega_3(-1-y)=-\omega_3(y-1)\cdot$$

Setting in (34) $x\to 0$, after some transformation, we get

$$\Omega_3(y)=-\omega_3(-y)\cdot$$

Hence, we found that

$$\Omega_3(x)=\begin{cases}-\omega_3(-2-x),\ -2\le x\le -1,\\ \omega_3(x),\ -1\le x\le 0,\\ -\omega_3(-x),\ 0\le x\le 1.\end{cases}$$

Substituting (32), (33) and (34) into (28), we come

$$u_3(x,y)=\frac{1}{2}\left[T_2(x+y)+T_2(x-y)\right]+\frac{1}{2}\int_{x-y}^{x+y}N_2(t)dt-\frac{1}{2}\int_0^y e^{-\frac{c}{b}\eta}d\eta\int_{x-y+\eta}^{x+y-\eta}\Omega_3(\xi)d\xi\cdot\tag{35}$$

Differentiating (35) with respect to x and passing to the limit $x\to 0$, in the taken equation, we

find the relation between unknown functions $\tau_3(y)$ and $\nu_3(y)$:

$$\nu_3(y) = \tau_3'(y) + \beta_1(y), \qquad (36)$$

where

$$\beta_1(y) = \tau_2'(-y) - \nu_2(-y) + \int_0^y e^{-\frac{c}{b}\eta}\omega_3(\eta)\,d\eta \cdot$$

Now, we will investigate to the problem in the domain D_1. Passing to the limit $y \to 0$ in equation (14), we get

$$\omega_1(x) = \tau_1''(x) - \nu_1(x).$$

Further, we write solution of equation satisfying (14), satisfying conditions (2), (8), (11):

$$u_1(x,y) = \int_0^y \tau_3(\eta)G_\xi(x,y;0,\eta)\,d\eta - \int_0^y \varphi_1(\eta)G_\xi(x,y;1,\eta)\,d\eta +$$

$$+\int_0^1 \tau_1(\xi)G(x,y;\xi,0)\,d\xi - \int_0^y e^{-\frac{c}{b}\eta}d\eta\int_0^1 \omega_1(\xi)G(x,y;\xi,\eta)\,d\xi \cdot$$

Differentiating this solution with respect to x and tending x to zero, we get a relation between unknown functions $\tau_3(y)$ and $\nu_3(y)$. Eliminating function $\nu_3(y)$ from taken relation and (36), we arrive the second kind Volterra integral equation with respect to $\tau_3'(y)$:

$$\tau_3'(y) + \int_0^y K(y,\eta)\tau_3'(\eta)\,d\eta = g(y), \qquad (37)$$

where $K(y,\eta) = N(0,y;0,\eta)$,

$$g(y) = -\beta_1(y) + \int_0^y \varphi_1'(\eta)N(0,y;1,\eta)\,d\eta + \int_0^1 \tau_1'(\xi)N(0,y;\xi,0)\,d\xi +$$

$$+\int_0^y e^{-\frac{c}{b}\eta}d\eta\int_0^1 \omega_1(\xi)N_\xi(0,y;\xi,\eta)\,d\xi,$$

$$\left.\begin{matrix} G(x,y;\xi,\eta) \\ N(x,y;\xi,\eta) \end{matrix}\right\} = \frac{1}{2\sqrt{\pi(y-\eta)}}\sum_{n=-\infty}^{+\infty}\left\{\exp\left[-\frac{(x-\xi-2n)^2}{4(y-\eta)}\right] \mp \exp\left[-\frac{(x+\xi-2n)^2}{4(y-\eta)}\right]\right\}$$

is

Green's function of the first and second boundary-value problems for equation Furier.

By solving equation (37), we find function $\tau_3'(y)$ and using this functions we will find functions

$$\nu_3(y),\ T_2(x),\ u_1(x,y),\ u_3(x,y).$$

Conclusion

In conclusion we note that in the work [1, 2] some boundary-value problems were considered for the third and fourth order more general equations of parabolic- hyperbolic type I the domains with a line of type changing.

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PROGRAM-METHODOLOGICAL COMPLEX AS A MEANS OF IMPROVING THE QUALITY OF LEARNING IN HIGHER EDUCATIONAL INSTITUTIONS

Abstract: *The article considers issues related to the use of information technology in teaching the subject "Theory of Algorithms", highlights some of the features of teaching this academic discipline. The factors that contribute to the effective assimilation of educational material in this subject are formulated. The main aspects and goals of the methodology of using the program-methodological complex developed in support of the subject "Theory of Algorithms" are given. The results of a pedagogical experiment are described as part of a study on the methodology of teaching the subject "Theory of Algorithms" using a software-methodological complex.*

Key words: *educational process, "Theory of Algorithms", program- methodological complex, teaching methodology for the subject "Theory of Algorithms" pedagogical experiment.*

Language: *English*

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Introduction

At present, the most important component of the modernization of education is the change in the requirements for a university graduate. The modern system of higher education should shape the future specialist and prepare him for future professional activities. A complex set of qualities that a modern specialist should possess can be developed by a system in which everything positive that is in traditional training will be used, and new, rational approaches will be introduced to compensate for the shortcomings of the existing system in their mutual complement. The basis of training is the implementation of educational programs in various fields. One of them is an educational program for the preparation of a bachelor of applied mathematics and computer science. The areas of professional activity of the bachelor of applied mathematics and computer science are research centers, government bodies, educational institutions and organizations of various forms of ownership, using methods of applied mathematics and computer technology in their work. Bachelors of applied mathematics and computer science are mainly preparing to carry out research in areas using applied mathematics and computer technology, to develop and apply modern mathematical methods and software to solve problems of science, technology, economics and management, to use information technologies in design, managerial and financial activities. And also they are prepared for pedagogical activity as a teacher in high school or college. One of the components of the block of general professional disciplines of the educational program in this area is the subject "Theory of Algorithms". The course "Theory of Algorithms" refers to fundamental disciplines, is the most important in the system of training students (bachelors) in areas related to the field of computer science. The theoretical provisions of the course "Theory of Algorithms" are the basis for the successful development of related disciplines. This implies the importance of the course, which it occupies as the theoretical basis of the modern theory

of programming, the construction of algorithmic languages and computers, the analysis of algorithms in order to choose the most rational computer solution and, finally, the analysis of algorithmic languages and their syntactic control in the development of translators. The high abstractness of the content, its fundamental and theoretical nature makes the course difficult for students to master. This is due to the need for the student to have a certain level of abstract thinking for the conscious assimilation of the teaching material of the course "Theory of Algorithms" and the acquisition of specified subject competencies. In this regard, the urgent problem of designing a teaching methodology for the course "Theory of Algorithms" by means of a program-methodological complex that provides a high level of subject competence in accordance with the requirements of the state standard. The teaching methodology is based on the use of visualized teaching materials as part of the program-methodological complex in the educational process using the means of information and communication technologies (ICT), which ensure a conscious perception of the course content. The results of such training are expressed in the achieved level of subject competence in the theory of algorithms.

Overview of the problem.

Theory and practice of teaching the course "Theory of Algorithms", as well as the subsequent development of a methodology for teaching theory of algorithms, were dealt with by V.I Igoshin [1], A.V. Golanova [2], I. D. Koldunova [3] and others. Their work is devoted to the construction of methodological training systems for the course "Theory of Algorithms", which are based on the logical-semiotic approach (A.V. Golanova), system-activity approach (E.N. Bobonova). Works by V.I. Igoshin is dedicated to building a model of fundamental mathematical training for future teachers of mathematics and computer science at a pedagogical university in the field of disciplines of discrete mathematics, which includes logical and logical-didactic components. Training in accordance with such a model will allow, in his opinion, future teachers to effectively master both methods of logical reasoning and evidence, and applied tools of discrete mathematical sciences. In the work of I. D. Koldunova, the methodology of teaching students the course "Theory of Algorithms" on the basis of analytical and synthetic activity is considered. A significant contribution to the teaching methodology of the discipline "Theory of Algorithms" was made by V.L. Sailors. In 1989, the course of theory of algorithms was singled out as an independent separate discipline, a discipline program was developed and the first textbook was written [4].

After analyzing the existing teaching methods of the “Theory of Algorithms” course, it can be concluded that understanding the content of the fundamental disciplines of subject preparation contributes to the formation of a future science teacher in computer science, an appropriate informational, mathematical culture, as well as providing the base necessary for future professional activities. Given the specifics of the concepts that operate with the fundamental disciplines of subject preparation, including the “Theory of Algorithms”, namely, their formalization and a high degree of abstraction, the learning process should be built using methods and means that ensure its maximum visibility, strict consistency of presentation, which can support theoretical students thinking [5]. The main objective of the course is to introduce students to the means that allow the transition from an informal statement of the problem to its description in the form of a formal system. The traditional teaching materials of the course "Theory of Algorithms" (textbooks, teaching aids and task books) reflect the system of didactic units of the discipline, but they do not have a high degree of visibility necessary for a generation whose living information space is shifted from text to figurative, visual. These limitations of teaching aids prevent students from deep understanding of the content of the course “Theory of Algorithms” and mastery of fundamental subject skills. Despite this, the studies do not pay enough attention to the features of developing a holistic methodological training system based on the use of ICT tools, do not take into account the features of the specialties in which the discipline is studied, and does not examine the impact of the use of ICT tools on the quality of education [6].

In view of the foregoing, we get a contradiction: on the one hand, the theory of algorithms is one of the most important sections of the university course of disciplines related to areas related to information technology, in particular applied mathematics and computer science, and, on the other hand, there is insufficient methodological elaboration of content, organizational forms and teaching methods for this section of computer science and mathematics, there is a lack of teaching and methodological aids in the Uzbek language. This determines the relevance of the study, consisting in eliminating this contradiction.

Material and research methods

The issues of organizing the educational process using program-methodological complexes (PMC) in disciplines related to the theory of algorithms and algorithmization are still open, an integrated methodological system for teaching theory of algorithms based on the use of specialized software products has not been defined. One of the ways to eliminate this contradiction is the use of ICT used in the organization of the educational process at a university in disciplines related to the theory of algorithms. One of the priority areas for the use of ICT in the educational process is the creation of electronic educational tools (EET) [7], the use of which allows

to increase the effectiveness of training by reducing the time of mastering the material and, therefore, expanding the range of questions studied, revealing the intellectual potential of students, developing them cognitive interest, which will provide an incentive for subsequent active independent work.

Among EET, a special place is occupied by program-methodical complexes (PMC). The development and use of the PMC in the educational process allows us to successfully solve new problems of education, the emphasis is shifting from the receipt by students of a certain amount of knowledge to the development of their skills and skills for the independent acquisition of this knowledge, which corresponds to the concept of a competency-based approach. Obviously, with the advent and improvement of the curriculum, lecture plans and practical classes, as well as the role of the teacher in the educational process, should fundamentally change i.e. a reorganization of the methodological training system is necessary, taking into account the features of educational activities based on the use of the PMC.

Results

The pedagogical experiment on the object of research was carried out in three stages: search-stating (2014-2016), formative (2016-2018) and control and evaluation (2018-2020). At each stage, their goals are set and specific research tasks were solved. The control and evaluation stage of the pedagogical experiment was carried out on the basis of three higher educational institutions for two years (2018–2020). By tradition, the groups were divided into two approximately equal subgroups: experimental (EG) and control (CG). Groups were formed in such a way that they were comparable in terms of basic indicators of equality of initial conditions, significant from the point of view of the study. Education in the experimental groups was carried out using the developed PMC, in the control groups using traditional methods, without resorting to the developed programmatic and methodological materials.

The effectiveness of the developed teaching methodology based on the PMC was tested according to the following criteria: the degree of students' knowledge of the basic algorithms, methods for constructing algorithms, methods for calculating the complexity of algorithms, and basic knowledge of the theory of algorithms; skills to develop algorithms for specific tasks; determine the complexity of the algorithms; apply the acquired knowledge in solving assigned tasks. The experiment included intermediate tests and final testing. The table below shows the results of the final testing of the experiment. The main results were obtained in the process of teaching the subject “Algorithms” and “Theory of Algorithms”. The experiment was attended by students of 1-2 courses of educational areas "Methods of teaching computer science" (group no. 1, no. 2, no. 3) and "Applied mathematics and computer science" (group no. 4, no. 5). The percentage of students' grades before the experiment (BE) and after the experiment (AE) are shown in Table 1.

Table 1. Percentage of results of final tests conducted as part of a pedagogical experiment

Subgroups	Amount of students in groups	Testing steps	Low degree (%)	Medium (%)	High degree (%)	Percentage increase in high and medium ratings
CG no.1	27	BE	70	30	-	-
		AE	74	26	-	
EG no.1	26	BE	69	31	-	19%
		AE	30	46	4	
CG no. 2	22	BE	55	45	-	-
		AE	59	41	-	
EG no. 2	20	BE	60	35	5	20%
		AE	40	35	25	
CG no. 3	27	BE	59	41	-	-
		AE	59	30	11	
EG no. 3	26	BE	62	38	-	24%
		AE	38	27	35	
CG no. 4	24	BE	50	50	-	4%
		AE	46	54	-	
EG no. 4	20	BE	55	40	5	20%
		AE	35	50	15	
CG no. 5	24	BE	50	29	21	-

		AE	50	34	16	
EG no. 5	24	BE	46	38	16	17%
		AE	29	25	46	

The table shows that in the control groups, the quantitative increase in students who received average and high marks was 0-4%, which is insignificant. If we compare this increase in the experimental groups, then it is 17% -24%. Data on the increase in the percentage of average and high marks of students of experimental groups indicates an increase in the quality of the study of the subject "Algorithms" and "Theory of Algorithms". Below is a diagram reflecting the overall results of the experiment (Fig. 1).

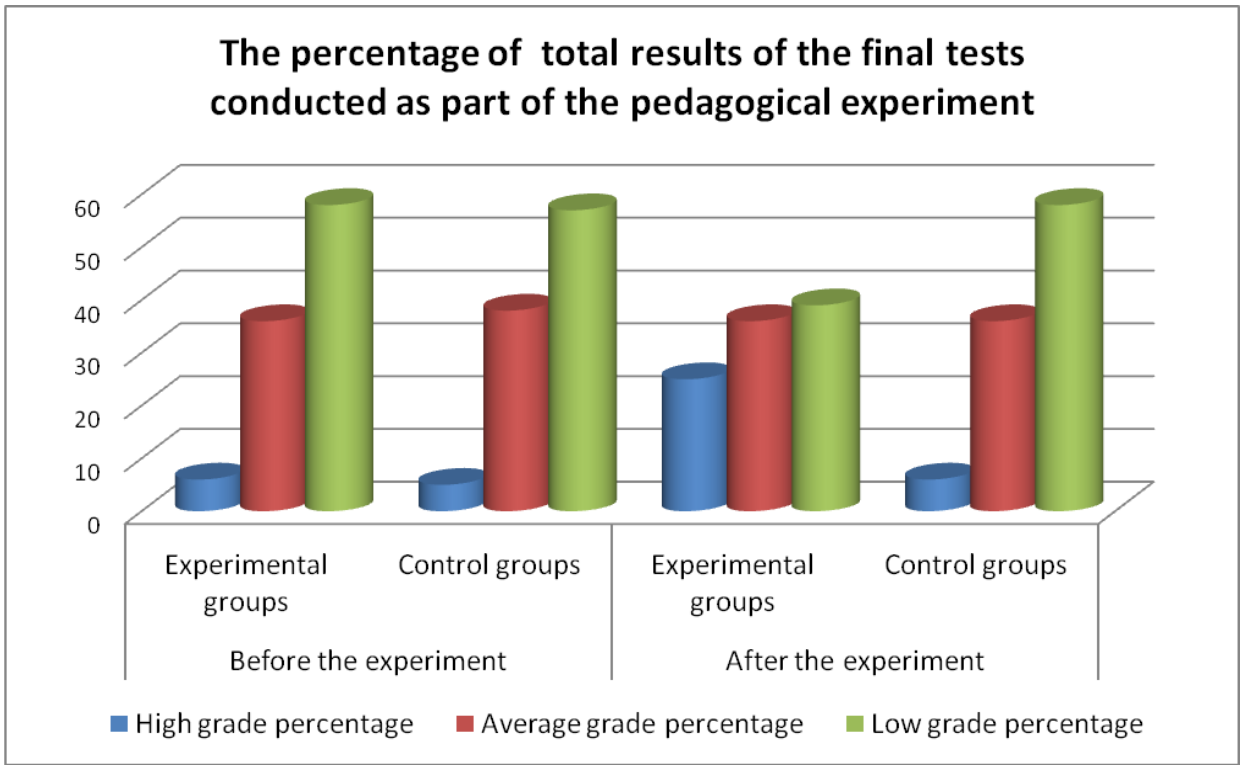

Fig. 1. The percentage of total results of the final tests conducted as part of the pedagogical experiment

To analyze the results of a pedagogical experiment, methods of mathematical statistics were used [8]. Sample mean values ($\overline{x}$,$\overline{y}$), the validity interval (confidence interval), and the efficiency coefficient of the overall results for the control and experimental groups were calculated. The resulting statistics are shown in table 2.

Table 2. General results of final tests conducted as part of a pedagogical experiment

	Experimental groups n=116			Control groups m=124		
Ratings	5	4	3	5	4	3
The number of relevant ratings	29	42	45	7	45	72
Sample averages	$\overline{x}$=3,86			$\overline{y}$=3,47		
Efficiency coefficient	$\overline{x}/\overline{y}$=1,11					
Validity interval	3,7164 ≤ 3,86 ≤ 4,0031			3,3640 ≤ 3,47 ≤3,5759		

Conclusion.

In the course of a theoretical and experimental study of the scientific problem posed in accordance with the purpose and objectives of the study, the following conclusions and results were obtained:

1. As a result of the analysis and research of existing approaches and methods of using PMC in education, the main goals of using PMC in the process of teaching the discipline "Theory of Algorithms" and related disciplines are determined. This made it possible to determine the main directions and requirements for the use of the PMC in the educational process of the university, which opens up new possibilities for improving the process of teaching the subject and maximizes interest in the study of the subject.
2. The structure of the educational material and the methodology for conducting classes on the subject "Theory of Algorithms" using the PMC [9] are developed.
3. Methodological methods for the use of PMC are developed. The sequence of tasks presented corresponds to the logic of the formation of the final knowledge, which, according to the methodological approach, is composed of a chain of certain skills. For each of the sections, the requirements for initial training, preceding the study of this section, as well as the requirements for knowledge and skills at the end of the study, distribution were identified.
4. Based on the developed methodology, a program-methodological complex is implemented.
5. The effectiveness of the developed methodology for the use of PMC was proved during the experimental work carried out over several years.
6. The research hypothesis was confirmed that if students are taught the basics of the theory of algorithms according to the proposed methodology using the PMC, this will improve the efficiency of the educational process and the quality of learning material: students spend significantly less time on research; due to graphical capabilities, problem solving becomes more visual; regular use of a computer allows students to treat software tools as convenient working tools; the use of PMC makes it possible to concentrate on the substantive part of the material being studied, to study the qualitative features of its behavior, without being distracted by the technical implementation.
7. The use of the PMC gives integrity to the educational process, allows the teacher to raise the organization of the pedagogical process, preparation and conduct of classes to a higher level. PMC is an important means of a more perfect organization of pedagogical work. By mobilizing the existing knowledge and experience to solve certain pedagogical problems, carrying out the analysis and introspection of pedagogical activity in the course of work on the curriculum, the teacher fundamentally increases his professional competence. Thus, the creative process of working on PMC, a product that meets the time in which the functional role of each of its components can change under the influence of many factors, can be considered as a means of improving the quality of education.

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THE SYNTHESIS OF NEW 3,5-DIALKYL (PHENYL) DERIVATIVES OF PYRROLE-2-CARBOXYLATES

Abstract: *Enamines are synthesized by the condensation of 1,3-dicarbonyl compounds with glycine ethyl ether hidrochloride. New 3,5-dialkyl and diaryl derivatives of pyrroles are synthesized from the cyclic reaction of obtaining enamines under the super base medium.*

Key words: *Pyrrole, Knorr method, pyrrole-2-carboxylate.*

Language: *English*

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Introduction

Pyrrole itself is not naturally occurring in nature. However, its derivatives are a major fragment of many natural macrocycles. Pyrrole is a component of a number of drugs, catalysts and biologically active compounds. These include vitamin B_{12}, bile pigments bilirubin and biliverdin, blood pigment heme, photosynthetic pigment chlorophyll, chlorine, bacteriochlorins and porphyrine rings of porphyrogens [1-2]. Pyrrole-containing molecules often exhibit antibacterial, antifungal, anti-inflammatory, or antitumor effects. These bioactivity properties made them significant fragments for drug industry. Atorvastatin is an antihyperlipidemic drug, alorectam is an anti-Alzaimer drug, elopiprazole is an antipsychotic drug, lorpiprazole is a tranquilizer, and tolmetin is an anti-inflammatory drug containing pyrrole ring compounds [3].

Pyrrol-2-carboxylates and carboxyamides are used as intermediates in the synthesis of lamellarins [4,5], which are natural compounds, or bromopyrrol alkaloids, such as hanisin and longamide B [6].They are also key fragments for polycyclic heterocycles such as indolons and pyrrolindolones [7].

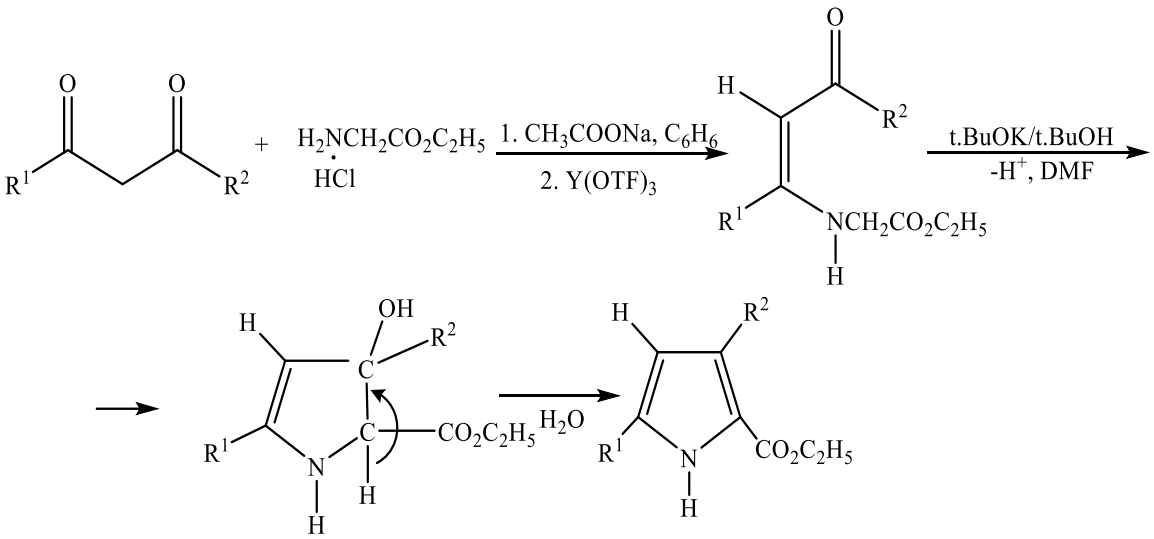
A number of methods have been developed for the synthesis of pyrrole-2-carboxylates, including the Knorr and Fischer methods [8-11]. For example metal catalyst cyclization of izosianides and alkynes [12,13], and the cycloizomerization of some functional intermediates like dienyl azids [14], homopropargyl azids [15], alkynyl aziridines [16], homoproporgyl amines [17]. The reaction of ethyl

isocyanates with nitroolefins through the Barton-Zard reaction is also used for the synthesis of compounds [18].

The synthesis of pyrroles by Paal-Knorr method from the interaction of amines with 1,4-diketones has been extensively studied [19,20]. However, studies on the synthesis of pyrrole from 1,3-dicarbonyl compounds are not large-scale. Taking this into account, the presented research work was carried out in the mentioned direction.

Result and discussion

For the synthesize of 3,5-dialkyl (phenyl)-pyrrole-2-ethyl-carboxilate derivatives at first we have synthesized enamines by the condensation 1,3-dicarbonyl compounds with glycine ethyl ester hidrochloride. As a continuation of the process, pyrrole derivatives (I-III) were synthesized from the reaction of enamines with glycine ethyl ester in the presence of *tert*-BuOK / *tert*-BuOH/ DMFA . During the reaction, *tert*-BuOK is used as a super basic medium, like in the synthesis of 2-phenylpyroles. At first we used C_2H_5ONa/ C_2H_5OH for cyclization of enamines into pyrrole derivatives with a yield of 10-42%. However, when enamines were mixed in a dimethylformamide medium at 60-70° C in the presence of *tert*-BuOK / *tert*-BuOH, derivatives of 3,5-dialkyl (phenyl) -pyrrol-2-ethyl carboxylate were synthesized with a practical yield of 45-50%. Reaction proceeded for 4-5 hours by the following scheme.



$R^1=R^2=CH_3$ (1) ; $R^1=CH_3$, $R^2=C_6H_5$ (II); $R^1=R^2=C_6H_5$ (III).

Although this type of pyrrole has been synthesized by many scientists in the literature, for the first time we have obtained 3,5-dialkyl (phenyl) -pyrrole-2-ethylcarboxylates from the reaction of enamines and glycic acid with ethyl ether in the presence of *tert*-BuOK / *tert*-BuOH.

Experimental

^1H NMR and ^{13}C NMR spectra ware recorded on a 400 spectrophotometer using in DMSO-d6 as the solvent. Chemical shifts values are reported in ppm taking tetramethylsilane as the internal standard and J values are given in hertz. The types of signals are indicated by the following letters: s=singlet, d=doublet, t=triplet, m=multiplet. Flash column chromatography (FCC) was performed by using glass columns with flash grade silica gel (70-230 mesh). Reactions were monitored by thin-layer chromatography (TCL) using pre coated silica gel plates, visualized by UV light. All organic extracts were dehydrated over oven-dried $MgSO_4$.

The synthesis of 2,4-dimethyl-2*H*-pyrrole-5-carboxilate (I)

4.18 g glycine ethyl ester hydrochloride was added to 300 mg acetyl acetone and reflux in 50 ml benzene in the presence of 5% mole $Yb(OTF)_3$ catalyst for 6 hours. At the end the reaction mixture was cooled to room temperature, washed with 100 ml water. It was then extracted three times with 50 ml CH_2Cl_2. All organic extracts were dehydrated over oven-dried $MgSO_4$ and crystallized in hexane. In the second stage of reaction, 7 ml of *tert*-BuOH and 14 ml DMFA was added to the obtained crystals and mixed. Then 1.5 g *tert*-BuOK was added to this mixture and mixed for 4-5 hours at 80°C. The mixture was cooled to room temperature, washed with 50 ml of water and extracted with 50 ml of ether. All organic extracts were dehydrated over oven-dried $MgSO_4$ and cleaned by column chromatography. Eluent n-hexane : ethyl acetate 10:1. Yellow crystals were obtained.

^{13}CNMR spectra (DMSO-*d6*), δ [ppm], m.h.: 13.14 (CH3), 13.21(CH_3), 14.84 (CH_3), 59.27(CH_2O), 111.17 (C_{pyr}), 117.24 (=C_{pyr}), 128.24 (C_{pyr}), 133.36 (C_{pyr}), 161.38 (COO).

^{1}HNMR(300 MHz,DMSO-*d6*), δ [ppm],m.h.: 1.24 (t,3H, CH_3,); 2.12 (s, 3H, CH_3,), 2.17 (s, 3H, CH_3,), 4.18 (q, 2H, CH_2O), 5.69(s,1H,CH=), 11.08 (s,1H,NH).

The synthesis of ethyl-2-methyl-4-phenyl-2*H*-pyrrole-5-carboxylate (II)

500 mg benzoyl acetone was added to 4.30 g glycine ethyl ester hydrochloride and reflux in 100 ml benzene in the presence of 5% mole $Yb(OTF)_3$ catalyst for 6 hours. At the end the reaction mixture was cooled to room temperature, washed with 100 ml water. Then extracted three times with 50 ml CH_2Cl_2. All organic extracts were dehydrated over oven-dried $MgSO_4$ and crystalized in hexane. In the second stage of reaction 5 ml *tert*-BuOH and 10 ml DMFA was added to the obtained crystals and mixed. Then 0.67 g *tert*-BuOK was added to this mixture and stirred for 4-5 hours at 80°C. After the reaction mixture cooled to room temperature, washed with 50 ml water. Then extracted with 30 ml diethyl ether. All organic extracts were dehydrated over oven-dried $MgSO_4$ and cleaned by column chromatography. Eluent n-hexane : ethyl acetate 10:1. Yellow crystals were obtained.

^{13}CNMR spectra (DMSO-*d6*), δ [ppm], m.h.: 14.37(CH_3), 16.34 (CH_3), 60.31 (CH_2O), 111.46 (C_{pyr}), 119.29 (C_{pyr}), 127.71 (C_{pyr}), 128.96 (2 C_{ar}), 129.92 (2 C_{ar}), 132.79(C_{ar}), 135.02 (C_{ar}), 136.24 (C_{pyr}), 161.12(COO).

^{1}HNMR(300 MHz,DMSO-*d6*), δ [ppm],m.h.: 1.21 (t,3H, CH_3,); 2.16 (s,3H, CH_3,);4.16 (q, 2H, CH_2O), 6.27(s,1H,CH=); 7.36-7.79 (m,5H,Ar-H), 11.98 (s,1H,NH).

The synthesis of ethyl 3,5-diphenyl-2*H*-pyrrole -2-carboxylate (III)

500 mg dibenzoylmethane was added to 3.11 g glycine ethyl ester hydrochloride and reflux in 100 ml benzene in the presence of 5% mole $Yb(OTF)_3$ catalyst for 6 hours. At the end the reaction mixture was cooled to room temperature, washed with 200 ml water.Then extracted three times with 50 ml CH_2Cl_2. Organic phase was dried on $MgSO_4$ and crystalized in hexane. In the second stage of reaction 6 ml *tert*-BuOH and 12 ml DMFA was added to the obtained crystals and mixed. Then 1.27 g *tert*-BuOK was added to this mixture and mixed for 4-5 hours at 80°C. After the reaction mixture cooled to room temperature, washed with 50 ml water.Then extracted with 50 ml diethyl ether. All organic extracts were dehydrated over oven-dried $MgSO_4$ and cleaned by column chromatography. Eluent n-hexane : ethyl acetate 10:1. Yellow crystals were obtained.

^{13}CNMR spectra (DMSO-*d6*), δ [ppm], m.h.: 14.52(CH_3), 60.11 (CH_2O), 110.23 (C_{pyr}), 118.99 (C_{pyr}), 125.82 (2 C_{ar}), 127.18 (CH_{pyr}), 128.01 (2 C_{ar}), 129.15(2 C_{ar}), 129.78 (2 C_{ar}), 131.45 (2 C_{ar}), 132.95 (C_{ar}), 135.70 (C_{ar}), 136.16 (=C_{pyr}), 161.04 (COO)

^{1}HNMR (300 MHz,DMSO-*d6*), δ [ppm],m.h.: 1.18 (t,3H, CH_3,); 4.17 (q, 2H, CH_2O), 6.74 (s,1H,CH=); 7.30-7.90 (m,10H,2Ar), 11.94 (s,1H,NH).

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ANALYSIS OF PROBLEMS IN COMPARATIVE SENTENCES INVOLVING PREFIX 比BǏ IN CHINESE LANGUAGE

Abstract: *In comparative meaning context, one statement in relation to another statement, is expressed proceeding from it and depending on it. In such sentences, the sentence is expressed not directly, straight, but in relation to a particular other sentence. That is, the completeness of the thought depends not only on two principal clause of the sentence, but also as a second part of the comparison, also related to the third part. In this case, when the comparative meaning sentences are made up with prefix 比bǐ , they are aimed at analyzing the errors and omissions in the sentences.*

Key words: *analogy, comparison, analogy, comparative degree, prefix, object of comparison, subject of comparison, abbreviation, omission, keyword.*

Language: *English*

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Introduction

In comparative meaning context, subject, process, phenomenon and others are compared not for the purpose of analogy with the other, but for the purpose of distinguishing one from another. Thus, both of the subjects that are being compared will have the same character, feature. But this sign does not belong to the subjects that are being compared , with not exactly the same degree, but different degrees. Of course, the subjects which are being compared are opposed to each other by this diversity and the difference between subjects are shown in this way [2, p.238].

There are four parts in comparative meaning context: 1) compared thing or the subject, 2) comparative thing or object to it 3) a comparative sign and 4) a formal indicator. In a perfect comparative meaning sentences, a predicate, process, phenomenon are compared not for the purpose of analogy with the other, but for the purpose of distinguishing one from another. Both of the subjects that are being compared by this way will have the same character, feature. But this sign does not belong to the subjects that are being compared ,with not exactly the same degree, but different degrees. The subjects which are being compared are opposed to each other by this difference and the difference between subjects are shown in this way [1, p.336].

THE MAIN FINDINGS AND RESULTS

Sentences in the context of comparison are represented by 比较句*bǐjiào jù* terms in Chinese. If we look at the analysis of this word, 比较 comparisons mean *bǐjiào*, 句*jù* sentences. There is no Chinese equivalent of the words comparison, analogy, and comparison in Uzbek, all of which are referred to as 比较句 comparisons. [4, p.122].

The prefix比*bǐ* is used to denote the difference between the quality and the degree, high or low, and is used mainly in the levels of two people, two subjects or two cases, different in comparison. If the comparison object is compared with prefix比*bǐ*, the predicate reflects the result of the comparison.

In this case, in accordance with the location, firstly compared object or sentence and then prefix 比

bǐ, compared object, after which the result of the comparison takes place.

Semantically, in the main structure modifier takes place between the subject predicate and the prefix 比*bi* acts as a modifier [6, p.250]. The structure of this type of sentence is as follows: [A+比+ B+verb or adjective +(object)]. For example:

1. 他比她的弟弟聪明。
Tā bǐ tā dìdì cōngmíng.
He is clever than his brother.
2. 昨天比今天冷得多。
Zuótiān bǐ jīntiān lěngdé duō.
Yesterday was colder than today.

In order to prevent the mistakes while using prefix 比 in the sentences the followings should be paid attention:

1) The word 很*hěn* very can not be used in the sentences where degree of adverb 比*bǐ* is used.

×我弟弟比我很高。
Wǒ dìdì bǐ wǒ hěngāo.
√我弟弟比我高得多。
Wǒ dìdì bǐ wǒ gāo deduō.
√我弟弟比我高多了。
Wǒ dìdì bǐ wǒ gāo duōle.
My brother is higher than me.

Besides, the adverbs illustrating the degrees, such as 非常*fēicháng*, 极*jí* can not be used in the sentences where the prefix比*bǐ* is used. If there is a big difference in the opinion then [比 *bǐ* ....得多*deduō*] or [比*bǐ*……多了*duōle*] constructions can be used [4, p.122].

2) Quantity object can not be used in front of the adjective

×我弟弟比我一头高。
Wǒ dì dì bǐ wǒ yì tóu gāo.
√我弟弟比我高一头。
Wǒ dìdì bǐ wǒ gāo yìtóu.
He is a head higher than me.

Quantitative phrase in the above sentence 一头 *yìtóu* as adjective 高*gāo* is considered as quality object. The following rule s established in the Chinese language grammar: "If comparative degree is carried out with the prefix 比*bǐ*, the quantity phrase acts as a quantity ojbect and should be used after the adjective" [6, p.205]. The structure of this type of sentence is as follows:

[比+person/subject+adjective+ quantity word combinations]. For example:

1. ×比他一岁小。*Bǐ tā yī suì xiǎo.*
√比他小一岁。*Bǐ tā xiǎo yī suì.*
He is one year younger than him.
2. ×比那条马路三米宽。*Bǐ nàtiáo mǎlù sān mǐ kuān。*
√比那条马路宽三米。*Bǐ nàtiáo mǎlù kuān sān mǐ。*
It is three meters wider than the highway

3) Degree of adverbs can not be used in front of verbs. For example:

×今天我比玛丽早来。*Jīntiān wǒ bǐ Mǎlì zǎo lái.*
√今天我比玛丽来得早。*Jīntiān wǒ bǐ Mǎlì lái de zǎo.*
Today, I came earlier than Mali.

The above sentence compares who came earlier. 早zǎo, 来lái are considered degree objects. The following rule is established in the Chinese language grammar: if the comparative degree is carried out with the prefix比*bǐ, prefix* 得*de* should be used in front of the degree object[6, p.226]. The structure of this type of statement is as follows: [比*bǐ*+person/subject +predicate + 得*dé* + degree of object] For example:

1. ×比他快跑。*Bǐ tā kuài pǎo.*
√比他跑得快。*Bǐ tā pǎo dé kuài.*
He runs faster than him.
2. ×比我好学。*Bǐ wǒ hào xué.*
√比我学得好。*Bǐwǒ xué de hǎo.*
He reads better than me.

4) Degree and quantity objects can not be used subsequently . For example:

×我比玛丽来得早十分钟。*Wǒ bǐ Mǎlì lái de zǎo shífēn zhōng.*
√我比玛丽早来十分钟。*Wǒ bǐ Mǎlì zǎo lái shífēn zhōng.*
I came ten minutes earlier than Mali

The quantity object 十分钟*shí fēnzhōng and*来得早*lái dé zǎoare used above sentence.* The following rule is established in Chinese language: if comparison is used with prefx 比*bǐ,* two objects can not be used in one sentence subsequently. In this situation the degree object 得*dé* will be omitted, the adjective 早*zǎo* makes condition, is used before the verb 来*lái* [7, p.30]. The structure of this type of statement is as follows: [比*bǐ* +person/predicate+adjective (condition maker)+verb-predicate + quantity object]. For example:

1. ×比我来得晚半个小时。
Bǐ wǒ lái de wǎn bàn gè xiǎoshí.
√比我晚半个小时。
Bǐ wǒ wǎnlái bàn gè xiǎoshí.
He came for half an hour later.
2. ×比她学得多十个生词。
Bǐ tā xuédé duō shígè shēngcí.
√比她多学十个生词。
Bǐ tā duō xué shígè shēngcí.
He learnt more than ten words.

5) Negative adverb 不*bù* can not be used before predicate. For example:

×我的汉语水平比玛丽的汉语水平不高。
Wǒ de hànyǔ shuǐpíng bǐ Mǎlì de hànyǔ shuǐpíng bù gāo.
√我的汉语水平不比玛丽的汉语水平高。
My level of Chinese is not higher than Mali's.

6) If comparison is carried out with the prefix 比 bǐ, negative adverb 不bù, should be used before the prefix 比*bǐ* [9, p.154].

7) If there is a big difference between the opposing parties while comparing the sentences with prefixes比*bǐ*, constructions [比*bǐ*…得多*deduō*] or [比*bǐ*…多了*duōle*] can be used .But these two constructions can not be used together.

For example:

×我跑得比玛丽快得多了。

Wǒ pǎo dé bǐ mǎ lì kuài de duō le.

√我跑得比玛丽快得多。

Wǒ pǎodé bǐ Mǎlì kuài de duō.

√我跑得比玛丽快得多了。

Wǒ pǎo dé bǐ mǎ lì kuài duō le.

I run faster than Mali.

8) The age is expressed with 岁*suì* not with 年*nián*. For example:

1. √我比你大两岁, 他比你小一岁。

Wǒ bǐ nǐ dà liǎng suì, tā bǐ nǐ xiǎo yí suì.

×我比你大两年,他比你小一年。

Wǒ bǐ nǐ dà liǎng nián, tā bǐ nǐ xiǎo yì nián.

I am two years older than you. He is younger than you.

2. √王伯母比王伯父小三岁。

Wáng bó mǔ bǐ wáng bó fù xiǎo sān suì.

×王伯母比王伯父小三年。

Wáng bó mǔ bǐ wáng bó fù xiǎo sān nián.

The aunt Vang is three years younger than uncle Vang.

9) If the same subjects is compared and changed in two different time samples the word illustrating time is used after the prefix比*bǐ*. For example:

1. 这孩子的身体比以前好得多。

Zhè hái zi de shēn tǐ bǐ yǐqiánhǎo dé duō.

The child'e health is much better than before.

2. 他的身体比三年前强壮得多。

Tā de shēntǐ bǐ sānnián qián qiáng zhuàng dé duō.

Her health is much better now than it was three years ago.

In this case it is not possible to use words denoting time before the prefix 比*bǐ*.

10) If both subjects and predicates are not the same, in this case, abbreviation can not be used. For instance:

你吃盐比他吃米多。

Nǐ chī yán bǐtā chīmǐ duō.

You eat more salt than rice

Since rice or salt are different here, omitting one will affect the meaning of the sentence [8, p.143].

[一*yì* + amount word + 比*bǐ* + number 一*yì* + amount word] the construction comes as a function of the condition in the sentence, indicating that the difference in level is gradually changing. It is impossible to use *prefixes* 一天比一天*yìtiān bǐ yìtiān*, 一年比一年*yìnián bǐ yìnián*, 一次比一次*yícì bǐ yícì* in front of the subject. For example :

1. √天气一天比一天凉快了。

Tiānqì yìtiān bǐ yìtiān liángkuài le.

×一天比一天天气凉快了。

Yìtiān bǐ yìtiān tiānqì liángkuài le.

The weather is getting colder day by day.

2. √人民的生活一年比一年丰富.

Rénmín de shēnghuó yìnián bǐ yìnián fēngfù.

×一年比一年人民的生活丰富.

Yì nián bǐ yì nián rén mín de shēng huó fēng fù.

The population is getting richer year by year.

The negative forms of the sentences with the prefix 比*bǐ is* 不比*bùbǐ* "The previous one is not equal to the next one…." thus "it means that "A is not as same as B". But I the translation process it is impossible to say that "B is as A…". Thus it is impossible to say " the latter is relate to next [10, p.128]. For example: 今天不比昨天冷 *jīntān bùbǐ zuótiān lěng* it is translated like today is not as cold as yesterday, that means today is hot. If it is translated as yesterday was not colder than today, it meant that yesterday was hot and today is cold, leads to the change of the meaning.

We can express the negative form of statements in the context of comparison in different ways. But in the process of translating, one should not confuse them with each other. For example: "*He is not as tall as me*l" 他不比我高*tā bùbǐ wǒ gāo*" the negative form of the sentence can be made in different forms:

他跟我差不多高。*Tā gēn wǒ chàbuduō gāo.*

他跟我不一样高。*Tā gēn wǒ bù yíyàng gāo.*

我比她高一点儿。*Wǒ bǐ tā gāo yìdiánér.*

她比我高一点儿。*Tā bǐ wǒ gāo yìdiánér.*

However, each sentence does not mean the same. In such sentences不*bù* can not be used before predicate. For example:

× 她比我不高。*Tā bǐ wǒ bù gāo.*

× 今天比昨天不暖。*Jīn tiān bǐ zuó tiān bù nuǎn.*

Along with the negative form of比*bǐ and* 不比*bùbǐ* there are also negative form of 没有*méiyǒu* [A 不比B] construction is a negative form of comparative sentences, they must not be mixed with the forms of A [没有*méiyǒu*B] (A B are not the same) or [A 不如 B] (A is not equal to B) They also have different meanings [10, p.169]. For instance:

1. 这件衣服不比那件衣服长.

Zhè jiàn yīfú bùbǐ nà jiàn yīfú zhǎng.

It can not be said that this dress is longer than that one

2. 这件衣服没有那件衣服长.

Zhè jiàn yīfú méiyǒu nà jiàn yīfú zhǎng.

This dress is not as long as that one

3. 这件衣服不如那件衣服长.

Zhè jiàn yīfú bùrú nà jiàn yīfú zhǎng.
Your dress is not as long as that one

If any situation or event compared through 不如 *bùrú*, the degree difference of particular side of A and B are shown. The structure of such statements has the following construction: [subject+不如+ person +predicate + object +repeated verbs +得+ degree objects]. Below we will look at their correct and incorrect forms:

1. ×我不如他打排球好。
Wǒ bùrú tā dǎpáiqiú hǎo.
√我不如他打排球打得好。
Wǒ bùrú tā dǎpáiqiú dǎ de hǎo.
I can't play volleyball as well as he does.
2. ×我不如玛丽写汉字快。
Wǒ bù rú Mǎlì xiě hàn zì kuài.
√我不如玛丽写汉字写得快。
Wǒ bùrú Mǎlì xiě hànzì xiě dé kuài.
My hieroglyphic writing is not as fast as Mali's.

CONCLUSION

The results of the article analysis came to the following conclusions:

- In the context of comparison, one object, process, or event is compared in order to distinguish one from another, not to compare it with another. In this case, both objects being compared have the same characteristics. However, this sign does not apply to the objects being compared to the same degree, but to different degrees.

- The prefix 比*bǐ is* used to show the difference between high or low adjectives and degrees, mainly used in comparing two people, two objects, or differences in the levels of two states. If the compared object is compared with prefix 比*bǐ* , the predicate represents the result of the comparison: [A+比 +B+verb or adjective +(object)].

- If the comparision is done with the presence of the prefix 比, it is not possible to use two objects at the same time in the same sentence. The prefix 比 is used to compare two people, the age is expressed with 岁, but not with 年*nián* . The differences of age is expressed with 大,小verbs.

- If the words before and after the prefix 比 are similar, usually the next part of 比is omitted. It does not affect on the content. But if both subject and predicate are different, then the abbreviation method can not be used.

- It is not possible to use adverbs like 很, 非常, 极 which means very in比 prefix participated sentences If there is a big difference, then it can be expressed as "比…得多" or "比…多了". But these two constructions can not be used together.

- If the comparison is carried out with prefix 比 , the negative adverb 不should be used before the prefix 比. But, it should never be used before predicate.

- There are also negative forms of 不如along with negative structure 没有, the construction of [A 不比B] is a form of negation of statements in the context of comparison. [A没有B] (is not like A B or [A 不如B] (not equal to A B) should not be confused with forms. They have different meanings in the context.

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Inheritance and Variability of Boll Weight in F_1-F_2 Plants of Fine-Fiber Cotton Varieties

Abstract: *This paper deals with the results of conducted research on the issues of the inheritance and variability of boll weight in F_1-F_2 plants of fine-fiber local cotton varieties. According to the experiments, we have made that generation hybrids in F_1, the trait of boll weight were inherited basically positive superdominance. Additionally, the determination of the general combining ability of fine-fiber cotton varieties of morpho-agronomic traits, and genetic-selection were further conducted the possibility of using Duru Gavkhar and Bukhara-7 varieties as a valuable primary source of cotton weight of boll. Furthermore, selection work in the population of the family O-449, depended on the basis of a combination of F_2 Surkhan-9 x Termez-32 hybrids. Moreover, a new cotton variety "Marvarid" was created.*

Key words: *fine-fiber cotton varieties, hybrids, heterosis, combining ability, inheritance, variability, boll weight.*
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Introduction

Currently, scientific research on fine-fiber cotton varieties around the world is aimed at studying the genetics of valuable economic traits in geographically remote hybrids of cotton varieties, lines and forms and exporting excess fiber while meeting domestic demand based on increasing yield and fiber quality. Fine-fiber cotton varieties are characterized by high fiber quality, resistant to verticillium wilt, other diseases and pests, as well as adverse environmental factors, which is the main disease of *G.hirsutum* L. fiber varieties. Therefore, the creation of competitive fine-fiber cotton varieties is one of the most important scientific and practical directions. Some scholars in the field of agriculture made some contributions, they were I.E.El-Beially and G.I.Mohamed (2008), S.H.Abd-El-Haleem, and others (2010) found that quantitative traits are inherited in F_1 hybrids with different levels of dominance or super dominance of the parent species. A.M.El-Zanaty et al (2012) identified phenotypic variability in quantitative characteristics in fine-fiber Egyptian cotton varieties, M.M.Abd El-Maksoud (2003), A.M.Abdal El-Bary (2013) identified combining abilities some of foreign cotton varieties and lines.Also, recently, scientific and practical research on the genetics and selection of *G. barbadense* L. varieties in our country carried out by M.I.Iksanov (2011), K.O.Khudarganov, S.A.Usmanov (2015), Vik.A.Avtonomov and others. Vik.A.Avtonomov, R.R.Egamberdiev, M.H.Kimsanboev (2009) carried out geographical far hybridization and selection work on fine-fiber cotton varieties.

It is known that the weight of boll is one of the main components of plant productivity. Therefore, in genetic-selection research, special attention is paid to the study of the manifestation, inheritance and variability of this trait. According to S.A.Usmanov, S.S.Alikhodjaeva and others (2007), in some fine-fiber donors the weight of boll can reach 5.0-6.0 grams. R.R.Egamberdiev and others (2007) reported that it was advisable to start the selection work on weight of boll and yield per plant from F_2 generation in geographically far hybrids of G.barbadense *L.* type.

In F_1 combinations were further conducted a research by K.O.Khudargonov, S.A.Usmanov (2015), mean medium of both parent was observed on the indicator boll weight. The intergenerational rate of boll weight of Surkhan-16 and Surkhan-101 varieties was $h^2 = 0.50$ and higher.

Research methods

The aim of the research was to determine the inheritance and variability characteristics of boll weight in F_1-F_2 hybrids of local cotton varieties belonging to species of G.barbadense L. Local Surkhan-9, Termez-32, Duru Gavkhar, Bukhara-7, Surkhan-10 cotton varieties of G.barbadense L. species and their diallel F_1-F_2 generation plants were used as **the object of research.**

In our experiment, the primary source was the local fine-fiber cotton varieties Surkhan-9, Termez-32, Duru Gavkhar, Bukhara-7, Surkhan-10 and their interspecific plants F_1, F_2. In the study, combinations of each variety and F_1 hybrid were placed in three turns, 4 rows, and 25 in each row using the randomization method. Planting scheme 90x20x1. In the course of the experiment, the inheritance and variability of important morphobiological and valuable-economic traits in F_1 plants, the scale of variability of some valuable-economic traits in F_2 combinations were studied in comparison with parental forms. Varieties and 30 plants in each of their F_1 combinations and 150 plants in each of the F_2 combinations were studied.

The dominance coefficient (hp) in F_1 plants were determine by formula S.Wright given in the works of G.E. Beil and R.E. Atkins [1965].

$$hp = \frac{F_1 - MP}{P - MP} \quad (2.1)$$

hp - coefficient of dominance;F_1 - the medium arithmetic mean of the hybrid F_1; MP- the arithmetic mean of both parents; P- the arithmetic mean of the best parent.

hp = 0 - no dominance;

0 <hp <± 1.0 - intermediate dominance;

hp = ± 1.0 - complete dominance;

hp> ± 1.0 - extreme dominance

The results of the applied research carried out by statistical processes in the method of B.A. Dospexov [1985]. In this case, the parameters obtained for each character were analyzed by variance, namely, the differences between varieties and hybrids were determined by the Fisher criterion (F), the total error of the experiment $S\bar{x}$, the error of the mean differences *Sd* and the smallest difference (EKF) 95%, and each of the data obtained on one character were statistically analyzed using a modern variance (ANOVA) program.

Litun P.P., Proskurin N.V. [1976] suggests that the Griffing 4 method (model 1) is widely used in determining combining ability in the field of practical selection. Therefore, in our study, the combining ability of varieties Griffing (B.I. Griffing) [1956] was determined using the following formula based on method 4.

The sum of the squares of the General combining ability: (2.2)

$$Sg = \frac{1}{P-2}\sum_i x^2_{i.} - \frac{4}{P(P-2)} x^2_{..}$$

The sum of squares of special combining ability: (2.3)

$$Ss = \sum_i \sum_j x_{ij} - \frac{1}{P-2}\sum_i x^2_{i.} + \frac{2}{(P-1)(P-2)} X^2..$$

GCA (General combining ability) of each variety: (2.4)

$$g_i = \frac{1}{P(P-2)}(pxi. - 2x..)$$

GCA variance: (2.5)

$$\sigma^2_{gi} = \frac{P-1}{P(P-2)} y^2$$

The SCA (specific combining ability) constant of each hybrid combination: (2.6)

$$S_{\hat{ij}} = X_{ij.} - \frac{1}{P-2}(Xi. + Xj.) + \frac{2}{(P-1)(P-2)} X..$$

SCA variance (2.7)

$$\sigma^2_{si} = \frac{P-3}{P-1} y^2$$

The ratio of genotypic variance to total phenotypic variance determined by the rate of transmission of the trait from generation to generation (h^2) by the formula R.W. Allard [1956]: (2.10)

$$h^2 = \frac{\sigma^2 F_2 - \frac{\sigma^2 F_1 + \sigma^2 P_1 + \sigma^2 P_2}{3}}{\sigma^2 F_2}$$

h^2 – F_2 the transmission of the mark from generation to generation in hybrids;

$\sigma^2 F_1$ - a $\sigma^2 F_2$ -second generation dispersion;

$\sigma^2 P_1$ -first parental dispersion;

$\sigma^2 P_2$ - second parental dispersion;

Results of research: Bukhara-7 and Duru Gavkhar (2.97g and 2.89g, respectively) have the highest boll weight, while Termez-32 and Surkhan-9 have the lowest (2.52g and 2.62g, respectively).) was shown (Table 1).

The highest values of this trait in F_1 plants of varieties are Duru Gavkhar x Bukhara-7 (3.25g), Surkhan-9 x Bukhara-7 (3.10g), Termez-32 x Bukhara-7 (3.05g), Bukhara-7 x In the combinations of Surkhan-10 (3.00g), and relatively low performance Termez-32 x Surkhan-10 (2.62g), Surkhan-10 x Surkhan-9 (2.65g), Surkhan-9 x

Surkhan-10 (2, 73g), Duru Gavkhar x Surkhan-9 and Bukhara-7 x Surkhan-9 (from 2.77g).

Table 1. Inheritance of boll weight in F_1 plants of fine-fiber local cotton varieties.

♀ \ ♂	Surkhon-9	Termiz-32	Duru Gavxar	Bukhara-7	Surkhan-10
Surkhon-9	2,62*	2,84 / 5,40	2,82 / 0,48	3,10 / 1,74	2,73 / 1,20
Termiz-32	2,84 / 5,40	2,52	2,99 / 1,54	3,05 / 1,36	2,62 / 0,10
Duru Gavxar	2,77 / 0,11	2,92 / 1,16	2,89	3,25 / 8,00	2,85 / 0,53
Bukhara-7	2,77 / – 0,14	2,92 / 0,78	2,82 / – 2,75	2,97	3,00 / 1,24
Surkhan-10	2,65 / – 0,40	2,94 / 3,20	2,97 / 1,94	2,82 / – 0,20	2,72

ЭКФ$_{05}$= 0,2г

Note: * - the average value of the character in F_1 plants

In the denominator - an indicator of the degree of superiority (l.s.)

The boll weight inherited in 11 of the 20 F_1 combinations with a positive super-predominance, 5 with an incomplete dominance of the high-yielding variety, 3 combinations with an incomplete dominance of the low-yielding variety, and 1 with a negative super-dominance.When Surkhan-9 and Termez-32 varieties, which are close to each other in terms of same size, were cross-bred, the trait was inherited in a positive extreme dominance (hp = 5.40) in reciprocal combinations. When mixing Bukhara-7 and Termez-32 varieties, which differ in character, F_1 Bukhara-7 x Termez-32 combination was incomplete (hp = 0.78), however in the combination F_1 Termez-32 x Bukhara-7 there were cases of positive overdose (hp = 1.36). Thus, the boll weight inherited in the F_1 plants of the studied varieties mainly in the case of positive super-predominance and incomplete predominance of high-yielding variety, negative super-predominance in one combination and incomplete dominance of low-yielding variety in 3 combinations.

When analyzing the boll weight according to EKF$_{05}$, the effect of heterosis observed only in 4 combinations – F_1 Duru Gavkhar x Bukhara-7 - 109.4%, F_1Surkhan-10 x Termez-32 - 108.1%, Surkhan-9 and Termez- It was found that 108 varieties accounted for 108.4% in reciprocal combinations.

The dispersion analysis showed that there was a statistical difference between the variants on boll weight (F_f>F_{05}). Reciprocal differences were noted in the reciprocal combinations of Surkhan-9 and Bukhara-7, Termez-32 and Surkhan-10, Duru Gavkhar and Bukhara-7 varieties. This suggests that cytoplasmic genes are also involved in the genetic control the weight boll.

When the combining ability of the primary varieties were studied according to the Fisher (F) criterion, it was found that the varieties differed in terms of GCA yield and SCA variance (P> 0.05). It was found that the relatively highest GCA yield in terms of boll weight was in the large boll Bukhara-7 variety ($\hat{g}_1$ = 0.23) (Table 2). In the remaining varieties, a negative GCA effect was noted. Our data show that the Bukhara-7 variety should be used as a primary source in the creation of a relatively large boll fine-fiber cotton varieties.

In the Bukhara-7 and Surkhan-10 varieties, the GCA variance is higher than the SCA variance(σ^2_{gi}>σ^2_{si}), indicating that the trait is mainly controlled by additive genes. In other varieties, additive and non-additive genes are involved in the control of this trait.

Table 2. GCA yield ($\hat{g}_i$), SCA constant ($\hat{s}_{ij}$), GCA variance (σ^2_{gi}) and SCA variance (σ^2_{si}) of fine-fiber local cotton varieties by boll weight

♀ \ ♂	Surkhan-9	Termiz-32	Duru Gavhar	Buxoro-7	Surkhon-10	$\Sigma\hat{s}_{ij}^2$	σ^2_{si}	σ^2_{gi}	$\hat{g}_i$
Surkhan-9		0,15	-0,11	0,0033	0,04	0,0162	0,0049	0,005	-0,072
Termiz-32			0,06	-0,04	-0,08	0,0141	0,0042	0,004	-0,065
Duru Gavhar				0,02	0,02	0,0165	0,0050	0,005	0,071
Buxoro-7					0,01	0,0021	0,0002	0,053	0,231
Surkhon-10						0,0085	0,0023	0,027	-0,165

In the parent cotton varieties, the variability of the boll weight in one was 4 classes in all varieties except Bukhara-7, and 3 classes in Bukhara-7. In F_2 hybrids of varieties the most classes are in correct combinations of Termez-32 variety with Bukhara-7 and Surkhan-10 varieties (9 classes), Surkhan-9 x Bukhara-7, Surkhan-10 x Bukhara-7 combinations and Bukhara-7 and recorded in reciprocal hybrids of Duru Gavhar varieties (8 classes) (Table 3).

The lowest classes of character, namely the relatively narrow range of variability are in the reciprocal hybrids of Termez-32 and Surkhan-9 varieties, Termez-32 x Duru Gavkhar, Duru Gavkhar x Surkhan-10, Bukhara-7 x Termez-32 and Bukhara-7xSurkhan-10 combinations (6 classes).The highest percentage of plants in the varieties Surkhan-9, Surkhan-10 and Termez-32 belongs to the modal class with an index of 2.5-2.7g (40.0; 46.6; 50.0%, respectively), Duru Gavkhar and Bukhara-7 in varieties it corresponded to modal classes with an index of 2.8-3.0g (40.0 and 50.0%, respectively). The highest percentage of plants is in the right combinations of Surkhan-10 with Surkhan-9 and Termez-32 in the modal class of 1.9-2.1g, in F_2 Duru Gavkhar x Surkhan-9 and Bukhara-7 x Surkhan-10. together with the class belonged to the modal classes with indicators of 2.2-2.4g and 2.5-2.7g. Also, the maximum percentage of plants is 2.2-2.4g in 11 combinations, 2.5-2.7g in 3 combinations, 2.8-3.0g in 1 combination, 2.5-2.7g in 5 combinations and in 2 combinations belonged to the modal classes with an index of 2.8-3.0g. In all the F_2 combinations studied, a left-sided negative transgressive variability in one boll weight, namely, a shift from the lowest-performing edge classes of the parent varieties to grades 2-3, was noted. In 10 of the 20 hybrid combinations, a right-sided transgressive variability occurred, resulting in large-bolled plants relative to the parent varieties.The shift to the right to class 2 was observed in the correct combinations of F_2Bukhara-7 x Duru Gavkhar, as well as Termez-32 mixed with Bukhara-7 and Surkhan-10 (Figure 1). In the remaining F_2 combinations, a shift to class 1 to the right was noted.The presence of right-sided transgressive variability in boll weight is important from a selection point of view, indicating that larger cotyledonous genotypes can also be obtained from parent varieties. Isolated large-boll genotypes can be a valuable resource in the creation of new large-celled varieties.

As having analyzed the coefficient of variation on the bollweight, it was found that it had a small variability (V = 7.7–11.4%) in the parent varieties. The average variability in most F_2 combinations (V = 13.9-20.5%), in only 2 combinations, the large variability (V = 27.7% and V = 29) in hybrids of Termez-32 mixed with Duru Gavkhar and Bukhara-7 varieties. , 5%) were observed.

In all the F_2 combinations studied, the coefficient of intergenerational transmission of the bollweight averaged 0.30–0.63. Only in the Termez-32 x Duru Gavhar combination it found was that the transmission of the mark from generation to generation was very low (h^2=0,24).

CONCLUSION

1. In the first generation hybrids of local cotton varieties belonging to the genus *G. barbadense* L., the boll weight was mainly in a state of positive super-predominance.

2. The presence of statistical differences in morphological characteristics of some reciprocal combinations of fine-fiber cotton varieties of F_1 indicates that genetic control of these traits involves not only nuclear genes, but also cytoplasmic genes.

3. Duru Gavkhar and Bukhara-7 varieties can be used as a valuable starting source for the bollweight in a in genetic-selection research on the basis of determining the general combining ability of fine-fiber cotton varieties on economic characteristics.

4. In the F_2 generation of fine-fiber local cotton varieties, the coefficient of variation was average and high in terms of boll weight.

Table 3. Variability scale and intergenerational transmission of boll weight in F_2 generation of varieties

T/p	Varieties and F_2 combinations	The percentage of the plants									$\bar{x} \pm S_{\bar{x}}$	G	V%	h^2
		1,3 1,5	1,6 1,8	1,9 2,1	2,2 2,4	2,5 2,7	2,8 3,0	3,1 3,3	3,4 3,6	3,7 4,0				
1	Surkhan-9				20,0	40,0	30,0	10,0			2,62±0,04	0,24	9,2	-
2	Termiz-32				36,6	50,0	10,0	3,3			2,52±0,04	0,22	8,7	-
3	Duru Gavxar				10,0	20,0	40,0	30,0			2,89±0,06	0,33	11,4	-
4	Bukhara-7					20,0	50,0	30,0			2,97±0,04	0,23	7,7	-
5	Surkhan-10				13,3	46,6	26,6	13,3			2,72±0,04	0,25	9,2	-
6	Surkhan-9x Termiz-32	1,3	13,0	20,8	39,0	16,8	9,1				2,35±0,03	0,41	15,2	0,46
7	Surkhan-9xDuru Gavxar	8,3	8,3	13,9	25,0	25,0	13,9	5,6			2,33±0,06	0,76	20,5	0,50
8	Surkhan-9xBukhara-7	1,3	2,6	29,0	34,2	19,7	6,6	5,3	1,3		2,35±0,03	0,38	16,6	0,39
9	Surkhan-9xSurkhan-10		6,2	12,3	29,2	27,7	16,9	4,6	3,1		2,49±0,03	0,41	15,7	0,44
10	Termiz-32xSurkhan-9		10,4	28,1	38,5	11,5	8,3	3,1			2,34±0,03	0,36	14,1	0,44
11	Termiz-32x Duru Gavxar		5,9	25,0	40,5	16,7	10,7	1,2			2,31±0,03	0,33	27,7	0,24
12	Termiz -32xBukhara-7	7,6	13,6	19,7	16,7	21,2	10,6	6,1	3,0	1,5	2,86±0,05	0,56	29,5	0,63
13	Termiz-32xSurkhan-10	1,3	6,5	20,8	14,3	23,4	22,0	6,5	3,9	1,3	2,66±0,06	0,48	19,1	0,59
14	Duru Gavxar x Surkhan-9		12,2	31,7	26,8	9,9	14,6	2,4	2,4		2,29±0,03	0,42	15,2	0,50
15	Duru Gavxar xТермиз-32		2,4	12,9	24,7	18,8	28,2	11,8	1,2		3,21±0,03	0,41	20,2	0,34
16	Duru Gavxar xBukhara-7	2,1	5,2	21,9	31,2	12,5	12,5	9,4	5,2		2,77±0,04	0,47	15,1	0,49
17	Duru GavxarxSurkhan-10		3,0	10,6	22,7	24,2	25,8	13,7			3,2±0,03	0,40	14,5	0,39
18	Bukhara-7x Surkhan-9		1,4	6,9	23,6	32,0	23,6	9,7	2,8		2,63±0,06	0,67	14,9	0,58
19	Bukhara-7x Termiz -32		2,0	28,1	17,5	34,9	13,6	3,9			2,80±0,03	0,33	20,0	0,39
20	Bukhara-7 x Duru Gavxar		12,8	20,5	26,9	15,4	14,1	7,7	1,3	1,3	2,40±0,04	0,48	17,8	0,58
21	Bukhara-7xSurkhan-10		7,1	28,6	10,7	28,6	17,9	7,1			2,48±0,03	0,39	17,8	0,56
22	Surkhan-10x Surkhan-9	4,2	11,6	32,6	25,3	17,9	5,3	3,1			2,21±0,03	0,39	17,9	0,56
23	Surkhan-10x Termiz -32	2,4	7,0	29,4	21,2	20,0	17,6	2,4			2,34±0,03	0,42	17,9	0,55
24	Surkhan-10x Duru Gavxar	1,2	1,2	25,3	38,6	22,9	8,4	2,4			2,34±0,03	0,36	13,9	0,30
25	Surkhan-10xBukhara-7	3,1	9,4	11,0	23,4	23,4	17,2	9,4	3,1		3,09±0,04	0,49	18,4	0,50

Note: the number of selections in varieties - 30, in combinations F_2 - 150 plants

5. The emergence of valuable F_2recombinants with high performance traits has been at different levels depending on the mixing components, namely, the parent varieties and their combining ability.

6. As a result of selection work in the population of the family O-449, obtained on the basis of a hybrid combination F_2 Surkhan-9 x Termez-32, a variety of cotton "Marvarid" was created. This variety successfully passed the Ground Control of the State

Variety Test in 2017 and in 2018 was accepted to the varietal testing outlets of the DNS.

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METAPHORS IN " KUTADGU BILIG» AND TRANSLATION PROBLEMS

Abstract: *This article exposes the features of usage of metaphors as a literary device in "Kutadgu bilig" one of the early Turkic monuments and problems of translating them into different foreign languages. The problems of recreation of metaphor in foreign languages were also analyzed according to viewpoint of translation theory.*

Key words: *metaphor, literary, semantics, translation, original, talent, quatrain.*
Language: *Russian*
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МЕТАФОРЫ В «КУТАДГУ БИЛИГ» И ПРОБЛЕМЫ ПЕРЕВОДА

Аннотация: *В данной статье освещены особенности использования метафор в качестве художественного средства в древнетюркском памятнике «Кутадгу билиг», раскрыта специфика их перевода на различные иностранные языки. Проблема воссоздания метафоры на иностранных языках рассмотрена с точки зрения теории перевода.*

Ключевые слова: *метафора, литературный, семантика, перевод, оригинал, талант, катрен.*

Введение

Традиция построения и истолкования метафор вошла в узбекскую литературу из арабской поэзии и обозначается термином «истиора» (метафора), что в буквальном смысле означает «взятый для прочности и сбережения». Применительно к восточной литературе термины «метафора» и «истиора» в целом имеют одинаковое значение. Атулах Хусейни описывал искусство метафоры так: «…Метафора - это своего рода речение, которое в определенной степени противоположно реальности. Правда заключается в том, что это слово является украшением, то есть предназначено для использования в переносном смысле» [3.219].

Рашидиддин Ватвот описывал: «Это искусство состоит в том, что писец или писатель уводит слово его от истинного значения и использует его где-то еще» [3.220].

В английский язык слово «метафора» пришло из латинского языка через посредство французского. А в латинский язык оно пришло из греческого «metapherein – «принести из далека», «передача». На Западе, особенно в английской литературе, метафора имеет широкий и узкий смысл. Применяясь в широком смысле, она охватывает и другие средства литературного, такие как метонимия, синекдоха и гипербола. В английском языке понятие метафора означает перенос несвязанных между собой названий одного предмета на другой на основании их сходства [11.112].

Являясь несколько сложнее других художественных средств, метафора требует от писателя или поэта внимания и изящности. Хорошо известно, что метафора может быть представлена различными лексико-грамматическими разрядами слов – существительными или глаголами. В восточном

контексте метафоры-существительные называются «истиораи аслия», а метафоры, состоящие из глаголов – «истиораи тарбия»[10.54]. По мнению специалистов, на практике в количественном отношении преобладают метафоры, выраженные именами существительными.

Уникальное произведение древнетюркской литературы «Кутадгу билиг» Юсуфа Хас Хаджиба содержит в себе немало богатых литературных изобразительных средств. В произведении много метафор, выраженных существительными и глаголами. При этом создание метафорических оборотов с помощью глаголов требует от автора большего мастерства, поскольку такие обороты более сложны, чем метафорические обороты с существительными.

Четверостишия в «Кутадгу билиг» отличаются своей наполненностью и многогранностью. Чтобы проиллюстрировать и донести смысл четверостиший до читателя, автор использует ряд художественных приёмов,среди которых особое место занимает метафора. Юсуф Хас Хаджиб не просто описывает реальность словами, но в живом и жизненном изображении он использует множество метафор. В связи с этим он широко использовал образы человека, природы, животного мира. Потому что «вся вселенная исполнена разных символов, и у каждого представления есть своё второе значение» [9.162]. Юсуф Хас Хаджиб использовал эти символы чрезвычайно уместно и мастерски.

Также интересны выводы Каюма Каримова о видах художественного искусства, применявшихся в «Кутадгу билиг». «Используя данные художественные средства, Юсуф переносит черты природы, её явлений, особенностей характеров её бессознательных сущностей на человека и тем самым добивается описания его характер, а в других случаях, наоборот, через особенности характеров и личных качеств людей он раскрывает свойства природы, её явлений и различных природных пейзажей»[6.154].

Как известно, метафоры бывают открытыми и закрытыми. Открытая метафора содержит только слово, используемое в переносном значении, поэтому значение такой метафоры имплицитно. В закрытой же метафоре участвует как метафорическое слово, так и то слово, к которому отсылает аналогия. В терминологии литературоведа Д. Куранова открытые и закрытые метафоры делятся на лексические и контекстуальные, и если значение первых можно понять по одному слову, то вторые становятся понятны только во взаимодействии с другими словами [8.128].

Метафоры, используемые в четверостишиях «Кутадгу билиг» можно разделить на следующие группы:

1. Открытые метафоры:

а) образованные от имён существительных:

робот – рабат (квартал ремесленников), карвон – караван, сарой – дворец, тўр – сеть, арслон – лев, бўри – волк, ит – собака, қил – волос, бурж – зодиак, очиқувчи – голодный, тўювчи – ситый, ҳинду – индеец, олтин камар боғлаб юрувчилар – обладатели золотого пояса, неъмат соҳиби – обладатель даров, меҳнат соҳиби – собственник труда, ўткир кўз – зоркий глаз, соқ қулоқ – здоровые уши, кенг кўнгил – широкая душа, ғойиб киши – человек-невидимка, одамлар боши – глава людей, тили ёлғон – ложноязичный, пул – денги, қаттиқ тугун – крепкий узел. қўли узун – длиннорукий, тили тўғри – прямоязычный и др.

б) Образованные от глаголов:

юзига тупурмоқ – плевать в лицо, оёққа қўймоқ – ставить на ноги, қориндан чиқмоқ – выйти из чрева, бўйин бермоқ – сдаваться, оти шуҳрат қозонмоқ – приобретать известность, қўл кўтармоқ – поднимать руки, тил очмоқ – говорить, бағрга олмоқ – брать в объятья, бўйнини қайирмоқ – гнуть шею, кўзи дадиллашмоқ – смело смотреть, қул йиғмоқ – собирать рабов, кўзи сув ичмоқ – пить воду глазами, юз кўрсатмоқ – показывать лицо, тилидан заҳар сочмоқ – язвить языком, қилич урмоқ – ударять мечом, боши айланмоқ – гружить голову, кўнгилга эргашмоқ – следовать чувствам, ширин жон бермоқ – умереть, кулиб очилмоқ – смеясь открываться, ўзини яширмоқ – скрывать себя, оёқ урмоқ – ударять ногами, рўпарада учмоқ – летать напротив и др.

2. Закрытые метафоры:

беглик пойдевори – основа бекства (т.е. дворянства), беглик томири – корень бекства, эзгу ўрин – доброе место, қайғу эшиги – врата скорби, гадолик тўни – складки нищеты, маърифат эшиги – врата просвещения, тўғрилик йўли – путь праведности, кўнгил сири – секрет души, жон риштаси – нить жизни, кўз чашмаси – родник глаз, ғафлат уйқуси – безмятежный сон, ҳақиқат куни – день истины, тириклик суви – вода жизни, кўчар пайти – момент перехода.

Задача перевода заключена не в том, чтобы дословно переводить слова одного языка на другой язык, а в том, чтобы раскрыть смысл этих слов. Точное и полное понимание действительности переводчиком, его словарный запас становится фундаментом для создания правильного, точного и наиболее близкого к оригиналу перевода произведения. Трудности, связанные с такими важными задачами как сохранение индивидуального стиля автора и сохранения им национального колорита в произведении, в определённой степени связаны с

проблемами перевода лексики и фразеологии [2.432].

Воссоздание на английском языке метафор из четверостиший «Кутадгу билиг» является не просто переводом, а требует от переводчика особого внимания, глубоких знаний о культуре тюркских народов, их жизни и образе мышления, национальных ценностях и своеобразных национально-культурных традициях.

Как это следует из данных истории, жизнь тюркских народов X-XI веков невозможно представить без скотоводства и сельского хозяйства. Естественно, это отразилось в творчестве поэтов и писателей того времени. В ряде бейтов из «Кутадгу билиг» встречаются метафоры, основанные на названиях животных. Так, автор переносит качества животных на характеристики человека (см. Таблицу 1):

Таблица 1

На древнетюркском	Прямое значение	Смысловая нагрузка в произведении
arslan	лев	язык, отважный, коварный;
börı	волк	голодный, властный, богатый, бдительный, храбрый, полководец, враг, смерть
qözi	баран (овца)	умный, бдительный, беспомощный, ребёнок, простой народ
At	лошадь	сильный, быстрый, гроб
qoy	баран	народ, следующий, мягкий, ребёнок
büği	олень	внимательный, быстрый
it	собака	презренный, жадный, низкий, неумный
qirği	ястреб	высоко летающий, чарующий
qulan	кулан	быстрый, неуловимый, трудности
jilqi	кони	зажиточный народ, неумный, глупый, жадный
toqli	козы	простой народ, беззащитный
tönguz	свинья	нападающий

В главе «Слово о том, какими должны быть беки» предворитель Огдулмыш описывает качества, присущие бекам:

Кур арслан болу бэрсэ ытқа башы,
Бу ыт барча арслан болур өз туши.
Қалы болса арсланқа ыт башчысы ,
Бу арслан болур барча ыт сақышы.
Смотри, если предворителем собак станет лев,
То все эти собаки будут львами, как и он.
А если собака станет предворителем львов
Эти львы станут наравне с собаками.

Если в четверостишии автор под образом *льва* имеет в виду отважного, справедливого правителя, то под образом *собаки* разумеются низкие и подлые люди. Значит, положительные и отрицательные качества животных метафорически переносятся на людей. Посредством данной метафоры отмечается, что если правитель будет отважным и справедливым, то люди последуют за ним, и страна будет процветать.

Обращает на себя внимание тот факт, что первое слово в даннном четверостишии у К.Каримова представлена в форме “kur” и контаминирует с формой “ko‘rgin” (что может быть и технической ошибкой). Автор производил транскрипцию на основании Наманганской копии. В вводной части книги учёный отметил, что данная транскрипция не может в полной степени воссоздать язык «Кутадгу билиг» и что его труд является первым шагом по воссозданию языка этого произведения [10.38]. А.Касиева приходит к выводу, что вследствие этого при переводе смелое, сильное, отважное, бесстрашное стихотворение превращается обычную лирику [7.28]. Основанием для этого суждения является тот факт, что в переводах У. Мэй и А. Иванова перевод опорного слова в бейте “kur” (смелый, отважный) остался в стороне. Нужно полностью согласиться с этим мнением. В действительности нужно будет отметить, что и “kur” и “kör” по строению и смыслу соответствует всем требованиям. В этом смысле оно может существовать в смысловой парадигме и в форме “kur” и с формой “ko‘r” (c to see, to obey –увидеть, смотреть, подчиняться) [12.316].

Рассмотрим два перевода вышеуказанных четверостиший. Перевод У.Мэй:

Whenever a lion o'er dogs takes the lead,
Then any poor cur roars like lions, indeed!
But if some poor hound o'er the lions should reign,
Then lions would look just like curs, once again!

Когда лев станет предводителем над псами,
Тогда всякая бродячая собака рыкает как лев.
Но если отвратительный пес станет управлять львами,
Львы станут похожими на бродячих собак.

Воссоздание при переводе поэтических приёмов, передает гармоничность, достигнутую автором, и применение их в других интерпретациях, способствует расширению и усилению мыслей и сохранению смысла текста оригинала на языке перевода [1.95].

Четверостишия переведены согласно оригиналу, сохранив свои художественные особенности. Но если в оригинале один из главных образов – отважный и справедливый падишах – меафорически уподобляется льву, то в переводе его сопоставляют со львом в виде сравнения. Это не является чем-то негативным. Так, в арабской поэтической традиции при использовании образа льва как символа отважности и справедливости шах, акцент делается на льве.

Рассмотрим перевод четверостишия, сделанный Р.Денкоффом:

A dog is leonine
If he gets a lion's head;
Give the dog's head to the lion.
He becomes canine instead.
Если собака обреете голову льва,
То она станет львом;
Дай собачью голову льву –
И он уподобится собаке.

Р.Денкофф при переводе меняет размер стихотворения, но рифма остаётся сохранённой. Так же на английском языке воссоздаются подлинные метафоры. Подлинную метафору «собака» переводчик с английского языка переводит в двух вариантах как "dog – собака" и "canine" - "похожий на собаку (собакоподобный)". Метафора в переводе конкретизируется, т.е. преобразована в соответствии с подлинным смыслом. Потому что в соответствии с подлинным смыслом, если львом управляет собака, он не превратится в собаку (с физиологической точки зрения), но его действия будут похожими на действия собаки. В этом плане перевод Р.Денкоффа адекватен.

Это состояние очень удачно отражено в переводе С.Иванова:

Когда над собаками лев – голова,
Любая собака похожа на льва.
А если над львами главенствует пес,
Собачьего будут все львы естества!

Видно, что в произведении слова «лев», «собака», «пёс», «собачьего» полностью раскрывают подлинный смысл.

Можно сделать вывод, что метафоры, употреблённые Юсуфом Хас Хаджибом в четверостишиях, говорят о том, что он является талантливым мастером слова. Перевод таких метафор на другие языки требует от переводчика большой ответственности и таланта. Как показывают исследования, в переводе метафор У.Мей и Р.Денкофф в различной степени приближались к оригиналу. Во многих случая при переводе тонкие оттенки литературно-изобразительных средств нередко размываются. Подача такого тонкого средства описания с помощью альтернативного варианта считается высоким профессионализмом переводчика. Не следует требовать дословности при анализе перевода. Наоборот, качество перевода нужно оценивать по тому, насколько адекватно передано подлинное значение оригинала. Ни в коем случае это не означает отказ от изобразительных средств. Естественно, невозможно всегда метафору переводить метафорой. Причиной этого может быть отсутствие эквивалента в том языке, на который осуществлен перевод. Целью перевода является не передача общего смысла текста, а то, чтобы при переводе не «растоптать» цветник, скрытый внутри переводимого произведения и показать его читателю на другом языке.

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