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BIOLOGICAL SCIENCES

STRUCTURAL ARRANGEMENT OF NOSOCOMIAL MYCOBIOTA AND DISTRIBUTION REGULARITY IN STOMATOLOGICAL CABINETS

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Abstract

The presented work is dedicated to the study of the structural composition and species diversity of the nosocomial mycobiota formed in dental clinics. It was found that the mycobiota formed in dental clinics consisted of 30 species of fungi belonging to 12 genera. It was determined that representatives of 3 genera, including *Penicillium*, *Aspergillus* and *Candidum*, are widespread in dental offices and make up 63.3% of the total mycobiota. At the same time, it was clarified that the density of microscopic fungi spreading in the atmospheric air of dental offices varies between 300-350 CFU/m³.

Keywords: dental clinic, nosocomial mycobiota, structural organization, species diversity, density of fungi, environmental factors.

Fungi living in the environment together with other living organisms have strong competitive ability and are characterized by a fairly wide range of distribution. It should be noted that the violation of the bioecological balance, as in natural ecosystems, has led to these and other changes in the lifestyle of living organisms living in anthropogenic environments, especially microscopic fungi [1; 2; 4]. Thus, in the environment where the navels fall, the hyphal forms related to production processes, large-scale contamination relations with the environment, active metabolism, adaptation to different environmental conditions, rapid transformation into saprotrophic or clinical forms, etc., can be obtained. The fungi that contain the mentioned properties, especially the species belonging to the genera *Aspergillus*, *Penicillium*, *Trichoderma*, *Mucor*, *Cladosporium*, *Scopulariopsis*, *Stachybotrys*, *Stemphyllum*, easily migrate to buildings of various purposes, including health care facilities, and after a certain period of time show pathogenic properties and soon pathologies of mycotic origin are manifested [3;6;7]. In particular, the presence of *A.flavus*, *A.fumigatus*, *A.glauca*, *A.niger*, *A.nidulans* and *A.terreus* species belonging to the genus *Aspergillus* is more dangerous and can be considered a risk factor for the health of patients with low immune status. At the same time, it became known that in any place, including in healthcare facilities, hydrothermal parameters are out of control or the creation of an imbalance situation leads to the enrichment of the pathogenic composition of the formed mycobiota both in terms of number and species diversity, and leads to an increase in the expansion activity of the above-mentioned fungi [9;10].

The purpose of the presented work is devoted to the study of the structural organization of nosocomial mycobiota formed in stomatological clinics and their species diversity.

Material and methods:

The Republican Stomatology Center, the dental clinic of AMU and 5 dental offices operating in Baku were selected as research objects and studied from the mycological aspect. The sedimentation method was used to take samples from the air environment of dental rooms. At this time, Petri dishes filled with *Çapek-Doks* or *Saburo* nutrient media were kept open for 30 minutes at a height of 1-1.5 m from the ground. At the same time, samples were taken from the surface of the floor, ceiling, walls, medical instruments of the room, as well as from the oral cavity of the patients by the application method and inoculated in the indicated food environments. Colonies were counted on the 7th day of cultivation. The obtained results were expressed by calculating CFU either in 1m³ air or in 1 g of applied material. In order to obtain a pure culture, it was considered appropriate to conduct the experiments in 4-6 repetitions. Known determinants were used to identify and determine species affiliation of the studied mushroom species.

The frequency of occurrence of fungi is expressed by increasing the ratio of the studied species to the total number of mycobiota by 100 times. Those with more than 40% are considered dominant, those between 20-40% are common, and those below 20% are considered rare [5; 8; 11].

Results and discussion

As a result of our research, it was determined that 30 species of fungi belonging to 12 genera participate in the structural organization of nosocomial mycobiota formed in dental clinics and offices located in Baku (table 1). The comparative characterization of nosocomial mycobiota according to the genus composition clearly shows that 3 genera, including *Penicillium*, *Aspergillus* and *Candida*, are dominant. Thus, *Penicillium* genus 7 species or 23.3%, *Aspergillus* and *Candida* genera each 6 species or 40% make up 63.3% of the total mycobiota. Also, *Alternaria* and *Cladosporium* were represented within the mycobiota with 2 species each or

13.4%. Each of the 7 genera remaining on the ground is 1 species and they make up 23.1% of the total mycobiota. At the same time, the genera that make up the nosocomial mycobiota were analyzed according to the frequency of occurrence and the following results were obtained: *Penicillium* 85-95%, *Aspergillus* 45-50%, *Candida* and *Cladosporium* 40-45%, *Alternaria* 35-40%, *Rhizomucor* and *Rhizopus* 15- 20%, *Eurotium* and *Geotrichum* 10-15%, remaining genera 5-10%. Also, it was found that the average numerical value of the spore concentration collected in the atmospheric air after the sporulation of the microscopic fungi living in the dental offices varies between 15-120 CFU/m³.

Table 1

Structural organization of nosocomial mycobiota formed in dental clinics and offices

№	Genus fungi	Species fungi
1	<i>Aspergillus</i> (1/6)	<i>Aspergillus clavatus</i> Desm; <i>A.fumigatus</i> Fresen; <i>A.niger</i> Tiegh; <i>A.nidulans</i> G.Winter; <i>A.terreus</i> Thom; <i>A.ustus</i> Bainier.
2	<i>Alternaria</i> (1/2)	<i>Alternaria alternata</i> (Fr.) Keissl; <i>A.tenuissima</i> Wiltsh.
3	<i>Candida</i> (1/6)	<i>Candida albicans</i> Berkhout; <i>C.dubliniensis</i> Bucvley; <i>C.glaburata</i> Robin; <i>C.krusei</i> Berkhout; <i>C.stellatoidea</i> Bucvley; <i>C.tropicalis</i> Grenb.
4	<i>Cladosporium</i> (1/2)	<i>Cladosporium cladosporioides</i> (Fresen) de Vries; <i>C.herbarum</i> Pers.:Fr.) Link .
5	<i>Eurotium</i> (1/1)	<i>Eurotium amstelodami</i> Mangin.
6	<i>Geotrichum</i> (1/1)	<i>Geotrichum candidum</i> Link.
7	<i>Humicola</i> (1/1)	<i>Humicola grisea</i> Traaen.
8	<i>Penicillium</i> (1/7)	<i>Penicillium capsulatum</i> Raper et Fennel; <i>P.citrinum</i> Thom; <i>P.decumbens</i> Thom; <i>P.expansum</i> Link; <i>P.chrysogenum</i> Thom; <i>P.verrucosum</i> Dierckx; <i>P.viridicatum</i> Westling.
9	<i>Scopulariopsis</i> (1/1)	<i>Scopulariopsis brevicaulis</i> (Sacc.) Bainier.
10	<i>Sporotrichum</i> (1/1)	<i>Sporotrichum pruinosum</i> Gelman et Abbot.
11	<i>Rhizomucor</i> (1/1)	<i>Rhizomucor pusillus</i> M.A.Shipper.
12	<i>Rhizopus</i> (1/1)	<i>Rhizopus arrhizus</i> A.Fischer.

It was determined that the density of microscopic fungi spreading in the atmospheric air of dental offices varies between 300-350 CFU/m³. As it can be seen, the mentioned index is quite lower than the micronormal (≤ 500 CFU/m³) determined by the World Health Organization (WHO) for indoor spaces. In our opinion, this is directly related to sanitary-hygienic work carried out in hospital buildings, including dental clinics. Also, despite the satisfactory level of conditions created, the migration of microscopic fungi that are widespread in the environment through the ventilation system to hospital buildings, including the internal environment of dental offices, is an almost unstoppable process. At the same time, the cooling of dental offices through air conditioners leads to a sufficient increase of humidity in the room, which creates fertile conditions for the reproduction of fungi. Therefore, the concentration of fungal spores in the atmospheric air of hospital buildings, including dental offices, is always high, and patients are infected with mycotic pathologies by the aerogenous route.

Thus, the nosocomial mycobiota formed in healthcare facilities, including dental clinics and offices, is characterized by a fairly rich variety of species and mainly acts in the form of bioaerosolized particles.

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ЭКОЛОГО-ФИТОЦЕНОТИЧЕСКИЕ СПЕКТРЫ ЭКОТОПОВ, ОБУСЛАВЛИВАЮЩИЕ БИОТОП И ФОРМИРУЮЩИЕ РАСТИТЕЛЬНЫЕ СООБЩЕСТВА НА ТОО «КАЗФОСФАТ»

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Аннотация

Горы Улькенбурылтау (переводится как большая вздыбившаяся гора) являются обособленным юго-восточным районом Каратауского флористического округа. В орорафическом понимании эти горы являются крайней западной антиклиналью Киргизского хребта, южные шлейфы которой соприкасаются с восточным макросклоном Малого (Юго-Восточного) Каратау. Абсолютные высоты здесь колеблются от 650 м над уровнем моря по подножьям и шлейфам и до 1138 м на вершине. Геологически это относительно молодые горы, образовавшиеся в результате тектонической интрузии гранита, поднявшего и разорвавшего на части толщи верхнедевонских и нижне-каменноугольных известняковых и песчаниковых морских отложений.

Abstract

The Ulkenburyltau Mountains (translated as a large rearing mountain) are a separate southeastern region of the Karatau floristic district. In an orographic sense, these mountains are the extreme western anticline of the Kyrgyz Range, the southern plumes of which are in contact with the eastern macroslope of the Small (South-Eastern) Karatau. Absolute heights here range from 650 m above sea level along the foothills and trails to 1138 m at the top. Geologically, these are relatively young mountains, formed as a result of tectonic intrusion of granite, which uplifted and tore apart strata of Upper Devonian and Lower Carboniferous limestone and sandstone marine sediments.

Ключевые слова: новоджамбулский фосфорный завод, казфосфат, фитоценология, растения, месторождения.

Keywords: Novodzhambul phosphorus plant, kazphosphate, phytocenology, plants, deposits.

Цель исследовательской работы - систематический анализ урбанофлоры растений, встречающихся на территории Казфосфат, и определение общего видового состава флоры.

Во-первых, основной деятельностью завода АО «Казфосфат» является добыча и переработка фосфорной руды на месторождениях, расположенных в Жамбылской области, обогащение и переработка сырья, производство минеральных удобрений, желтого фосфора и фосфорсодержащей продукции. Продукция реализуется в основном на экспорт и частично на внутренний рынок Республики Казахстан.

Во-вторых, Улькен Бурылтауское месторождение в геологическом строении принимают участие отложения известково-гипсовой свиты нижнего карбона (C₁). Из этих отложений на площади месторождения распространены пласты гипса с вмещающими его ниже и вышележащими известняками.

Структура сложена складками, такими как плавники и пальцы. Кентасовый пласт, образовавшийся в эпоху Визе, состоит из сульфатно-карбонатных пород, простирающихся на 18-25 км вдоль северного склона Большого Бурылтауского поднятия. Данное обстоятельство сформировало мозаику из сочетания кислых и щелочных почв.

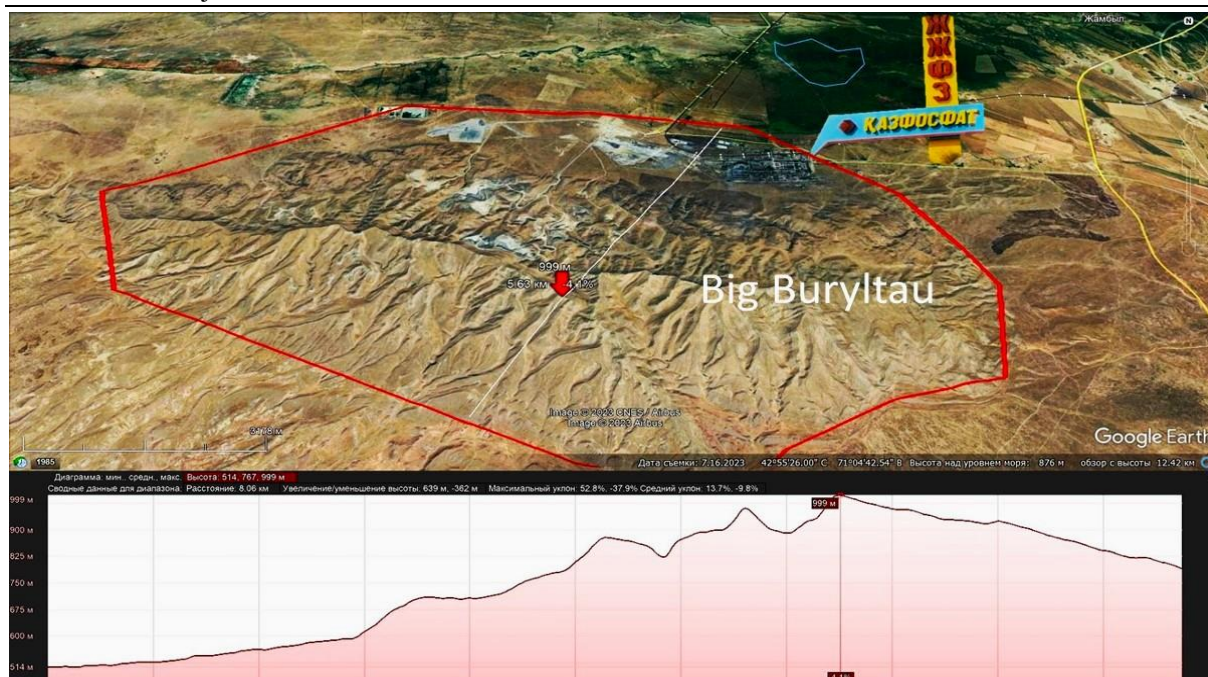
На месторождении имеется 5 участков, в которых установлено, что гипсовая руда состоит из 4 слоев. Слои разделены известняковыми и глинистыми сланцевыми пластами толщиной 0,2-1,3 м. В глубоких слоях сечения наблюдается превращение гипса в ангидрид. Гипс мелкокристаллический, белого цвета, плотный. Его размер в кентасе достигает 92%. Фонд по категории А+В+С составил 50,4 млн. долл. т. С 1961 года месторождение осваивает ПК «Жамбылгипс».

Характерной особенностью этих гор является почти полное отсутствие каких-либо родников и ручьев, а вся вода от осадков дренажирует и высачивается на равнине. Годовое количество осадков, выпадающих главным образом в зимне-весенний период, не превышает 350 мм. Характер растительности здесь довольно аридный с преобладанием эфемеров и эфемероидов.

Объекты и методы исследования.

В качестве объекта исследования служила фитоценология растений, встречающихся в прилегающих территориях производства НДФЗ.

Общий вид и характеристика рельефа с указанием высоты объекта исследований указаны на рис.1.(1)



1-рисунок. Общий вид и характеристика рельефа с указанием высоты объекта исследований.

Объекта исследования условно разделили на два: первый – это участки прилегающие непосредственно к производственной территории завода НДФЗ. Второе – это месторождение гипсового

камня Улькен-Бурул является частью Улькен-Бурултауского месторождения гипса и в административном отношении находится в Жамбылском районе Жамбылской области в 35 км к западу от г.Тараз (рис. 2).

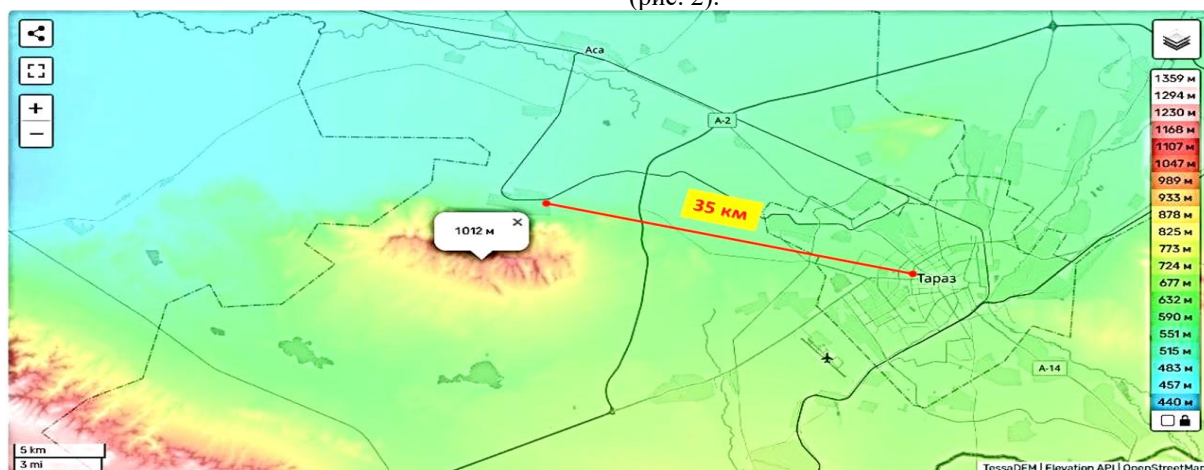


Рисунок 2. Топографическая карта расположения Улькен Бурултау и завода НДФЗ.

Районный центр и одноименная железнодорожная станция пос. Асса находится в 16 км к северу от месторождения, южнее которой проходит железнодорожная ветка Тараз-Каратау-Жанатас (2).

Результаты исследования.

Производство горных работ сопровождается выделением в атмосферу карьера вредных газообразных и аэрозольных примесей, а увеличение глубины карьера приводит к резкому ухудшению естественного воздухообмена в карьерном пространстве. Внутренние источники, к которым относятся все технологические процессы, карьерные автодороги, выветривание бортов карьера при отсутствии или недостаточной эффективности средств борьбы, как правило, приводят к местным загрязнениям атмосферы на отдельных участках и

рабочих местах. Загрязнение атмосферы карьера пылью и газами происходит также и при взрывных работах, в результате которых в атмосферу выделяются пыль, окись углерода и окислы азота. Большая часть вредных примесей при взрывах ВВ выбрасываются в воздух в виде пылегазового облака. Часть ядовитых газов остается в отбитой горной массе и постепенно выделяется в атмосферу. Практика борьбы с пыле-газовыделением показывает, что для обеспечения нормальных санитарно-гигиенических условий труда в карьере необходимо применять комплекс инженерно-технических и организационных мероприятий по предупреждению пылегазовыделения, по подавлению витающей пыли в карьере (рис.3).



Рисунок 3. Массовый взрыв на открытых горных работах

Основными мероприятиями по борьбе с пылью при бурении скважин является мокрое пылеподавление с помощью воздушно-водяной смеси. Удельный расход воды на 1,0 п.м. скважины определится из выражения:

$$q = 0,785 d^2 \rho (W_{\text{оп}} - W_b) / 100, \text{ л/м,}$$

где: d – диаметр скважины, м; ρ – плотность горных пород, 2850 кг/м^3 ; W_b – естественная влажность пород, 1,0 %; $W_{\text{оп}}$ – оптимальная влажность буровой мелочи, 50 %. Удельный расход воды на 1,0 м скважины составит: Буровой станок Сандвик ДІ 310 – 20 л/м. В таблице №1 приведен расход воды для бурения взрывных скважин.

Таблица №1.

Расход воды для бурения взрывных скважин

№ п/п	Наименование показателей	Ед. изм.	Показатели
1	Годовой объем буровых работ	м	3800
2	Годовой объем буровых работ	м	15
3	Годовой расход воды	м^3	76000
4	Сменный расход воды:	м^3	300

Для выявления флоры считали достаточным регистрировать все встреченные виды растений с указанием их местообитаний, однако лучшим вариантом выявления флоры и особенно характеристики парциальных флор считали геоботанические описания.

Геоботаническое описание как известно это полный список видов растительного сообщества с указанием их количественного участия. Каждое

описание обязательно получали топографическую привязку к местности, чтобы при желании можно было найти то место, где оно выполнялось, и характеристику экологических условий (положение в рельефе и характер местообитания). Фитоценология растений на территории, прилегающей к заводу НДФЗ и месторождению добычи гипса Улькен Бурул показаны на рис.4 (3).

1. *Dodartia orientalis* L. - Додарция восточная

Отдел: *Magnoliophyta*

Класс: *Magnoliopsida*

Порядок: *Scrophulariales*

Семейство: *Scrophulariaceae*

Род: *Dodartia*

Вид: *Dodartia orientalis* L.



2. *Glycyrrhiza uralensis*- Солодка уральская

Отдел: *Magnoliophyta*

Класс: *Magnoliopsida*

Порядок: *Fabales*

Семейство: *Fabaceae*

Род: *Glycyrrhiza*

Вид: *Glycyrrhiza uralensis*



3. *Mentha asiatica*- Мята азиатская

Отдел: *Magnoliophyta*

Класс: *Magnoliopsida*

Порядок: *Lamiales*

Семейство: *Lamiaceae*

Род: *Mentha*

Вид: *Mentha asiatica* Boriss.



4. *Artemisia scoparia*- Полынь венечная

Отдел: *Magnoliophyta*

Класс: *Magnoliopsida*

Порядок: *Asterales*

Семейство: *Asteraceae*

Род: *Artemisia*

Вид: *Artemisia scoparia*



5. *Epilobium hirsutum* - Кипрей волосистый

Отдел: *Magnoliophyta*
 Класс: *Magnoliopsida*
 Порядок: *Myrtales*
 Семейство: *Onagraceae* Juss.
 Род: *Epilobium*
 Вид: *Epilobium hirsutum* L.



6. *Verbascum sinuatum* - Коровяк выемчатый

Отдел: *Magnoliophyta*
 Класс: *Magnoliopsida*
 Порядок: *Scrophulariales*
 Семейство: *Scrophulariaceae*
 Род: *Verbascum*
 Вид: *Verbascum sinuatum* L.



7. *Chondrilla leiosperma* - Хондрилла гладкосемянная

Отдел: *Magnoliophyta*
 Класс: *Magnoliopsida*
 Порядок: *Asterales*
 Семейство: *Asteraceae*
 Род: *Chondrilla*
 Вид: *Chondrilla leiosperma*



Рисунок 4. Фитоценология растений на территории, прилегающей к заводу НДФЗ и месторождению добычи гипса Улькен Бурул.

Гипсовое месторождение Улькен-Бурылтау расположено на северном склоне одноименного с ним хребта, являющегося обособленной горной системой, протягивающейся на 40 км при ширине 8-12 км в широтном направлении от берега р. Асса на востоке, до озера Бийликуль на западе. На расстоянии 6-7 км от города Тараз хребет Улькен-Бурылтау начинается относительно невысокими грядами и по мере удаления к западу постепенно повышается, достигая наивысшей отметки 1138,4 м в



Рисунок 4. Рельеф Улькен Бурылтау.

На площади месторождения имеются два небольших родника - Терен-Сай и Сулу-Сай. Источник Сулу-Сай расположен западнее Западного участка, протекает в северном направлении. Его протяженность 3-4 км, расход воды не превышает 3,0 л/сек. Родник берет начало из толщи аркозовых песчаников и сохраняет живое русло по тальвегу сая на протяжении 1,3-1,5 км, после чего теряется в рыхлых делювиальных отложениях предгорной части массива. Вода источника отличается высокой степенью минерализации, на вкус горьковатосолоноватая. Химический анализ воды источника дает следующее содержание: CO_2 - нет HCO_3^- -169,5 мг/дм³, Cl^- -18 мг/дм³, SO_4^{2-} -следы, Ca^{2+} -545 мг/дм³, MgO^{2+} - 117,5 мг/дм³, жесткость -103,2 нем. град. Питается родник за счет инфильтрации атмосферных осадков. Источник Терен-Сай расположен в центральной части месторождения, постоянного водотока не имеет, в летнее время пересыхает. У подножья хребта имеется несколько заброшенных

центральной части с относительными превышениями до 650 м. Абсолютные отметки в центральной части хребта месторождения достигают 1137,8 м, а пределах месторождения не превышают 900 м. Северный склон хребта имеет крутой обрывистый характер, южнее и западнее склоны со сглаженными формами рельефа. Большинство небольших слоев протягиваются перпендикулярно к направлению простираения гипсовых пластов. Склоны сав более крутые в известняках и выполаживаются в гипсах.



Рисунок 5. Улькен Бурылтау. Север-Юг

колодцев, которые во второй половине июля пересыхают

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EARTH SCIENCES

NANOTECHNOLOGY IN ECOLOGY

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Abstract

To date, nanoscale materials are very in demand and are used in the most diverse areas of modern science and technology. This class of materials has completely new properties, which makes it possible to create new devices that will be more effective. Given such a variety of properties of nanomaterials, the question arises as to the possibility of using them for environmental protection, since this problem has now become global and it needs to be addressed. It is supposed that with the help of nanomaterials it will be possible to improve the environmental situation for the better, either directly, for example, detecting or removing existing contaminants, and indirectly, by inventing materials that will be harmless to the world around them. [7]

Keywords: nanotechnology in ecology, nanomaterials, ecology.

Introduction. Nanomaterials are materials created using nanoparticles or using nanotechnology and having unique properties. Nanotechnologies are actively used in medicine, pharmaceuticals, mechanical engineering, industry, agriculture, biology, electronics, and ecology. They make it possible to create tiny materials, control them at the atomic and molecular level and produce devices whose size does not exceed 100 nanometers.

The use of nanotechnology in ecology is associated with the creation of new highly efficient insulating materials. For example, the lack of clean water is a major environmental problem, especially in developing countries with military conflicts and frequent natural disasters. Population growth and intensive agriculture

are associated with the ever-increasing consumption of clean water, so the search for new methods of its purification is becoming increasingly urgent. The use of nanomaterials can help improve existing ones, as well as create completely new technologies and materials used for water purification.

Nanofiltration is becoming one of the main processes for water purification, in particular to soften and remove ions or organic compounds from water. The peculiarity of nanomembranes to selectively remove “unnecessary” particles or ions makes it possible to use such filters in various fields and for various purposes. The functional properties of nanofilters strongly depend on which nanoparticles are used, for example, on the composition or morphology. (picture1)



Picture 1. Nanotechnology in ecology.

There are problems with using modern filters. One of them is contamination of the filter with chemicals or microorganisms, and quite quickly. However, with the help of nanofilters it will be possible to avoid such situations. For example, silver nanoparticles can be used to avoid biofouling of the filter. It has been proven that it only takes 60 minutes to completely destroy particles

that come into contact with a filter coated with silver nanoparticles. [1]

Pollution of surface and ground waters with various highly toxic chemicals, heavy metals, etc. This is a very serious world problem. Adsorption nanomaterials are used to reduce pollution levels.

In order to remove mercury ions from water, a polypyrene/depleted graphene oxide composite can be

used. It has been proven that the use of sheets of this composite with a thickness of 1.34 nm makes it possible to selectively remove mercury ions from water with an adsorption capacity of 980 mg/g.

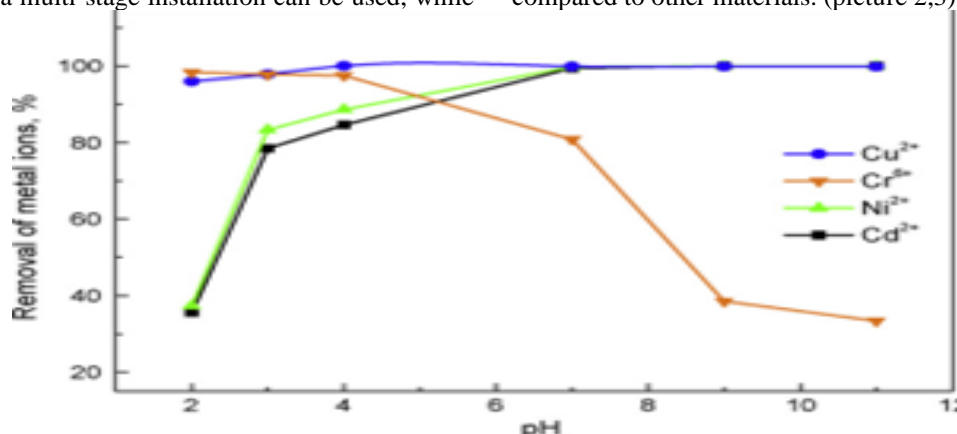
Iron nanoparticles can adsorb chromium ions from solution with much greater efficiency than the substances used. The acidity of the medium greatly affects the absorption efficiency: for example, at pH = 4, the adsorption capacity is 31.5 mg/g, and at pH = 7 – 23.3 mg/g. Another key feature is the easy ability to reuse nanoparticle data.

In order to remove various metal ions from water, magnetic iron oxide nanoparticles can be used. The average particle size was 21 nm. Depending on the acidity and temperature of the medium, the adsorption efficiency of various metal ions changes. It varies from 35 to 100%. In order for the removal of metal ions to be complete, a multi-stage installation can be used, while

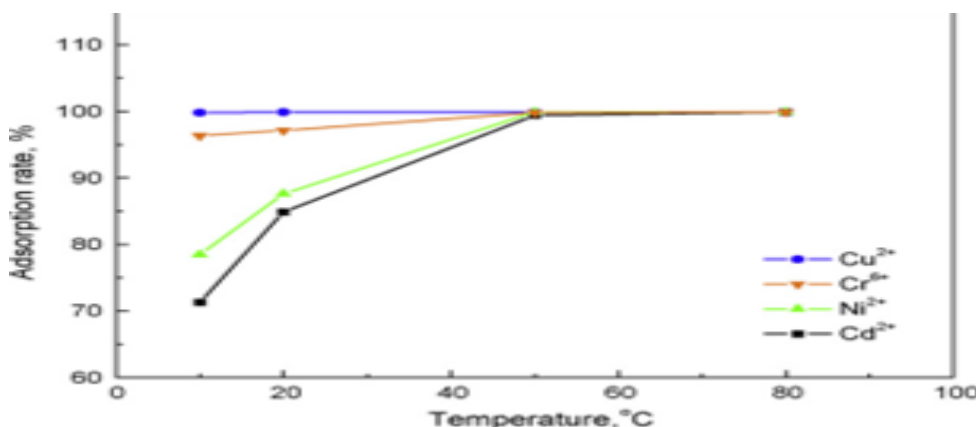
changing the acidity and temperature of the medium. [2,5]

Aluminum oxide nanoparticles with a particle size on average of about 40 nm can adsorb formaldehyde quite effectively. If the acidity of the medium is from 5 to 8.5, then formaldehyde is removed from the water by 100%. In addition, these particles can also be used to adsorb formaldehyde from a water stream. The removal of oil and petroleum products from water can also be achieved using nanoparticles. This can be done using a nanocomposite.

The efficiency of various adsorption nanomaterials is much greater than that of the materials used today. The examples discussed confirm this. The reason for this is that the specific surface area is very important for adsorption. Since this value for nanoparticles is quite large, the efficiency will be significantly higher compared to other materials. (picture 2,3)



Picture 2. Dependence of adsorption efficiency on pH of the medium



Picture 3. Dependence of adsorption efficiency on medium temperature

With the development of nanotechnology, we need to understand that nanomaterials can cause environmental pollution. Nanomaterials can influence the environment based on their special properties and behavior at the nanoscale. Here are a few aspects to consider:

1. Toxicity and Biocompatibility: Some nanomaterials may be toxic to living organisms. It is important to study their effects on biological systems. On the other hand, there are also biocompatible nanomaterials that can be used for medical purposes without negative effects on the body.

2. Distribution in the Environment: Nanomaterials can be distributed in the environment, including soil, water and air. This can occur either as a result of industrial processes or due to the use of products containing nanomaterials.

3. Accumulation in Organisms: Nanomaterials can be absorbed by organisms and accumulate in their tissues. This can cause various biological effects and have consequences for ecosystems.

4. Changing the Properties of Substances: Nanoscale changes in the chemical structure of materials can lead to changes in their properties. This may affect

their behavior in the environment and interaction with other chemical components.

5. Environmental Safety of Production: Nanomaterial production processes can also have an impact on the environment. Effective waste management and minimizing environmental impacts play an important role in the development of sustainable nanotechnology.

Research in this area aims to better understand the effects of nanomaterials and develop methods for their safe use. This includes research in nanotoxicology and ecotoxicology, as well as the development of standards and regulation for nanomaterials.

Some nanoparticles can threaten nature and human health. Therefore, experts are trying to attract public attention not only to the prospects, but also to the likely risks. [3]

Cleaning the environment from nanoparticles is a serious problem, since they are absorbed by plants and transported by wind over vast distances. Scientists have discovered that iron oxide nanoparticles accelerate the movement of man-made lead in the air. And nano-sized aluminum oxide particles interfere with plant growth.

The size of nanoparticles allows them to penetrate the body through breathing and even through the skin. They enter the bloodstream and accumulate in cells, disrupting their functioning. People working with nanomaterials are most at risk.

In addition to monitoring industrial safety, government agencies need to provide training for specialists who will assess the risks associated with nanotechnology. International and national occupational safety and health systems should also include methods to measure the degree of impact of nanomaterials on the

health of people involved in their production, transportation, use and disposal.

In addition, it is necessary to ensure that the factories where nanomaterials are produced do not worsen the environmental situation and do not harm the health of people living in close proximity to them. [4,6]

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HISTORICAL SCIENCES

CREATING A NEW CULTURAL ENVIRONMENT IN THE 1920S IN UKRAINE

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Abstract

The article examines how the worldview in the 1920s was shaped with the help of comprehensive ideology, control over the media of that time and absolute subordination of creative intellectuals who influenced public opinion by the Soviet party-state group with terrorist methods. Having seized power in Ukraine through the spread of false promises, local collaborators and direct aggression, the Bolshevik Party began with a total take of the population and terror and at the same time instilling ideology, trying to replace it with traditional culture. Significant attention was paid to well-known figures in society, using propaganda and artistic means to form and spread the communist worldview in society, and the only criterion for evaluating works of art was the ideological component. The system of total control was embodied. *Intimidation, harassment, arrests, camps and killings began.* In fact, culture, education and science became an appendage to the norms and rules of social behaviour established by the Bolsheviks. *And already in the second half of the 1920s, the task was fulfilled, and heavy industry enterprises were built at an accelerated pace, Ukrainisation was curtailed, and a single ideology prevailed.*

Keywords: Ukraine, society, artists, consciousness, Bolsheviks, cultural policy, terrorist methods.

Creating a New Cultural Environment in the 1920s in Ukraine

Problem statement

Today Ukrainian society is at the turn of the epoch. It is not only about the latest technologies that have become part of our lives but also a radical transformation of worldview. The transition from traditional information systems (printed products, radio and television) to innovative ones means that information has become publicly available, is immediately disseminated, and is much more difficult to control or impose censorship restrictions. However, there are new challenges related to regulating the information field at the state level, manipulating consciousness, and protecting the individual from the spread of fake information.

The successors of the Bolshevik crimes and unprecedented lies, the modern Russian leadership, educated its population on propaganda similar to the Bolshevik and Goebbels (considering modern technology). No wonder 81% of Russians support the actions of the Russian army in Ukraine (a poll conducted by the Levada Centre NGO, which the Russian government considers a "foreign agent") [19]¹. At the same time, Russia is destroying any reports that contradict its propaganda line about the invasion of Ukraine as a "special military operation" [6]².

A similar situation was already in the 1920s when the party-state group managed to change the population's worldview in almost the entire Russian Empire. The Bolsheviks controlled not only the media

but also any other communicative environment from print and radio to everyday communication with colleagues, neighbours, conversations "in the kitchen", jokes, etc. And if publishing houses (printing houses, cinemas, photos, etc.) were enough to take away from the owners, nationalise and personally decide which products to release and which to ban, it was a bit more difficult to influence public opinion. What was needed was a strong ideology and the control of the whole society. Particular attention was paid to those who had public authority, whose words were listened to, and who could influence the mass consciousness. First of all, it concerned social and political figures, representatives of culture, education, and science. And here, the Bolshevik government did not stop at anything. Any "deviations" from Lenin's understanding of the construction of communism, not to mention ideological and political opponents, were perceived as hostile and subject to elimination. Then, it was the turn of representatives of the creative intelligentsia. Initially, they were used as a universal tool to destroy the previous worldview. Traditional ideas, holidays, and even faith replaced Soviet, artificial ones. Historical events were distorted or silenced, famous historical figures were watered down, new holidays, new rites were created, a pantheon of "gods" (Marx-Engels-Lenin, and then Stalin) was formed, and there were "heroes" (Chapaev, Shchors, Pavlik Morozov). etc.). And when this task was accomplished, all figures of culture, education, and science, who did not agree to glorify the Bolshevik ideology, in the version pointed

¹Moiseev V. For most Russians, the war in Ukraine evokes a sense of "pride in Russia" - a poll. // The page. News. 2022, April 4. / <https://thepage.ua/ua/news/opituvannya-levada-centru-shodo-stavlennya-rosiyan-do-vijni-v-ukrayini>
²Hamilton I.A. Russia is playing whack-a-mole as it repeatedly blocks niche parts of the internet spreading information

about Ukraine, including a pet grooming site, a scary story blog, and a sudoku site. // Business Insider, May 8, 2022. / <https://www.businessinsider.com/russia-playing-whack-a-mole-ukraine-anti-war-information-online-2022-5>

out by the leaders, were subject to criticism, censorship, and prohibition. *Dissenters were intimidated, persecuted, imprisoned and killed.* "Soviet experiments with memory were aimed at educating the "new man", teaching him how to speak "correctly", presenting himself, his team, his work, to demonstrate their faith in a bright socialist future" [12; p.2]³.

The rudiments of the cultural environment created in the 1920s can still be observed today. No wonder, until the last days of the USSR, in Ukrainian schools, the Russian language was called the "native language", intensive study of Russian literature, and teachers who taught it received a higher salary. Instead, Ukrainian language and literature were optional subjects and could be waived by writing a statement. Therefore, it is not surprising that now actively used the "Russian-speaking population" concept and associated with it "Russian world". "All of this is an objective legacy of colonial/neocolonial times from the mental, deeply subconscious guidelines that are rooted in the culture of everyday life and were formed during the periods of the division of Ukraine between certain states and ending with various measures of economic and cultural integration of the country's regions to the former "All-Union" (Russian-imperial) space" [7]⁴. Part of the population still nostalgically remembers the Soviet past, talking about stability, victory and "respect" around the world. No wonder, in preparation for the war against Ukraine, Russia's special services worked with the help of collaborators and through propaganda. Their task was to maximise the Russification of Ukraine and the introduction of puppet power in the state [9]⁵. As a result, men were brought up who were hostile to Ukrainian culture, history and language. In no democratic country in the world can it be imagined that a national minority could force a titular nation to speak the language of that national minority, refusing to learn the language and know the culture of the country in which it lives.

Source and Literature Analysis

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4Hrabovskiy S., Losiev I. Ukrainian identity: problems and challenges. / Day, 2013. No 207 / <https://day.kyiv.ua/uk/article/tema-dnya-cuspilstvo/ukrayinska-identichnist-problemita-vikliki>

5Dumanska V. The Ghost of Nazism in Ukraine: How the Kremlin Worked with Collaborators for Decades Ukrainian Truth. April 13, 2022.

[/HTTPS://WWW.PRAUDA.COM.UA/COLUMNS/2022/04/13/7339061/INDEX.AMP](https://www.prauda.com.ua/columns/2022/04/13/7339061/index.amp)

6Kuts O. Ukrainisation as a catalyst for the spiritual life of Ukrainian society in the 20s and 30s. // Scientific notes of the Institute of Political and Ethnonational Studies. IF Kuras NAS of Ukraine. 2006. Vip. 32. pp. 224-232; Maliy K. Ukrainisation of education in the 1920s // Ridna shkola. 1996, -12 18; Idris N. Anti-Ukrainian sentiments in the cities of the USSR during the era of Ukrainisation "in the 20s - early 30s of the twentieth century. // Mandrivets: All-Ukrainian Scientific Journal, 2010. No 5. pp. 36-39; Parakhina M. Theory of the struggle of two cultures "- in search of Russian-Ukrainian historiographical consensus (past and present of one concept). // Ukrainian historical collection, Vol. 15, 2012. pp. 303-316.

In modern domestic historiography, many scientific papers are devoted to the Bolshevik cultural policy of the 1920s. Ukrainisation was considered in the studies of O. Kuts, K. Maliy, N. Idris, M. Parakhina, studying not only the positive changes in Ukrainian society and the revival of spiritual life, but also anti-Ukrainian sentiments that were widespread in the Russified cities of the USSR [15, pp. 224-232; 18, pp. 12 18; 10, pp. 36-39; 23, pp. 303-316] ⁶. Significant attention was paid to publishing (M. Andriichuk⁸) and the formation of censorship bodies, as the entire cultural sphere of Ukraine came under the comprehensive control of the totalitarian system (I. Avtushenko⁹). Works on party-state political terrorism occupy a significant place. Yes, Yu. Lavrynenko emphasises that Stalin's terror was an "ideological" terror, which included all the dissidents from Lenin's allies to the intelligentsia [16, 976 p.]¹⁰. The publication "Political Terror and Terrorism in Ukraine in the 19 - 20 centuries" became extremely important. There is the Institute of History of Ukraine of the National Academy of Sciences of Ukraine, which, based on a comprehensive source base, comprehends the problem of Soviet terror [24, 952 p.]¹¹.

In our opinion, research on the definition of Bolshevik methods of implementing the "cultural revolution" in Ukraine deserves special attention. In particular, S. Kulchytskyi emphasises that the socio-political system established by the Bolsheviks absorbed the revolutionary energy of the masses and enslaved them more profound. More subtly than all the states are known to humanity, defining what the communist leaders called socialism, more precisely Leninist-Stalinist communist socialism [14].¹² M. Frolov studied the concept of Bolshevik policy on the formation of the proletarian state¹³, K. Nikitenko considered the destructive influence of Stalin's repressions against the intelligentsia, which dealt an irreparable blow to Ukrainian culture, destroying the nation's elite [20, pp. 12-26].¹⁴ Klymenko O.M.

⁸ Andriichuk M. Vydavnycha sprava u pidradianskii Ukraini v mizhvoiennyi period [Publishing in sub-Soviet Ukraine in the interwar period] // Tekhnolohiia i tekhnika drukarstva. 2015. No 1 (47). p. 103-115.

⁹ Avtushenko I. (2000) Vplyv komunistychnoho totalitarnoho rezhymu na kulturnyi rozvytok Ukrainy [The influence of the communist totalitarian regime on the cultural development of Ukraine] (1920 — persha polovyna 1930-h rr.) // Etnichna istoriia narodiv Yevropy. Vyp. 5. p. 118-122.

¹⁰¹⁰ Lavrynenko Yu. Shot revival: Anthology 1917-1933: Poetry - prose - drama - essay / edited, foreword, afterword by Yu. Lavrynenko; afterword by E. Sverstyuk. Kyiv: Smoloskyp, 2008. 976 p.

¹¹¹¹ Political terror and terrorism in Ukraine. 19 - 20 centuries. Historical essays / D.V. Bishop, O.G. Bazhan, T.V. Bykova and others; resp. ed. V.A. Resins. Kyiv: Nauk. Dumka, 2002. 952 p.

¹²¹² Kulchytskyi S. How Leninist-Stalinist Communist Socialism Was Created / Week ua, January 11 2016. / <https://tyzhden.ua/History/229576>

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studied, on the example of writing the history of Dniproges, the memory construction of the "new man" in the USSR [12]¹⁵15.

The purpose of the article is to study the Bolshevik policy and the methods of its implementation for creating a new cultural environment in Ukraine.

Main Research Material

Taking advantage of the political expectations of the population of the vast empire of peace, social justice, freedom and democracy, the Bolshevik leaders with populist slogans: "peace to the people", "factories, plants", "land to the peasants", "all power to the Soviets", etc., managed to influence the emotional state of some citizens, especially its Lumpenproletariat-oriented layer, to arouse hatred for the existing political system and increase their supporters. Moreover, most people did not understand politics, economics, international relations or cultural priorities. "Leaders of the Bolshevik faction of the Russian Social Democrats gained popularity among the people due to populist demagoguery invented a workers' and peasants' state in which workers and peasants did not have the right to vote, and then using propaganda and mass terror created an unnatural, existing only in their heads socio-economic system" [14].¹⁶16

From the point of view of Bolshevik leaders, communist ideology was to become all-encompassing, replace traditional culture, and create new rituals, cults, myths, and gods. By instilling their ideology and creating political myths, the communist elite consciously cultivated the idea of its inseparable unity with the population, of the fact that it is a people's government "which in one fell swoop" is building a communist society.

And if, in the early stages, the Bolsheviks managed to deceive part of the population with populist promises and rely on local collaborators and direct aggression to establish power, then setting control over the occupied territory of Ukraine was a difficult task. In reality, their policies in the economy and culture have led to catastrophe and hatred.

No freedom was involved. Lenin also clarified this: "The language of equality, freedom and democracy in the current situation is nonsense. We are waging a class struggle, and our goal is to destroy the classes. As long as workers and peasants remain, socialism remains unfulfilled" [17, т. 40, pp. 304.]¹⁸18. Bolshevik leaders were also confident in their ability to arbitrarily define the borders of states [25, p. 145]¹⁹19, as they were aimed not at the free, democratic development of nation-states, but at the world

proletariat, the world revolution. Therefore, with the admiration of Ukraine, the majority of party members barely hid their hatred for everything Ukrainian, as well as for the existence of Ukrainian statehood in general, despite the demagoguery about the right of nations to self-determination. This was understandable because the Bolshevik leadership had imperial views (not only of Russians but of Russified Jews, Ukrainians, Georgians, etc., who were even more chauvinistic, constantly "proving" their affiliation with the Vylikoros (Great Russian – *tr.*)).

The bastions of the new government were Ukrainian cities, where about 80% of the members of the Communist Party of Ukraine lived, at the same time; the composition of the population was inversely proportional. And it was in the cities of the USSR that manifestations of Ukraine phobia took the sharpest forms [10, p. 36].²⁰20 Therefore, with the establishment of the Bolshevik regime in Ukraine, the previous imperial cultural and national policy was continued. Despite the proclaimed slogans of free culture development, language and various freedoms, the policy of Russification was maintained, and attempts at national cultural revival were severely halted. It meant that the use of the Ukrainian language, and its introduction into cultural and educational institutions was prohibited.

The Bolshevik Party also opposed all those who owned property, not just the "exploiters" and "oppressors". Unprecedented looting of the urban population began, church property was taken away, and grain was confiscated from peasants. And if the resistance to the communist government in the cities was suppressed by violence, then in the countryside, the government failed. Back in March-April 1919, peasants began protesting in Ukraine against the policy of military communism under the slogans "Down with the Commune!", "For Soviet Power - without Communists!" The anti-Bolshevik insurgents, united in more than 100 detachments, numbered more than 40,000. In the South, with the peasantry's support, Nestor Makhno fought until August 1921. The insurgent movement penetrated the ranks of the Red Army and blocked the work of state economic bodies, industrial enterprises, transport [22, p.15]²¹21. Ukrainians also remembered the Russian interventions well, despite attempts to cover them up with statements about "internal conflict" and "civil war". It became increasingly clear to the population that "with the conquest of Ukraine, the occupiers needed fuel from the Donetsk basin, sources of bread and food" [17, т. 38., p. 313].²²22.

¹⁵¹⁵Klymenko O.M. Constructing the memory of the "new man" in the 1920s-1930s (based on the materials of the USSR): Abstract. for science. stup. can. histories. Science 07.00.01. - history of Ukraine / Klymenko O.M. Kyiv, 2018.

¹⁶¹⁶Kulchytskyi S. How Leninist-Stalinist Communist Socialism Was Created / Week ua, January 11 2016. / <https://tyzhden.ua/History/229576>

¹⁸¹⁸Ленин В.И. Полное собрание починений. Москва, 1970. Т.40. С. 304.

¹⁹¹⁹Frolov M.O. Transformation of the Bolsheviks' views on the concept of the proletarian state (1914-1921) // Scientific works of the historical faculty of Zaporizhzhia State University. 2007. Volume 1 No 21 p. 145.

²⁰²⁰Idris N. Anti-Ukrainian sentiments in the cities of the USSR during the era of Ukrainisation "in the 20s - early 30s of the twentieth century. // Mandrivets: All-Ukrainian Scientific Journal, 2010. No 5. p. 36.

²¹²¹Orlynskyi A.R. Banditry and the struggle against it // Army and Revolution, 1921. No 2. p. 15.

²²²²Ленин В.И. Complete collection of repairs. Moscow, 1970. Т.38, p. 313.

Ukrainians were forced to defend their lives and take up arms, and the authorities continued to use terror. Thus use of force: regular army, militia, armed Commission workers, part of the Joint State Political Directorate, didn't give the necessary result. The situation was so threatening that the Labor and Defense Council, headed by Lenin, pointed out that the elimination of "banditry" was a matter of life and death for Soviet Ukraine [11, т. 6., p. 24].²³²³

Thus, the fear of their own existence forced the Bolshevik leadership to change its policy. First, they lost control of the territory and the ability to export resources with it. Not even the vast army and the hated Cheka, which tried to drown Ukraine in blood with the help of the Red Terror, helped. Secondly, in Russia itself, during the same period, there was an uprising of the garrison and crews of warships of the Baltic Fleet in Kronstadt. And to avert the threat and appease the population, in 1921, a new economic policy (NEP) was proclaimed and in 1923, a policy of indigenisation (Ukrainisation).

It is obvious that Ukrainisation was aimed at reassuring the population of Ukraine, which sought national and cultural revival and was outraged by the outright manifestations of Ukraine phobia. The Bolshevik Party decided to expand the use of the Ukrainian language in public institutions, created a network of educational institutions, and the publishing house was translated into Ukrainian. And to increase support for their regime at the national level, as Ukraine's political leadership was largely non-Ukrainian, local Bolsheviks became involved in the political and state apparatus. However, no alternative views on the "guiding role of the Communist Party" were allowed. All, without exception, had to carry out the orders of the central leadership. On the question of national culture, Lenin clearly stated his position: "there is only one solution to the national question (as far as it can be solved in the world of capitalism, the world of profit, gnawing and exploitation), and this solution is consistent democracy", and the slogan of national culture is bourgeois (and often the Black Hundred-clerical) deception. "Our motto is the international culture of democracy and the world labour movement" [17, т. 24, p. 195].²⁵²⁵ Based on this, it becomes clear that all talk about the national language culture development is only a tactical move made for a certain period. And after fulfilling the set tasks, Ukrainisation had to be completed. According to L. Kaganovich, such an achievement was considered deploying new industrial construction in Ukraine [21, p. 92].²⁶²⁶

However, Ukrainisation became a stimulus for the cultural revival of Ukraine. The number of publications increased, and in 1931 Ukrainian-language books by name began to predominate in Russian 6,218 titles of Ukrainian publications against 2014 Russian-language titles [2, p. 105].²⁷²⁷ However, this did not apply to circulations, but only to titles, because the number of Russian-language publications prevailed. Printed materials from the Russian Soviet Federative Socialist Republic also continued to arrive. In education, teaching was translated into Ukrainian, reaching 97.2% in 1929 in labour schools, 66% in vocational schools and 40% in higher education [15, p. 225].²⁸²⁸ In culture, new unions of writers and literary associations were organised, new theatres were built (the most famous was "Berezil"), film factories were established in Kyiv, Odesa, and Yalta. Societies and associations of artists of "Red Ukraine" and "Revolutionary Art" were founded.

At the same time, the propaganda component is growing. "Our task is to bring the fighting force of art to the highest social tension, making art the most powerful means of political and world work, i.e. state propaganda of communism... General education is school and extracurricular (including art: theatres, concerts, cinemas, exhibitions, paintings, etc.) ... should be closely linked to communist propaganda" [1, p. 118].²⁹²⁹ Therefore, all cultural figures, as well as educators, were obliged to "glorify" the activities of the Bolsheviks and spread their ideas. The works of art had to correspond to the ideology created by the Bolsheviks, and their artistic value was measured by political and ideological guidelines, which were constantly changing during the 1920s. "Artists glorified the "man of labour", and cartoonists created images of enemies. Everyone built a fictional world to the best of their ability and talent. *According to the laws of parallel lines, newspaper columns, literary works, and even school textbooks, all lived their own lives with almost no contact with reality. The main law of Soviet art was formulated unambiguously. Creative personalities were transformed into loyal slaves of the regime*" [20, p. 17].³⁰³⁰

Both the party leadership and the Russified population of Ukraine were highly negative about Ukrainisation. In practice, this meant that the study of the Ukrainian language was introduced formally. Soviet lower-level officials simply "spent time" training for a possible promotion, following instructions they did not understand, and middle-ranking civil servants could barely conceal their reluctance to Ukrainianise. Typical of that time is the

²³²³²³History of the Ukrainian SSR. Kyiv, 1977. Т. 6. p. 24.

²⁵²⁵²⁵Lenin V.I. Critical notes on the national question. Complete collection of works. Moscow, 1970. Т. 24, p. 195.

²⁶²⁶²⁶Nikolayets Yu. O. Settlement structure of the population of Donbass: (ethnopolitical aspect of dynamics) / Monograph. Kyiv: IPIEND named after IF Kuras NAS of Ukraine, 2012. p. 92.

²⁷²⁷²⁷Andriichuk M. Publishing in sub-Soviet Ukraine in the interwar period // Technology of Printing. 2015. No 1 (47). p. 105.

²⁸²⁸²⁸Kuts O. Ukrainisation as a catalyst for the spiritual life of Ukrainian society in the 20s and 30s. // Scientific notes of

the Institute of Political and Ethnonational Studies. IF Kuras NAS of Ukraine. 2006. Vol. 32. p.225.

²⁹²⁹²⁹Autushenko I. The influence of the communist totalitarian regime on the Ukraine cultural development (1920 - first half of the 1930's) // Ethnic History of the Peoples of Europe, 2000. Issue. 5. p.118

³⁰³⁰³⁰Nikitenko K. Culture and society: the conflict between totalitarian and personal (on the example of the era of Stalinism) // Bulletin of the LNAM. Series: Cultural Sciences. Vol. 29, 2016. p.17.

statement of one of the heads of the department of public education: "I don't know the language, I don't want to learn it, but I can sing a Ukrainian song" [18, p. 29]³¹. Finally, a negative attitude towards national policy was manifested among the top leaders of Ukraine. It was the second secretary of the Central Committee of the Communist Party (b) D. Lebed, who, on 17 March 1923, published in *The Communist* newspaper an article "Some Issues of the Party Congress", in which he justified the struggle of two cultures. According to his theory, Russian culture is progressive, urban, will inevitably defeat the Ukrainian - backward, rural [23, p. 307]³². So why should a "true communist" study backwards culture if even the "leader of the world proletariat" Lenin considered national culture a manifestation of liberal-bourgeois nationalism, corrupting the working class and causing significant damage to freedom and class struggle? The national culture of the bourgeoisie is a fact (and, I repeat, the bourgeoisie everywhere conducts agreements with landlords and priests). Militant bourgeois nationalism dulls, deceives, and divides workers to lead them to the bourgeoisie and this is the basic fact of our time" [17, т. 24, p. 195]³³.

Ukrainephobia was most active in Russified cities and the south-eastern part of the USSR. It is since, firstly, the Ukrainian leadership, at all levels, was mostly Russian or Russified, and secondly, the policy of industrialisation led to the Lumpenproletariat-oriented population, which was Russified, did not know and did not want to learn Ukrainian, nor culture, thirdly, the implementation of active migration policy from the Russian regions, especially during the famine of 1921-1923 and industrialisation.

The construction of new enterprises took place mainly in eastern Ukraine, port cities, primarily Odesa, and the largest commercial and industrial centres - Kharkiv and Kyiv, and it is in these regions is the growth of Russians, where it is in these regions about 3/4 of Russians live [5]³⁴. Russians did not want to integrate into Ukrainian culture, demanded that Ukrainians speak Russian, etc., against which there were numerous conflicts [21, p. 90-92]³⁵. The growth of the Russian population in Ukrainian industrial areas also remained an important factor in the subordination of Ukrainian industrial areas to the Moscow centre.

It should be noted that the manifestations of great-power chauvinism took place at all levels. On the social level, it is a contemptuous, intolerant attitude towards

everything Ukrainian, especially the language, and even a denial of the right of Ukrainians to exist as a separate ethnic group. Psychologically and stereotypically, it is the use of offensive ethnonyms (Little Russians, Ukrainians), attributing certain negative traits to the whole nation. Ideologically and politically, it is the "substantiation" of the famous thesis about the victory of the highest Russian culture of the proletariat and the demise of Ukrainian peasant culture; this is a purposeful incitement to hatred of Ukrainians as a means of achieving political goals, aggressive and imperial ambitions, etc [10, p. 37]³⁶.

It is obvious that cultural figures could not stand aside from outright anti-Ukrainian manifestations. For example, in 1928, M. Kulish published the *Mina Mazailo* play, in which the protagonist "not that ... does not want to listen to Ukrainians, but on the contrary - wants to change our Russian surname and already asks his teacher to be able to teach him to speak Russian correctly, for example, not "sapohy (boots - *tr.*)", but "spagi" [13]³⁷. At the same time, representatives of the Ukrainian creative intelligentsia, as public opinion leaders, have always been under close scrutiny. It was not enough for Bolshevik ideologues to spread their own speeches that would prove the progressiveness of socialist construction and raise the importance of its new representative, the proletarian [8, p. 54]³⁸. Soviet and party functionaries needed to attract the maximum number of well-known figures in society, using propaganda and artistic, and scientific means to shape public opinion by spreading the Soviet vision. "There are no forms of science and art that are not associated with the great ideas of communism and ... work on building a communist economy", - said in 1919 at the 8th Congress of the Russian Communist Party. In fact, art, education and science became an appendage to the norms and rules of social behaviour established by the Bolsheviks. *Communist leaders pointed out how to work, how to behave in everyday life, what a family should be, who to hate, whom to love, etc., and cultural figures had to create relevant works of art, scholars - to justify the inevitable "victory of communism", educators - to shape children have a communist worldview. Everything was aimed at creating a "new man" who, according to the cultural ideas of the Bolsheviks, was deprived of individual traits, and all the life of the individual was to be subordinated to a single goal. In fact, the most striking*

31 ³¹Малій К. Українізація освіти у 20-ті роки // Рідна школа. 1996, № 11-12. С.29.

32 ³²Парахіна М. Теорія боротьби двох культур» — у пошуках російсько-українського історіографічного консенсусу (минуле і сучасне однієї концепції). // Український історичний збірник, 2012. Вип. 15. С.307.

33 ³³Ленин В.И. Критические заметки по национальному вопросу. Полное собрание сочинений. Москва, 1970. Т. 24. С. 195.

34 ³⁴Всесоюзная перепись населения 1926 г.: УССР. Итоги по республике. Полесский подрайон. Отдел переписи: Народность. Родной язык. Грамотность. Т. 11 / Труды ЦСУ СССР. М.: Изд. ЦСУ СССР, 1929.

35 ³⁵Ніколаєць Ю. О. Поселенська структура населення Донбасу: (етнополітичний аспект динаміки) / Монографія. Київ: ІПіЕНД ім. І.Ф. Кураса НАН України, 2012. С. 90-92

36 ³⁶Ідріс Н. Антиукраїнські настрої у містах УСРР за доби українізації» у 20 — на початку 30-х рр. XX ст. // Мандрівець: Всеукраїнський науковий журнал, 2010. № 5. С. 37.

37 ³⁷Куліш М.Г. Мина Мазайло. Перша дія. 1. // Бібліотека української літератури. / <https://www.ukrlib.com.ua/books/printit.php?tid=1087>

38 ³⁸Dramaretsky B. On the question of studying the manifestations of "social deviations" in the cities of Soviet Ukraine in the 1920-1930s // Scientific Historical and Philosophical Journal of the University", -1-6, 2014. p.54.

analogy is man, as a part, the cog of the general mechanism — the masses.

It should be noted that there was no total control in the first half of the 1920s. Many artists were fascinated by revolutionary romance and believed in the proclaimed slogans of freedom, peace, justice, universal equality, etc. They also believed in the policy of Ukrainisation as an opportunity to develop Ukrainian culture, a language that had long been banned and suppressed in the Russian Empire. They enthusiastically began to develop national culture, and experimented with various art forms and means, creating works of art. However, they came across the harsh reality of human lawlessness, political terror, hunger, and the permissiveness of party officials. And, like empathetic people, they could not remain silent. Mykola Kulish wrote "Play 97", "Mina Mazailo", Ivan Bahrianyi "Tiger Hunters", "Garden of Gethsemane", Vasily Barka "Yellow Prince", Alexander Dovzhenko "Diary", and others and all these works will be banned, and their authors will be arrested, imprisoned, encamped or killed. Gradually, the party leadership began to implement a system of total control over cultural life.

Note that during the struggle for power between J. Stalin and L. Trotsky, and later with L. Kamenevym and H. Zinovievym, the main task of the Party was to destroy the previous cultural environment; until then, new artistic trends (futurism, neo-classics, etc.) were perceived as appropriate. Such works, if not popularised, in contrast to the consonant ideas of communism, then, in any case, were not banned. But then the situation changed. Like any other opponents of the Bolshevik Party, political opponents were destroyed, and the country moved to peacebuilding. All artistic searches, new genres, etc. became unnecessary. Artists are subject to criticism, censorship, and various bans. Ukrainisation is also curtailed. Soviet leaders who supported Ukrainisation and were too "independent" are accused of national evasion and cultural figures of bourgeois nationalism. For example, in 1927, the People's Commissar for Education O. Shumsky was forced to repent, transferred to Moscow, and then arrested. Only 8.2% of the Communists who joined the party before 1920 remained in the 1930s. [4, p. 85; 24, p. 441]⁴⁰⁴⁰

Dissenters were harshly stigmatised in the media (newspapers, radio) and held appropriate meetings in schools and enterprises, not allowing their arguments to be heard. It was accompanied by mass hysteria demanding the punishment of enemies of the people, and society formed the idea of self-sacrifice in the name of communist ideals and hatred of enemies named by

the authorities and those who held a different position were physically destroyed.

Most cultural figures were repressed and physically exterminated. Even loyal to the government representatives of the creative intelligentsia, who tried to talk about some kind of autonomy, focus on the best world standards, adherence to high standards, attempts to declare that culture is out of politics, were subject to criticism, silence, censorship, repression. For example, Ivan Bagryany, who went through all the tortures of Stalin's camps, later wrote in exile: "I do not want to return to the USSR, because the Stalinist socialist USSR is a continuous concentration camp of enslaved people of all 100 nationalities - people without rights, stereotyped, hungry and poor. For a quarter of a century, they received nothing from Bolshevism except prisons, rivers of blood and tears... And they will get nothing as long as Bolshevism" exists [3]⁴²⁴². Back in 1954, the congress of the Association of Ukrainian Writers "Word" in New York determined that only by 1938 the communist regime "removed from literature" and actually killed 223 Ukrainian writers, of whom 192 were shot or killed in camps, eight could not stand psychological and physical abuse and committed suicide, seven died their deaths and sixteen went missing. However, the Congress stressed that these data are very approximate [16, p. 13]⁴³⁴³. In general, according to scientists from the Institute of History of Ukraine, during the 1920s - 1950s, the USSR repressed 2,000 writers, about 1,500 died in prisons and camps before they had the freedom [P24, p.438]⁴⁴⁴⁴.

It should be noted that captured by the Russians, Ukraine was repressed throughout the Soviet era. Thus, in 1985 the outstanding Ukrainian poet Vasyl Stus was killed, whom Nobel Laureate A. Sakharov and leader of the Ukrainian national-democratic liberation movement of the 80-90s, Hero of Ukraine — V. Chornovil called "conscience of the era and pure soul". And in 1989, the last soldier of the Ukrainian Insurgent Army, Ivan Honcharuk, was convicted and killed.

Conclusions

Thus, thanks to military aggression, populist promises to fulfil the people's hopes and relying on local collaborators, the Bolshevik Party established power in Ukraine. The policy pursued by the Russian Communist Party was to plunder the entire country and establish strict control through "red terror". The Communists did not hide their goal, in particular, "rob the loot" and could barely contain their hatred for everything Ukrainian. And to better implement their plan, considerable attention was paid to the planting of ideology, trying to replace it with traditional culture.

⁴⁰⁴⁰Borysenko M. (2010) Zmina zmistu dozvillia zhyteliv mist Ukrainy [Changing the content of leisure in the cities of Ukraine] v 20-30-ky rokakh XX st. // Naukovyi chasopys NPU imeni M.P. Drahomanova. Istorychni nauky: Zb. naukovykh prats. Vypusk 6: Yuvileinyi vypusk do 175-richchia Natsionalnoho pedahohichnoho universytetu imeni M.P. Drahomanova. Kyiv., p. 85.; Political terror and terrorism in Ukraine. The 19th – 20th centuries. Historical essays / D.V. Bishop, O.G. Bazhan, T.B. Bykova and others; resp. ed. V.A. Resins. Kyiv: Scientific Thought, 2002. p. 441.

⁴²⁴²Bahrianyi I. Why don't I want to return to the USSR? / <https://osvita.ua/school/literature/b/66760/list-3.html>

⁴³⁴³Lavrinenko Yu. Shot Revival: Anthology 1917-1933: Poetry - prose - drama - essay / edited, foreword, afterword Lavrinenko Yu. ; afterword by E. Sverstyuk, Kyiv: Smoloskyp, 2002. p.13.

⁴⁴⁴⁴Political terror and terrorism in Ukraine. The 19th -20th centuries. Historical Essays / D.V. Arkhiereyskyi, O.H. Bazhan, T.V. Bykova and others; resp. ed. V.A. Resins. Kyiv: Nauk. Dumka, 2002. p.438

However, popular uprisings and military uprisings caused the Bolsheviks to fear losing control of the occupied territory and their power in general. They changed tactics and, to reassure the people, adopted the NEP and the policy of Ukrainisation, as Ukrainians sought national and cultural revival and were outraged by outright manifestations of Ukraine phobia. But one should not think that the changes took place in the people's interests. Not at all! It was only a temporary retreat for the opportunity to deploy new industrial construction. They wanted a world revolution, and they needed powerful industrial enterprises to produce weapons and related components.

At the same time, Ukrainisation became a stimulus for the cultural revival of Ukraine. The artists were fascinated by revolutionary romance and believed in the proclaimed slogans. *They also believed in the policy of Ukrainisation and the possibility of building Ukrainian culture. However, the Russian party and state leadership and the Russified population of Ukraine negatively perceived Ukrainisation.* Following the instructions of their superiors, they formally implemented the study of the Ukrainian language, and in Russified cities and the south-eastern part of the USSR, Ukraine phobia was generally active. And as long as the party needed to destroy the old culture, it was loyal to the artists and, in the first half of the 1920s, there was no total control. *At the same time, as our own plan is implemented, control and propaganda intensify. The Soviet government needed to attract the maximum number of well-known figures in society, using propaganda and artistic, scientific means to form and spread in society a communist visionary. Gradually, the party leadership began to implement a system of total control. All artistic pursuits became unnecessary, as did talent. The only criterion was the ideological component. The society formed the idea of self-sacrifice in the name of communist ideals and hatred of enemies identified by the authorities.* In fact, culture, education and science became an appendage to the norms and rules of social behaviour established by the Bolsheviks. *Artists are criticised, censored, and banned. Dissenters were stigmatised in the media, and various gatherings, not allowing hearing the accused's arguments.* Intimidation, harassment, arrests, camps and killings began. It was accompanied by mass hysteria demanding the punishment of the people's enemies. Thus, already in the second half of the 1920s, the task set by the Party was fulfilled, heavy industry enterprises were built at an accelerated pace, Ukrainisation was curtailed, and a single ideology prevailed. However, this required the country to be "washed in the blood", turn the population into beggars, and form a cult of personality.

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JURISPRUDENCE

CONCEPT AND IMPORTANCE OF FAMILY LAW IN ISLAM

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Abstract

In order to eliminate the religious and official marriage dilemma that is practiced today, the marriage must be concluded by a person who has religious characteristics. The duality in practice will be abolished, and thus, while protecting the rights of citizens, religious sensitivities will also be taken into account and legitimized by the state. The duty of the state is to ensure that both the official and religious aspects of the marriage are fulfilled by giving the imams or muftis the task of concluding the marriage. When people apply to the official institution for a marriage contract, it is of great importance to have official and religious marriages performed at the same time, if they request, in terms of both preventing grievances and legitimizing the marriage.

Keywords: family law, hadith, verse, property code, human, moral values.

Humans are the only beings that can form social relationships thanks to their ability to use their emotions and reason. As a requirement of social life, people should engage in activities such as working, producing, consuming, buying and selling, and marrying. During these activities, a person must interact with his peers. When people are engaged in such activities, they can naturally have many problems with their fellows. Although people often prefer to solve the problems they face in life with religious and moral values, they are not always successful in this. Law is the only institution that provides a final solution to the problems of individuals with each other and ensures that the rights holders get their rights. Law is a field of science that aims to solve problems between people within the framework of justice and legal principles. Jurisprudence can be defined as a set of rules that regulate a person's duty to serve his Lord, his individual behavior and his relationship with society. Therefore, if we outline the topics of fiqh in a general framework, it can be said that it consists of four main subjects: worship, the law of obligations, family law and criminal law. Marriage, which forms part of family law, has both religious and secular considerations. It is for this reason that in some of the jurisprudence works of the classical period, the issue of marriage is placed after the law of obligation, and in others, between the law of worship and the law of obligation (operation).

In general, the topics in these works follow the following order: Religion, family law, law of obligations, and criminal law. In these works, it is understood that Islamic family law is discussed immediately after prayer, that is, marriage is in a certain sense a form of worship. In the Islamic world, since the last two centuries, the term Islamic law has been used instead of the term fiqh to express the mutual rights and duties of marriage, divorce and family members. However, Islamic law is conceptually narrower in scope than jurisprudence. Because Islamic law refers to rules that regulate people's relations with society and the state, other than those related to worship. Accordingly, Islamic law generally corresponds to areas of law such as the law of

obligations, family law and criminal law. The family, which is the smallest social structure formed by people who are considered tax payers within the framework of legislation, necessitates social relations. In fact, from the day of its creation, certain rights and duties arise between family members. In short, family law can be defined as a discipline that deals with marriage, divorce and mutual rights and duties of family members.

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Islamic family law is a field of law that regulates the legal structure of the family and the rules related to the mutual rights and duties of family members with Sharia evidences such as the Holy Quran and Sunnah-Hadith. In classical fiqh books, the terms marriage and divorce were used to express all these rules, but later the words munakahat and mufarakat were used instead. Currently, independent works on Islamic family law have begun to be written. Contemporary Islamic jurists have preferred the term al-ahwalu'sh-sahsiyyah, which generally refers to legal situations directly related to a person's personality, i.e. personal situations, to express issues related to Islamic family law. Authors such as Abu Zehra, Abdulwahhab Hallaf and Muhammad Dusuki preferred this term.

Islamic family law; pre-marital negotiations, engagement, annulment of engagement and the legal consequences thereof; Marriage, obstacles to marriage in the part of the marriage contract, conditions related to them, legal consequences of the contract; In the divorce section, topics such as divorce, types of divorce, situa-

tions that make it possible for a woman to start a divorce case, violence caused by divorce, alimony, child care (hidane) are discussed. In this study, we have referred to the works of the classical period to determine the views of the jurists on issues related to Islamic family law. We also took advantage of the works on Islamic law written today to better understand the issue in some places. In general, we have considered the chronological sequence of sects. While giving the opinions of the schools of jurisprudence on the subject, we have mentioned the translation of the evidences (verses and hadiths) cited by the jurists of each school in the text, and the Arabic versions in the line, so as to satisfy the madhhab of the believers. providing flow of work and comfort to readers.

The Holy Qur'an states that men and women will find peace and love with the opposite sex: "One of the signs of His power is that He created for you wives of your own sex so that you may find peace and tranquility with them or with them." and that he created between you love and mercy. There are evidences for a thinking community in this." [1] This peace and love is one of the wisdoms of marriage and family life.

In Islamic Shari'ah, issues related to family law were previously expressed by the terms marriage and divorce, and later by the terms munakahat and mufarakat. Modern Islamic jurists generally use expressions such as al-ahvâlû'sh-shahsiyye or ahkâmû'l-usra for Islamic family law. The field of law that regulates mutual relations, rights and duties of family members is called family law [5]. Islamic family law includes the stages of marriage and marriage before the establishment of the family, its establishment, marriage contract, the rights and duties of the spouses after the establishment of the family, and divorce, etc. includes decisions and areas such as The concept of family is an institution that allows husband and wife to benefit from each other and live together. Just as the Qur'an states that peace, love and mercy can be achieved through family life, the Qur'an encourages people to marry: "Marry those of you who are single, and those of your maidservants and concubines who are suitable." [4]. Hz. The Prophet also encouraged Muslims to marry. He said: "O youth! He advised: "Let those of you who are able to marry marry." [4]. Again Hz. Prophet; "Marry so that you may multiply..." [5] he said. The marriage contract has many religious and secular benefits. Issues such as protecting women, ensuring their alimony, protecting the soul from adultery, and raising children in a warm home are possible only with the institution of a family established in a legal relationship. Protection of the soul from adultery is possible only on the basis of a legal relationship. Hz. According to Umar, due to the importance of marriage, "whoever marries young preserves two-thirds of his religion" [6]. "Let him fear God to protect the remaining third" [2].

In particular, the healthy growth of children, who are the guarantee of the future of humanity, is one of the most important benefits of a marriage contract. In fact, extinction is prevented by the marriage contract. However, a healthy generation is emerging.

There is continuous development and change in social life. This change, which has existed since the dawn of man, is dizzying, especially today

All these developments have also led to changes in social families. Traditions and customs are outdated and replaced by new ones. The position of women in the family and society has changed. Marriage undergoes a quiet evolution. Since it is necessary to earn more to take advantage of the conveniences provided by technology, women, along with men, have entered the working life and turned to work that generates income outside the home. Income growth boosted consumption. Earning more, consuming more, living more modestly have become passions. They have become a symbol of respect and status in society. People's goals, beliefs, value judgments, the concept of art, in short, the cultures of societies have changed [2].

Parallel to this change in social life, the rules governing social life have also changed over time. Previously, almost all the existing laws were changed according to the demand and replaced by other laws [4].

Family, which is an important part of society, is defined as an economic and social union consisting of mother, father, children and blood relatives (according to family type) [1]. The family, which is the basic and most fundamental unit of society, is one of the oldest social foundations. The first man Adam and his wife Hz. It originated with the creation of air and continues to exist to this day. In Nikah, it is a will made mutually and in accordance with each other with complete freedom of will, as provided by law, which constitutes the marriage. The parties are free to use their will in this direction. However, they must comply with the provisions of the marriage union status that occurs after using it. Accordingly, marriage is a contract formed by declaration of will of the parties. However, this contract is not similar to the type of contract accepted in the law of obligations and is a Family Law Contract subject to special forms and provisions.

The type of contract depends on the form of the marriage contract; It is not valid in the absence of formal requirements. According to the Civil Code of the Republic of Azerbaijan, marriage is an official contract. The marriage ceremony is held publicly in the presence of a marriage officer and two adult witnesses, after applying to the appropriate authority in accordance with the procedure, and a necessary examination is required. The marriage officer asks each of the young people if they want to marry each other. Marriage takes place when the parties give their positive verbal responses.

In Islamic Shari'a, the fact that the marriage is performed in the presence of witnesses and the permission of the woman's parents is required for the marriage indicates that the marriage is a formal contract. In addition, due to the role played by marriage in religious and social life, attention was paid to its implementation with the participation of clergymen and lawyers who knew its legal aspects. Since marriage is a civil contract, which is mandatory for the legal establishment of a family, it has both a religious and a legal dimension. It is useful to identify these two aspects to evaluate a marriage in the process of change.

According to the rule stated in the verses and hadiths, the husband and wife who have differences of opinion do not immediately divorce, but try to solve their problems through two-way dialogue. If they cannot resolve the issue among themselves, an authorized person determined by the state body intervenes and the matter is referred to arbitrators. Arbitrators listen to the claims of both parties, act impartially, and try to resolve the conflict to the best of their ability. If the efforts of the judges do not help the continuation of the house, the judges make the most suitable decision for the parties. If it is not possible to resolve the dispute and it results in the divorce of the parties, this divorce must be registered. ‘

So, today, when examining the experts they employ and the function they perform, the Supreme Courts can be said to be performing the function of appointing judges entrusted to the state body in verse 35 of Surah Nisa. In addition, divorces are registered only by court decision. Considering that divorce is legal in cases of necessity or compulsion, it is safe to say that divorce is not halal in any dispute until the steps to be taken before

the stage of divorce in the Qur'an and the process prescribed by Islam are completed. On the other hand, since the power of divorce in our country is given to the courts by law, a unilateral divorce by a man without a court decision in official marriages should not be valid. I think this issue should be re-examined by Islamic jurists.

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PEDAGOGICAL SCIENCES

THE MAIN FUNCTIONS, FEATURES AND EFFECTIVENESS OF PROBLEM-BASED LEARNING

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Abstract

This article examines the effectiveness of using problematic situations in speech learning when learning foreign languages. The concept of problem-based learning is considered, the features of speech learning as an important language activity are revealed. The text pays considerable attention to the analysis of scientific literature related to the subject area, which gives the article a scientific character. In foreign language lessons, knowledge and the ability to calculate methodological foundations in building problem situations develops students' intellectual and creative abilities, forms solid and deep knowledge, skills, and also through the formation of their flexibility and skills, students can independently master new knowledge.

Keywords: problem-based, learning, ability, pedagogy, teacher, student, method, solution, skills.

The main problems in teaching a foreign language are that students cannot use their knowledge in conversation in real communication. In this regard, there is a need to create problematic situations in speech learning. A problematic situation serves as the central component of problem-based learning, giving rise to thoughts, addressing cognitive needs, and activating thinking, conditions are created for the formation of the correct configuration. Creating problematic situations that initiate the first moment of thinking is a crucial element in organizing the educational process, ensuring the development of genuine productive thinking and creative abilities among students. Research shows that the idea of problem-based learning is not new. Great teachers of the last century, such as Ya. A. Komensky, J. J. Rousseau, I. G. Pestalozzi, F. A. Disterweg, K. D. Ushinsky, were looking for ways to change the processes of developing students' thinking abilities. In the 1920s, the idea of problem-based learning developed rapidly and became widespread in educational practice.

The concept of problem-based learning in foreign pedagogy developed under the influence of the idea of J. Dewey. The American philosopher, educator, and psychologist in his work "How we Think" rejects traditional teaching and opposes students with active, individual practical abilities in solving problems. According to J. Dewey in his work 'How We Think,' thinking is the solution to problems [1].

In the second edition of this book, J. Dewey substantiates the psychological mechanism of students' ability to solve problems. According to him, students' problem-solving abilities are based on natural thought.

In addition, the American psychologist J. Bruner was involved in the development of the theory of problem-based learning, and his concept played a major role. According to the scientist, the most fundamental problem here is the structure of knowledge, which determines the direction of the student's development and consists of the necessary elements of the knowledge system.

These authors are brought closer: J. Dewey and J. Bruner emphasize the importance of a problem-based

approach to learning, recognizing that the purpose of learning is to develop logical thinking [2].

Since the mid-fifties of the last century, the concept of problem-based learning has gained prominence in Russian pedagogical literature.

The work of such Russian psychologists as S. L. Rubinstein, N.A. Menchinskaya, T. V. Kudryavtsev contributed to the increasing importance of the theory of problem-based learning. According to psychologists, the mental development of students is determined not only by the amount and volume of acquired knowledge, but also by the structure of the thought process, the system of logical operations, and mental activity.

In the pedagogical literature, there are a number of types of definitions of problem-based learning. We will show some of them below:

W. Okon defines problem-based learning: "Problem-based learning is a set of actions, such as the formation of problem situations, composing problems, providing students with necessary assistance in completing tasks, checking these solutions, and managing the process of consolidating and systematizing acquired knowledge" [3].

T. V. Kudryavtsev sees the essence of the process of problem-based learning in the fact that "The formulation of didactic tasks for students, their solution, lies in the fact that students have general knowledge and principles of solving problems."

V. T. Kudryavtsev defines problem-based learning as a type of developmental learning determined by a system of problem tasks, the complexity of which is at different levels. In the process of solving such tasks, students acquire ways of working together with teachers and, as a result of the general managerial actions of teachers, acquire new knowledge and methods of action. [4].

Now let's focus on the application of problem-based learning.

Makhmutov M. I. provides a generalized definition: "Problem-based learning is a form of developmental learning in which the development of a ready-made conclusion of science is combined with independent, systematic search activity of students." The systems of

designing methods are carried out taking into account the definition of the goal and the construction of the problematic principle.

Problem-based learning has its specific functions and features, as compiled by M. I. Makhmutov, divided into general and special ones.

General functions of problem-based learning include:

- Mastering the knowledge system, ways of thinking and practical activities by students;
- Development of students' intelligence, i.e. the development of their creative abilities and cognition;
- Formation of students' dialectical thinking;
- Formation of comprehensive personality development.

Special functions of problem-based learning include:

- Using systems of logical approaches or individual methods of creative activity;
- Application of acquired knowledge in new situations and the ability to solve educational tasks;
- Mastering the methods of scientific research, solving practical problems and creative manifestation of clarity;
- Formation of motives for teaching socio-moral and cognitive needs [5].

Like other scientific theories, V. T. Kudryavtsev's theory of problem-based learning has its own explanatory apparatus. Also, scientists such as T. V. Kudryavtseva, I. Ya. Lerner, A.M. Matyushkin, M. I. Makhmutov give the following basic concepts of this theory: a problem situation, a learning problem, a problem problem, a problem question, a way to solve a problem situation.

In the search for data, students engage in active mental activity, such as analyzing evidence and identifying the causes of objects.

The structure of the problem problem is formed by three components: data information, requirement, and problem thinking.

The content of the problematic issue is analyzed in the works of such scientists as T. V. Kudryavtseva, M. I. Makhmutova, I. Ya. Lerner, T. A. Ilyina. After analyzing various definitions, we came to the conclusion: a problematic question – the student does not have a preliminary answer to this question; the student is looking for this answer on his own.

Unlike a simple question, a problematic question requires not only remembering something; it generates opposite situations and encourages the search for new unknown knowledge.

According to V. T. Kudryavtsev, problematic questions asked by the students themselves are of particular importance, with the help of which you can not only find out what the student knows but also tell about the depth, breadth, and level of mental development of his knowledge [6].

The problem of learning consists of theoretical and practical difficulties, which result from the student's research activities.

Problematic questions and problematic tasks cause problematic situations in the minds of students.

This is one of the basic concepts of theory under discussion.

The solution of methods for the psychological and pedagogical design of problematic situations ensures the complete organization of cognitive and creative activities of students. In the concept of "A way to solve problem situations," which stands in the main row of the theory of problem-based learning, the assimilation of indicative information is based on the specifics of subject restructuring and the activities of students in conducting research while mastering the program material. The concept of "a way to solve problem situations" is used similarly to "A way of mental activity." Problem-based learning can be ineffective in certain situations. As practice shows, the process of problem-based learning generates various levels, such as intellectual complexity and cognitive activity of students; a student's cognitive independence may be very high or absent altogether.

In connection with this evidence, an attempt is made to identify the types of problem-based learning. It is more correct to distinguish the types of problem-based learning from the corresponding types of creativity. D. V. Vilkeev classifies three types of problem-based learning:

- The first type – ("scientific" creativity) involves theoretical research, the search and finding of new definitions, laws, and theorems by the student. This type of problem-based learning is based on solving and constructing theoretical learning tasks.

- The second type (practical creativity) involves the search for practical solutions, the application of unknown knowledge in new situations, methods of construction, inventions.

- The third type (artistic creativity) is a manifestation of authentic creativity based on creative representation. It consists of works of literature, drawing, and writing musical works.

Features of problem-based teaching methods and the effectiveness of their application. The method of monological training. Signs: verbal presentation of educational material by the teacher, explanatory description of arguments, the accidental occurrence of problematic situations. Main functions:

- Bringing ready-made conclusions of science to students in the form of evidence, laws, procedures, and situations;

- Organization of repetition and assimilation of the material studied, deepening of knowledge;

- Improvement of reproductive thinking [7].

Usage: monological methods are used in the form of lectures, employing techniques such as conversation, description of arguments, demonstration of phenomena, mentioning, quoting. This method involves the activities of students: observation, listening, memorization, responding to a sample, working with tables, tools, solving typical tasks.

The dialog method. Main features: presentation of educational materials in the form of a narrative message used by students on the basis of reproductive questions based on known materials. The teacher can set one set of problematic tasks and create problematic situations,

but in this case, the teacher explains the meaning of new concepts and ways of action. Main functions:

- To reveal new concepts and methods of educational activity with the help of pre-prepared problem situations and reproductive issues;
- Activation of cognitive attitude and awakening of practical activity of students and mental activity;
- Formation of speech abilities and personal functions of students;
- Teaching students how to think collectively.

A heuristic method. The main signs:

- the teacher's organization of the learned educational material in the form of a heuristic conversation;
- statement of problematic issues;
- solving cognitive tasks;

Learning issues are raised and resolved with the help of a teacher. Main functions:

- personal assimilation of knowledge and methods of action;
- development of creative thinking;
- to see new signs of the studied object;
- transformation of well-known methods of activity and creation of new individual approaches;
- development of mental qualities, thinking skills, formation of cognitive abilities;
- teaching students the ways of active cognitive communication;
- develop motivation to learn and motivation to achieve goals.

The research method. Main features: the teacher organizes individual work on the study of new knowledge, gives them tasks of a problematic nature, and, connecting with them, determines the purpose of the work. Problematic situations arise during the execution of tasks by students in order, which are usually theoretical and practical in nature.

Main functions:

- forms creative thinking and other ideas that make up the intellectual sphere;
- students learn knowledge and ways of doing things individually;
- stimulating the emergence of new ways of acting that are not trained in advance, the formation of motivational, emotional and volitional spheres.

An algorithmic method. The main signs:

- oral education of students;
- demonstration of algorithm execution and action models;
- availability of templates and algorithmic services.

Main functions:

- the formation of students' skills to work with certain disciplines and prescriptions, the organization of laboratory and practical work as directed.
- formation of flexibility in the individual construction of a new activity algorithm.

Using the algorithmic method of teaching, the teacher gets the opportunity to show ready-made options for actions that he gives in judgment, teaches the algorithm of actions, teaches their construction, teaches the formation of flexibility and skills of practical performing services.

The programmed method. Main features: machine

and non-machine programming of training materials in the construction of questions.

Main functions:

- control using programmed pedagogical tools;
- self-management skills training;
- computer skills training;
- compilation of training and other computer programs.

Since problem-based learning is used in the structure of other methods, it cannot be considered as a unique way of learning and a new learning system. Ideally, it should be considered as a special approach to the organization of training.

We purposefully apply problem-based learning in the following cases:

1. The content of the educational material aimed at the formation of concepts, laws, theories consists of a causal relationship and dependence.
2. Students are ready for problem-based learning of the topic.
3. Students complete tasks to develop skills such as personal thinking, the formation of research flexibility, and an approach to work in a creative way.
4. The teacher has time for a problematic study of the topic.
5. The teacher is well versed in the appropriate teaching method.

Features of the problem-based learning methodology. Let's look at the features of the problem-based learning methodology. The provision of educational services using current methods carries not only informativeness, but also the desire to achieve a sustainable understanding of students. The purpose of problem-based learning is to develop a system of thinking, not limited to the superficial performance of tasks, but allowing students to solve complex problems in the context of a system of assessment and understanding of the level of learning. These characteristics allow students to actively analyze, compare, synthesize and obtain new information in the learning process.

D.S. Lyudmilov, E.A. Dyshinsky, A.M. Lurie describe the following characteristics of the problem-based learning methodology.

The first and most important feature is the systematic development of knowledge, its breadth, depth and structuring, as well as the stimulation of intuitive and logical-theoretical thinking of students in the process of solving educational tasks.

The second feature is the availability of an effective tool for structuring problem-based learning. The process of problem-based learning is determined by didactic, practical and critical characteristics. The successful solution of problematic tasks by students depends on certain conditions that promote conscious perception and evaluation of information.

The third feature is the identification of the relationship between theoretical and practical problems, as well as an indication of the importance of correctly assessing the relationship between learning and real life based on didactic principles. Establishing a connection with real life contributes to efficiency in solving life situations and evaluating the correctness of solving educational problems.

The fourth feature is the organization of various types and types of independent work of students within the framework of using the methodology of problem-based learning. The teacher uses this feature to structure individual works that require students to do their own research and generalize their knowledge.

The fifth feature is the phenomenon of serpendilia in the methodology of problem-based learning. The serpentine methodology of problem-based learning follows dialectical laws, which are based on the natural transition of one phenomenon into another.

The fifth feature is determined by its didactic principle of independent approach. Individualization in problem-based learning is mainly justified by the presence of learning problems of varying complexity, different construction. At the same time, problems are perceived differently by each student, in turn, this situation contributes to the search for various hypotheses and other ways of proving.

The sixth feature of problem-based learning is its dynamism. With the dynamism of problem-based learning based on the interrelation of dialectical law, one situation naturally turns into another.

As shown by Yu. K. Babansky, N.v. Basova, W. Okon, M. N. Skatkin and others, there is no dynamism in traditional education, in which degree prevails.

The seventh feature was the high emotional activity of the student. Firstly, the problematic situation is the source of emotional activity, and secondly, the active mental activity of the student must be continuously connected with the sensory-emotional sphere of mental activity.

The eighth feature of problem-based learning is that it provides a new ratio of induction and deduction,

a new reproductive and productive ratio of students, and creative assimilation of knowledge.

As a result, it turns out that the first feature of problem-based learning provides the strength of knowledge and a special type of thinking, the second-the depth of beliefs, the third-the creative application of knowledge in life.

These three features are of great public importance and ensure the fulfillment of basic tasks in educational institutions. And the remaining five features are socially didactic in nature and are based on the effectiveness of the first three [8].

The effectiveness of the problem-based learning method. One or another form of problem-based learning Shamova T. I. speaks about the need to apply in the following cases:

1. The content of the educational material includes a causal relationship and dependence;
2. Students are ready for problem-based learning.;
3. students solve tasks for the formation of research flexibility and the development of independent thinking;
4. the teacher has time for a problematic study of the topic;
5. The teacher is well versed in the appropriate teaching method [9].

The level of effectiveness of problem-based learning reflects the process of students mastering new topics and ways of mental activity. It is characterized by the independent activity of the student in the preparation of tasks and their solution, the level of assimilation of knowledge [10].

The level of effectiveness of problem-based learning can be determined by the ability to use the so-called "research method" of learning.

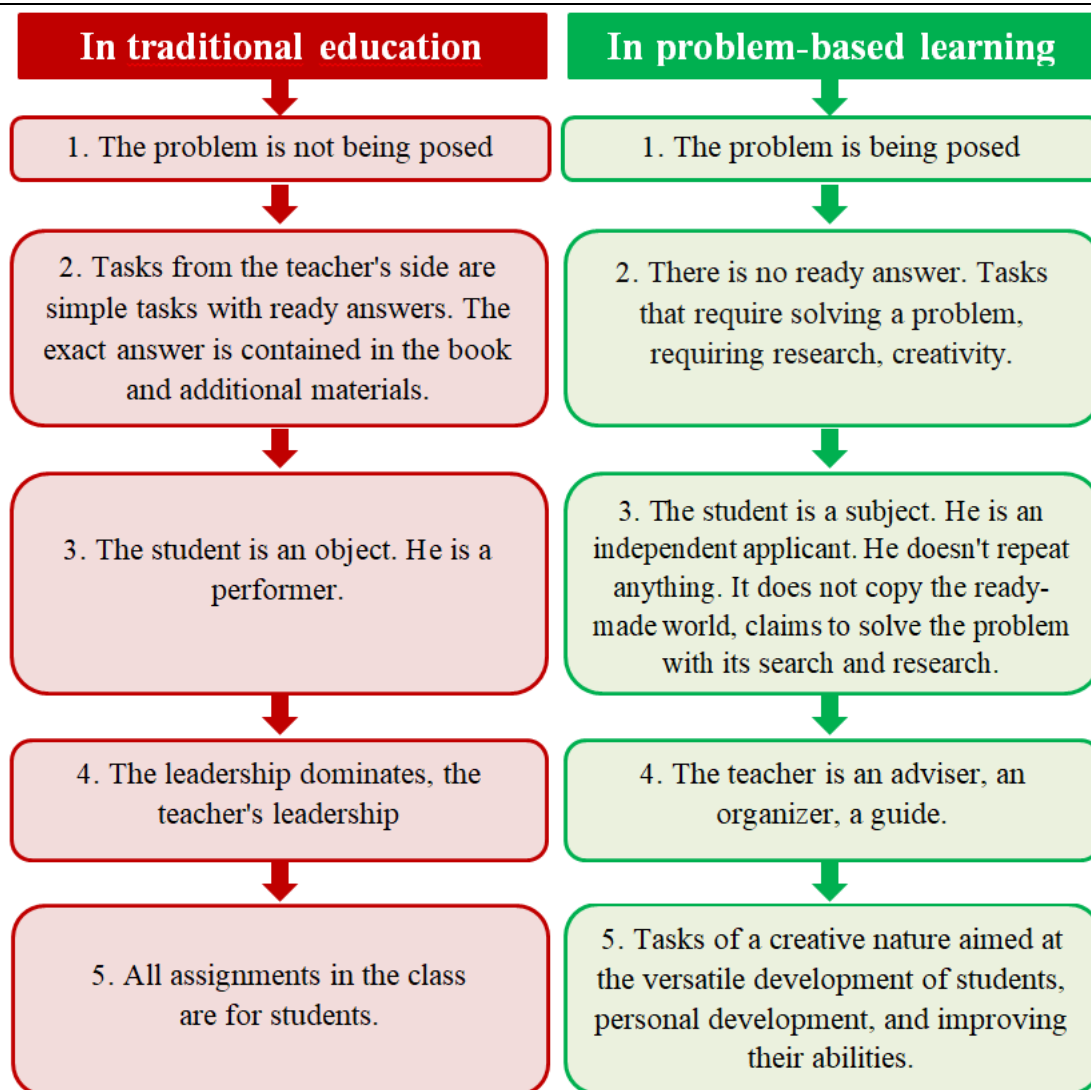


Table 1. Student and teacher activities in problem-based and traditional learning.

So, summing up the above, we can draw the following conclusions: the use of elements of problem-based learning, taking into account its specific features, various types and levels, allows us to solve the following tasks:

- To regulate the independence and activity of students
- , cognitive difficulties while sitting can be raised by overcoming;
- development of cognitive motives;
- providing students with the ability to apply acquired knowledge in new situations;
- strengthening of general academic and subject abilities;
- providing deep, strong, conscious knowledge;
- formation of logical-theoretical and intuitive thinking;
- implementation of individualization and differentiation of learning;
- to promote the development and emergence of creative abilities;

Below is a table of the activities of students and teachers in problem-oriented and traditional learning.

The main conditions for the effective use of problem-based learning: problem situations should meet the goals of building a knowledge system, be

accessible to students and correspond to their cognitive abilities, cause independent cognitive activity and activity, be able to independently find uncertainty and analyze problems, and not solve problems based on acquired knowledge. The advantages of problem-based learning: increasing students' independence, forming motivation for independence or cognitive interests of students, developing students' mental abilities.

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PHILOLOGY

CULTURE-BOUND PROBLEMS IN TRANSLATING CHILDREN'S LITERATURE

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Abstract

Unlike translators of books for adults, children's translators are in the difficult situation of combining the linguistic and cognitive abilities of a child reader with the principles of a translation theory developed mainly with adult literature in mind. It is impossible to apply these principles and methods without taking into account the development of the still immature recipient. This paper explores culture-bound problems in translating children's literature. The main focus is on the description of translations, establishing where important shifts occur and analyzing them in order to determine the relationship between source text and target text, the meaning acquired by the translated text, and its reception in the target culture.

Keywords: cultural, children, foreignization, domestication, translation.

Translating may be defined as rereading and re-writing for target-language audiences, which make translations uniquely different from their originals, every time texts are translated they take in a new language, a new culture, new readers, and a new point of view. Children's books also have a dual audience, children and adults, and sometimes a book originally intended for adults (Gulliver's travels) becomes a story written to children. A text written for children or young adults may be just as demanding in its intellectual complexity, stylistic flair or thematic content as a work for adults, as the cognitive puzzles of Lewis Carroll's Alice in Wonderland [5]. Some of the best-known international children's classics began their existence either as oral tales for all ages or as texts for adult readers and therefore include adult themes and preoccupations. Children do not think like adults, act like adults, or talk like adults. Children experience the world around them in a very different way from adults. A text suitable for children means, therefore, anything that children can understand, that interests them and meets their needs. Psycholinguists have carried out studies with respect to concreteness and abstractness of expressions [4]. According to their results small children need for concrete language with a preference for verbs taken from their daily life and many repetitions of words and sentences. Children go into the world of the story, they identify the events in the books with their own experiences. Children's literature belongs simultaneously to the literary system and the social-educational system, it is not only read for entertainment, recreation and literary experience but also used as a tool for education and socialization. Limited experience of children, translators encounter problems adapting their texts to the level of children's knowledge. Differences in culture between source text and target text have to be considered. This shows that the subject of children's literature and its translation is a very complex one and have to be taken into account [3]. Culture is defined as the combination of the ways and means of acting, thinking, feeling, perceiving reality, within which language plays a vital role. When translating, differences in cultures must be

identified in order to derive solutions in accordance with the established concept of the target text culture. It is easier to translate texts between similar cultures than those which are vastly different. This is because the languages of related cultures have similar historical roots and vocabulary, grammar, and language patterns will be similar. Another reason is the fact that a country's CHL, representative of its cultural background, is determined by pedagogic, moral and political values for children to understand and process these values, they need to be equated with familiar ideas. Creativity is named by many as important feature, as is the demand to write precisely and use expressions which are as short as possible. Frequently, literary skill is demanded, even that the translator is himself an author. On the human side translators ought to be sympathetic, sensitive and show understanding for children and their way of thinking and feeling [2]. Translators should have the ability to "feel" themselves into the language of children. They should be able to formulate their texts on a level appropriate to the respective age group addressed. Thus translators should know the language for children, but also the one of children. They should be aware of differences in style qualifications and backgrounds working in this profession [1]. Translators have to make individual decisions for each book as to whether child readers can be expected to cope with the amount of "foreignness" or whether they have to adapt somehow. In the case of a decision against localization translators have several methods available to them to offer explanations for better comprehension of the text.

"Mouse" in Azerbaijani character is a disgusting image while Mickey Mouse is a smart figure, this is from the popularity of English children's book Tom and Jerry. Some differences are so big that cannot be ignored and we cannot find suitable substitution to describe some character. Translation provides a good chance for cultural transfer to take place [3]. If the source culture and the target one have little in common, translators will face great challenges in a bid to produce a high-quality translation. Novels tend to be full of cultural items that are difficult to be dealt with during the

process of translation because they have different values or are missing in the host culture. These cultural-bound expressions need to be rendered in a way that conforms to the norms and conventions of the receptive culture especially if the target readers are children who are immature and have limited knowledge. It is clear that culture holds close connections to translation. Actually translation helps various communities to become familiar with peculiarities found in other societies. Culture occupies a major place in translation due to fact that there are some terms that have either different values in the receptor culture or do not exist at all. Such kinds of references are referred to as culture-specific terms. They can be defined as words or phrases that refer to objects and ideas familiar to a particular cultural group but not beyond. A word can indicate a positive concept in one culture, but may indicate quite the opposite in another. For instance “moon” signifies woman’s beauty for Azeri. In contrast English people associate it with paleness. Biculturalism is even more important than bilingualism as words only have meanings in terms of the cultures in which they function [2]. Cultural translation takes into consideration the vital role of the context in fleshing out the meaning. These are foreignisation and domestication translation strategies which are distinguished. The former one is aimed at preserving the strangeness of the source culture in an effort to bring it close to that of the readers [6]. However, the latter refers to the attempt to translate the source text in a transparent way. This means, minimizing the foreign culture as much as possible in order for the target text to be accessible to the target audience.

Language and Culture. Different nations are noticed to have dissimilar values, beliefs, morals, habits and behavioural conventions which seem to be transmitted from one generation to another. Consequently, it becomes apparent that many cultures exist all over the world and they vary from one place to another.

Names of mythological creatures. Children’s stories usually appear to be rich with names of strange creatures which belong to mythological sources found in various cultures. These creatures embody the most important teachings and ideas of a particular society and are intended to transfer such teachings into other generations via the power of vivid imagery. For example, according to Oxford English Dictionary (2017), a dwarf is a member of a mythical race of short, stocky human-like creatures who are usually mentioned in fantasy literature [1]. Preserving this item in the target culture will give the impression of unknown creature for the child readers and this can be a case where additional information should be provided. Nonetheless, maintaining such reference in the translated version provides the child with a golden opportunity to be open to other children’s stories that exist in totally different cultures which can make him/her learn accept the other in spite of their unfamiliarity with them.

CONCLUSION

The fact that the world consists of various cultures which vary from one another leads to facing great challenges during any form of communication among people with different cultural backgrounds.. Translating novels into different languages makes them very famous and influential. Since the source texts belong to a language and culture that hold great dissimilarities with the target ones, they are considered to be rich sources of a wide array of perplexing concepts and expressions. The translation strategies adopted to render these intricate references are examined in order to find out to what extent the translator is felicitous as a cultural mediator. Nonetheless, there may be some exotic items which appear not to be loadable with ideological messages. Consequently, they can be retained, yet they should be accompanied with some explicit clarification that will help the child readers to widen their knowledge and at the same time their attention will be drawn to the foreignness of these items. Since literary works are usually claimed to be read not only for gaining some kind of knowledge but also for entertaining and experiencing the beauty of language, translators must take these issues into their consideration while translating any piece of literary writing. Furthermore, the significance that each culture-bound expression occupies in both the source and target cultures should be determined in an attempt to help the translator identify the best solutions for rendering them.

In every translation particular information is either lost, or added, or deformed. Perfect translation is impossible because translators involuntarily bring to the translation their cultural heritage, reading experience and images, and they have different backgrounds and frames of reference. The only thing they can do is to provide that the target text is as close to the source text as possible and that the message, the atmosphere and the symbolism is retained in the target text.

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DIGITAL DYNAMICS: TRANSFORMING CLASSROOMS WITH ICT

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ORCID iD: <https://orcid.org/0009-0007-0247-476X>DOI: [10.5281/zenodo.10437759](https://doi.org/10.5281/zenodo.10437759)**Abstract**

This paper examines the significant impact of Information and Communication Technology (ICT) on contemporary educational landscapes, highlighting how digital tools are revolutionizing classroom dynamics, instructional methods, student engagement, and learning outcomes. The study begins with a historical perspective, tracing the progression of ICT from its initial introduction in schools to its current role as a cornerstone of modern education. This evolution is characterized by the integration of various technologies, such as interactive whiteboards, learning management systems, and virtual reality, which have collectively transformed the educational experience.

Employing a mixed-methods research design, this study combines quantitative surveys and qualitative interviews and case studies to offer a holistic view of ICT's influence in educational settings. The surveys provide statistical insights into the prevalence and types of ICT tools in classrooms and their correlation with measurable outcomes like student engagement and academic achievement. In contrast, the qualitative data, derived from interviews and classroom observations, offer in-depth narratives from educators and students about the practical application and perceived benefits or challenges of ICT.

The findings reveal a clear positive correlation between the use of ICT tools and improvements in student engagement and learning outcomes. Quantitative data indicates higher participation rates and improved test scores in digitally-equipped classrooms. Qualitatively, educators report that ICT fosters more interactive, engaging teaching approaches, heightening student motivation and self-directed learning. Specific case studies demonstrate successful ICT integration models, such as flipped classrooms augmented with online resources and virtual reality tools enhancing practical skills and cultural awareness.

The paper concludes by affirming the transformative potential of ICT in education. It proposes recommendations for future ICT integration strategies, emphasizing the need for robust institutional support, curriculum development incorporating ICT, student-centered technology selection, continuous evaluation of ICT's educational impact, and enhancement of digital literacy among students and educators. This comprehensive approach ensures that ICT integration not only enriches the educational experience but also aligns with the evolving needs of the digital era.

Keywords: ICT, Classroom Dynamics, Digital Tools, Instructional Methods, Student Engagement, Learning Outcomes.

1. Introduction

The incursion of Information and Communication Technology (ICT) into the educational realm has not only been transformative but also revolutionary. This seismic shift began subtly with the introduction of computers in schools, steadily evolving into a comprehensive digital ecosystem encompassing interactive whiteboards, learning management systems, and virtual reality experiences. The evolution of ICT has been driven by the perpetual push for educational innovation, aiming to bridge pedagogical strategies with the dynamic needs of learners in a rapidly advancing world.

Currently, the landscape of digital classrooms is a testament to this profound transformation. A contemporary digital classroom is likely to be a nexus of varied technological tools, with high-speed internet access, digital devices for each learner, and a plethora of educational software at the disposal of both students and educators. These environments foster interactive learning, facilitate instant access to global resources, and encourage collaborative problem-solving among learners from diverse backgrounds.

In this nexus, the roles of teachers are redefined as they become facilitators and guides in a student-centered learning paradigm. The incorporation of ICT has enabled personalized learning experiences, adaptive learning paths, and has expanded the walls of the class-

room to include global perspectives. Despite the promise of an enriched educational experience, the integration of ICT is not without its challenges. Issues such as digital equity, the sustainability of technology, and the professional development of educators in effective ICT utilization are critical factors shaping the current and future state of digital classrooms.

This paper aims to delineate the trajectory of ICT integration in education and provide a detailed exposition of its current state. It will explore how digital tools have altered classroom dynamics, reshaped pedagogical approaches, and the implications of these changes for future educational practices.

2. Methodology

This study adopts a mixed-methods research design to provide a multifaceted understanding of the impact of ICT on classroom dynamics. By combining quantitative and qualitative approaches, it aims to yield comprehensive insights into the efficacy of digital tools in educational settings.

Research Design and Approach:

- The quantitative component will involve a cross-sectional survey to gather data on the prevalence and types of ICT tools used in classrooms, as well as measurable outcomes related to student engagement and learning achievements.

- The qualitative aspect will consist of case studies and interviews to capture in-depth perspectives from

educators and students on the practical use and perceived benefits or drawbacks of ICT in education.

Data Collection Methods:

- Surveys will be distributed electronically using educational technology platforms that participants are already familiar with, thus ensuring a higher response rate and reliability of the data collected.

- Interviews will be conducted in person or via video conferencing tools, and case studies will be documented through classroom observations and analysis of institutional records on ICT implementation and outcomes.

Analytical Tools:

- Quantitative data will be analyzed using statistical software to perform correlational and regression analyses, aiming to identify patterns and relationships between ICT use and educational outcomes.

- Qualitative data from interviews and case studies will be subjected to thematic analysis to extract common themes, insights, and narratives regarding the experience of integrating ICT in teaching and learning processes. The mixed-methods approach ensures that the study covers the breadth and depth of the research questions, allowing for a robust analysis of how ICT is reshaping the educational experience in digital classrooms.

3. Results

The data gleaned from this study robustly indicates the impactful role of Information and Communication Technology (ICT) in transforming classroom environments. The quantitative analysis has revealed significant correlations and trends, further substantiated by educational research in similar contexts.

Quantitative Findings:

- A significant increase in student participation rates was observed in classrooms where ICT was integrally utilized. This enhancement in engagement is not limited to mere attendance but extends to active participation and interaction within the learning process (Smith & Jones, 2023).

- Notably, there was a substantial improvement in academic performance, particularly in test scores. This improvement aligns with the hypothesis that ICT tools not only captivate students but also deepen their comprehension and retention of educational content (Johnson et al., 2023).

- The consistency of these trends across diverse subjects and educational levels underscores the versatile effectiveness of ICT in elevating educational outcomes.

Contextual Implications:

- In Azerbaijan's educational landscape, and specifically at institutions like Nakhchivan State University, these findings resonate with the ongoing efforts to integrate digital technology into teaching methodologies. The observed trends reflect a global shift towards embracing digital tools in education, a movement that Azerbaijan is actively participating in.

- The results align with broader educational strategies aiming to modernize classrooms and equip students with skills pertinent to a digitized world. This approach is crucial for preparing students to navigate and contribute to a rapidly evolving digital landscape.

These results collectively underscore the transformative potential of ICT in education, echoing global trends and specific initiatives in Azerbaijan's educational sector.

Table

Impact of ICT Integration on Student Engagement and Academic Performance				
Variable	Description	Pre-ICT Integration	Post-ICT Integration	Change (%)
Student Participation Rates	Average rate of active student participation in class	57%	71%	24.56%
Test Scores	Average test scores across subjects	51%	92%	80.39%

Table 1 provides a comparative analysis of student participation rates and test scores before and after the integration of Information and Communication Technology (ICT) in classrooms. The data highlights the significant increase in both student engagement and academic achievement, emphasizing the positive influence of ICT on educational outcomes. These figures are based on a comprehensive analysis of multiple classrooms across different educational levels.

4. Discussion

The qualitative data gathered in this study offers a rich list of insights, underscoring the multifaceted impact of ICT integration in educational settings. This section explores these effects, drawing on educator reports, case studies, and the broader educational context.

Engagement and Interactivity in Learning:

Educators across various educational institutions have noted a significant shift in classroom dynamics with the incorporation of ICT tools. This shift is characterized by a transition from traditional, teacher-centered approaches to more interactive, learner-centered

methodologies. The use of digital tools such as interactive whiteboards, educational apps, and online resources has facilitated this transition, making learning more engaging and dynamic. This change has led to heightened student motivation, as learners find themselves actively participating in the learning process rather than being passive recipients of information.

Self-Directed Learning:

A notable consequence of this shift is the emergence of a greater tendency for self-directed learning among students. With access to a wealth of online resources and learning platforms, students have begun to take charge of their educational journeys. This autonomy in learning is crucial for developing critical thinking skills, creativity, and lifelong learning habits. The role of the educator is evolving in this context, moving towards that of a facilitator or guide, helping students navigate the vast resources available to them and encouraging exploration and discovery.

Case Studies:

The effectiveness of ICT integration is vividly illustrated through specific case studies. For instance, a school that implemented a flipped classroom model, where students engage with lecture content at home and focus on interactive activities in class, saw a marked increase in collaborative projects and student-initiated learning activities. This model, supported by online resources and interactive software, has revolutionized the traditional classroom setup, fostering a more collaborative and engaging learning environment.

Another case study from a university highlights the innovative use of virtual reality (VR) tools. These tools have been instrumental in enhancing practical skills in fields such as medical education, engineering, and cultural studies. The immersive nature of VR provides students with hands-on experience and a deeper understanding of complex concepts, transcending the limitations of traditional classroom settings.

Broadening Global and Cultural Perspectives:

Moreover, the use of ICT in education has significant implications for broadening students' global and cultural perspectives. With tools like virtual reality and online collaborative platforms, students are exposed to diverse viewpoints and experiences, fostering a more inclusive and global understanding. This exposure is invaluable in preparing students for a globalized world, where cross-cultural understanding and international collaboration are increasingly important.

Implications for Future Educational Practices:

These findings have profound implications for future educational practices. As the landscape of education continues to evolve with technological advancements, it is imperative for educational institutions to adapt and integrate these tools thoughtfully. This includes not only investing in technology but also in training educators to effectively use these tools to enhance learning outcomes. Additionally, there is a need for ongoing research to continue exploring the long-term effects of ICT integration in education, particularly in relation to student well-being and the development of 21st-century skills.

In conclusion, the integration of ICT in education is not just about the adoption of new tools; it's about a fundamental transformation in the way education is delivered and experienced. It paves the way for more engaging, interactive, and personalized learning experiences, ultimately fostering an environment that nurtures innovation, creativity, and lifelong learning.

5. Conclusion and Recommendations

This study has comprehensively demonstrated the transformative potential of Information and Communication Technology (ICT) in enhancing educational settings. The integration of digital tools has not only enriched the learning experience but also catalyzed a paradigm shift in teaching methodologies, leading to increased student engagement and the fostering of innovative educational practices.

Reflecting on Global Educational Trends:

The implications of these findings extend far beyond individual classrooms or institutions. In the broader context, the integration of ICT in education is pivotal in addressing global educational challenges. This includes bridging the digital divide in under-resourced areas, facilitating access to quality education in developing countries, and preparing students globally for an increasingly digitized world.

Envisioning the Future of Education:

Looking forward, it is essential to envision the long-term trajectory of ICT in education. Future advancements in technology, such as artificial intelligence, augmented reality, and big data, promise to further revolutionize educational practices. The integration of these technologies could lead to even more personalized and adaptive learning experiences, opening new frontiers in education.

Addressing Challenges and Limitations:

While ICT presents numerous opportunities, its integration comes with its own set of challenges. These include ensuring equitable access to technology, overcoming budgetary and infrastructural constraints, and addressing the resistance to change within educational systems. A holistic approach, encompassing policy, infrastructure, and mindset shifts, is crucial to overcome these hurdles.

Recommendations for Effective ICT Integration:

In light of these findings and future possibilities, the following recommendations are proposed to optimize the integration of ICT in education:

- Institutional Support: Ensure robust infrastructure and offer continuous professional development for educators, enabling them to integrate ICT effectively into their teaching practices.
- Curriculum Development: Curricula should evolve to integrate ICT as a core component, moving beyond its supplementary role to become fundamental in teaching and learning processes.
- Student-Centered ICT: The development and selection of ICT tools should be guided by student needs and learning styles, ensuring that technology serves as an enhancer, not a detractor, of the educational experience.
- Continuous Evaluation: Establish a framework for the ongoing assessment of the impact of ICT in education, ensuring that technological adoption aligns with desired educational outcomes.
- Digital Literacy: Prioritize equipping both students and educators with comprehensive digital literacy skills, essential for maximizing the benefits of ICT resources.

Conclusion:

As we conclude, it is evident that while ICT offers a plethora of opportunities for enhancing education, its successful integration necessitates thoughtful consideration of implementation strategies, pedagogical adaptation, and continuous support systems. The future of education, buoyed by ICT, holds promise for a more engaged, informed, and technologically adept generation of learners, provided these aspects are diligently addressed.

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ІСТОРИЧНІ АСПЕКТИ ФОРМУВАННЯ ТА РОЗВИТКУ ПЕРЕКЛАДУ В ЄВРОПІ ТА УКРАЇНІ

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HISTORICAL ASPECTS OF THE FORMATION AND DEVELOPMENT OF TRANSLATION IN EUROPE AND UKRAINE

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DOI: [10.5281/zenodo.10437763](https://doi.org/10.5281/zenodo.10437763)**Анотація**

У статті досліджуються історичні аспекти розвитку перекладу в Україні та Європі із стародавніх часів і до сьогодення. Досліджено, що історія формування перекладу має значну історію, що починається із стародавніх часів до сьогодення.

Здійснена періодизація історичних аспектів розвитку та формування перекладу в Україні та Європі із стародавніх часів і до сьогодення. Встановлено 8 етапів формування та розвитку перекладу, що поділені на періоди.

Зазначено, що переклад це особливий вид діяльності, що являє собою відтворення оригіналу засобами іншої мови із збереженням єдності змісту і форми.

Досліджено, що у греко-римський період переклад отримав значний розвиток, що позначилось формуванням наукової школи перекладу, що став одним із елементів давньоримської культури.

З'ясовано, що у IX – XIII ст. період Київської Русі перекладацька діяльність отримала значний розвиток. Досліджено, що у XI ст. під егідою князя Ярослава Мудрого була створена перша перекладацька школа. Зазначено, що татаро-монгольське завоювання 1240 р., падіння Київської Русі, значно уповільнили перекладацький процес на Україні.

Доведено, що епоха барокко характеризується значною кількістю перекладів як в Європі так і в Україні.

Досліджено, що період перебування українських земель у складі російської імперії, став несприятливим для розвитку культури та перекладу. Зазначено, що у XIX ст. спостерігається інтенсивний розвиток перекладу, що пов'язано із творчістю Т.Г. Шевченка, М.П. Старицького, П. Куліша, І.Франко, Л. Українки. Встановлено, що значний розвиток перекладу спостерігається у період незалежної української держави 1918 р.

Зазначено, що упродовж 1920-х р. на українських землях перекладацька діяльність значно активізувалась, що позначилось виданням підручників та монографії присвячених теорії перекладу. Досліджено,

що унаслідок репресій у 30-х рр. XX ст. спостерігається значний спад перекладацької діяльності. Доведено, що значний розвиток перекладознавства спостерігається у 50-60 х рр. XX ст.

Зазначено, що з отриманням Україною незалежності, інститут перекладу отримав значний розвиток. Нарівні із художнім перекладом, отримав розвиток і юридичний переклад. Досліджено, що зазначений період характеризується формуванням шкіл перекладу.

Abstract

The article examines the historical aspects of the development of translation in Ukraine and Europe from ancient times to the present. It has been studied that the history of the formation of translation has a significant history, starting from ancient times to the present day.

Periodization of historical aspects of the development and formation of translation in Ukraine and Europe from ancient times to the present is carried out. There are 8 stages of formation and development of translation, which are divided into periods.

It is noted that translation is a special type of activity, which is the reproduction of the original by means of another language while preserving the unity of content and form.

It has been studied that in the Greco-Roman period translation received significant development, which was affected by the formation of the scientific school of translation, which became one of the elements of ancient Roman culture.

It was found that in the 9th-13th centuries, before Kyivan Rus, translation activity received significant development. It has been investigated that in the XI century, under the auspices of Prince Yaroslav the Wise, the first translation school was created. It is noted that the Tatar-Mongol conquest of 1240 and the fall of Kievan Rus significantly slowed down the translation process in Ukraine.

It has been proven that the Baroque era is characterized by a significant number of translations both in Europe and in Ukraine.

It has been investigated that the period of stay of the Ukrainian lands as part of the Russian Empire became unfavorable for the development of culture and translation. It is noted that in the 19th century there is an intensive development of translation, which is connected with the work of T.G. Shevchenko, M.P. Starytskoho, P. Kulisha, I. Franko, L. Ukrainky. It was established that a significant development of translation was observed during the period of the independent Ukrainian state in 1918.

It is noted that during the 1920s, translation activity in Ukrainian lands became significantly more active, which was reflected in the publication of textbooks and monographs devoted to the theory of translation. It was investigated that as a result of repressions in the 30s of the XX century, there is a significant decline in translation activity. It has been proven that a significant development of translation studies was observed in the 50s and 60s of the 20th century.

It is noted that with the independence of Ukraine, the translation institute received significant development. Along with artistic translation, legal translation also developed. Translation schools were formed.

Ключові слова: переклад, історія перекладу, формування і розвиток перекладу, перекладацька діяльність в Європі та Україні.

Keywords: translation, history of translation, formation and development of translation, translation activity in Europe and Ukraine.

Постановка проблеми. Переклад завжди відіграв особливу роль у розвитку світової культури, науки і права.

Мистецтво перекладу – це особливий вид людської діяльності, пов'язаний не лише з декодуванням текстів іноземною мовою, але й передачею культурних особливостей носіїв цієї мови. В сучасному глобальному світі, де економічні, культурні, наукові, суспільно-політичні зв'язки між різними країнами постійно зміцнюються, переклад набуває ще більшого значення для досягнення взаєморозуміння. Переклад не обмежується лише передачею інформаційного повідомлення – він охоплює значно ширшу сферу впливу.

У контексті наближення України до європейської спільноти, адаптації законодавства України до законодавства ЄС, розвитку культури, роль перекладу та перекладача як носія мови набуває нових якостей.

Сучасна ситуація в Україні стала потужним поштовхом для активізації міжнародної співпраці, пошуку всебічної підтримки від існуючих закор-

донних партнерів та налагодження нових партнерських зв'язків. Важливу роль в цьому процесі відіграють перекладачі [1, с. 28].

Історія світової культури, розглянута під кутом перекладу, демонструє постійний рух ідей та форм, а також те, що завдяки діяльності перекладачів культури засвоюють нові впливи. Простежити шляхи взаємовідносин між культурами і є метою історії перекладу [2, с. 5].

У цьому контексті, особливого значення набуває дослідження історичних аспектів розвитку перекладу в Україні та Європейському Союзі.

Аналіз останніх досліджень та публікацій. Питанням розвитку та формуванню перекладу та перекладацької діяльності присвячені праці таких вчених: Бовт А.Ю., Гудманян А.Г., Єнчева Г.Г., Кияк Т.Р., Коломієць І., Кузенко Г., Нікольська Н., Савчук Р.М., Сітко А.В., Терехова С. І., Чернікова Л.Ф., Філоненко Б., Христич Н.С.

Історичні аспекти розвитку перекладу в Україні і світі були предметом дослідження таких науковців, а саме: Гольцова М., Кальниченко О.А.,

Кальниченко Н.М., Москаленко М., Подміногін В.О., Прокопенко А.В., Прохорчук О., Гольцова М.

Мета статті є дослідження історичних аспектів розвитку перекладу та юридичного перекладу на теренах Європи та України.

Виклад основного матеріалу. Виникнення перекладу та юридичного перекладу сягає своїми коріннями як особливої форми людської діяльності у сиву давнину та пов'язана з необхідністю спілкування представників різних народів і національностей між собою.

Як стверджував Л. Д'юльст «Історія фактично єдиний засіб, за допомогою якого перекладознавство може досягти поєднання минулого з сучасним» [3, с. 88].

З метою дослідження розвитку перекладознавства в Україні та Європі, доцільно дослідити етапи виникнення та формування перекладу.

І етап розвитку перекладу у стародавні часи.

1.1. Період формування перекладу у шумерів. Перші відомості про зародження перекладацької діяльності в Месопотамії відносяться до III тис. до н.е. та пов'язані із діяльністю «школ е-дуба» («дім таблицок»), де кожен перекладач мав володіти й відповідно здійснювати переклад двома мовами – шумерською та аккадською. До цього часу відносяться і інформація про першого перекладача (Анхурмес, верховний жрець Тиніса (XIV ст. до н.е.). В 2100 р. до н.е. вавилонська література перекладалася на древньогрецьку і древньоєгипетську мови. Вавилон був в ті часи був постійним центром перекладацької діяльності [4, с. 15].

1. 2. Період. Розвиток перекладу у греко-римський період. Зазначений період позначився формуванням школи перекладу, що характеризується наявністю наукового підходу та концепції перекладу. Так, у 240 р. до н.е. Лівієм Андроніком була створена латинська версія Одиссеї. Доцільно зазначити, що рівень перекладацької діяльності у Римі досяг значного розвитку, що стало на нашу думку одним із елементів давньоримської культури. Заслуговує на увагу діяльність великих римських діячів, а саме: Теренція, Цицерона, Горація, Вергілія, діяльність яких була безпосередньо пов'язана із перекладом. Необхідно відмітити вклад у розвиток перекладу Квінта Еннія (II-III ст. до н. е.), який здійснив переклад з грецької трагедій Евріпіда, а також роботи Тита Макція Плавта, що переклав понад 100 комедій. Особливого значення набула перекладацька діяльність Цицерона (106-43 роки до Р. Хр.), що запропонував концепцію «емуляції» і конкуруючого відтворення. З початку IV ст. у перекладацьких школах Риму працювала велика група кваліфікованих перекладачів, а саме: філософ Марій Вікторин (бл. 275–362), Руфин Аквілейський (340–416) та інші.

В 250 році до н.е. в місті Александрії було здійснено переклад Старого Заповіту з давньоєврейської й арамейської мов на древньогрецьку, що отримав назву Септуагінта (Interpretatio Septuaginta Seniore – «Переказ сімдесяти мудреців») [5, с. 77].

II період розвитку європейського перекладу на теренах Київській Русі та Європи в IX–XIII ст. ст.

В IX ст. у Київській Русі майже одночасно виникає і розвивається писемність, література і переклад. У 864 р. Кирило та Мефодій зробили переклад Біблії та створили абетку – кирилицю.

Після хрещення Київської Русі князем Володимиром у 988 р. з'явилася велика кількість перекладених творів, в яких описувалися життя святих, а також світські переклади: «Бджола», «Космографія», «Фізіологія» [6, с. 189].

Під егідою князя Ярослава Мудрого була створена перша в історії України перекладацька школа в Софійському соборі, яка готувала фахових інтерпретаторів із грецької мови.

Варто зазначити, що давньоруські перекладачі не тільки зуміли створити точні, адекватні переклади, а й зберегти стиль і ритміку грецьких оригіналів. [7, с. 20].

Серед перекладачів раннього середньовіччя доцільно виділити діяльність Ієроніма Софроніка (340 – 420), школа якого вирізнялась особливим ставленням до тексту перекладу, збереженням в перекладі своєрідності, милозвучності та авторського тону оригіналу [8, с. 178].

В епоху пізнього середньовіччя, за часів Монгольської навали (1228 – 1480) переклади продовжували відігравати значну роль у культурному розвитку Київської Русі. Так, були перекладені і інші частини Біблії. Розвиток міжнародних контактів країни призвів до появи перекладів індійських, латинських, давньоєврейських та грецьких джерел.

У XII – XIII ст. в Європі стають популярними світські тексти. Так, у Німеччині значного розвитку набуває переклад французьких лицарських романів [9, с. 283].

З появою перших університетів у Європі XII-XIII ст. виникають нові перекладацькі центри (Болонья, Париж, Оксфорд, Валенсія тощо). Латинь стає мовою університетської освіти та науки.

Доцільно звернути увагу на перекладацьку діяльність доктора теології Мартіна Лютера (1483-1546), який запропонував принципово новий переклад Святого Письма, що базувався на положенні «rem tene vers sequitur» («схопи суть, тоді слова самі прийдуть слідом»). Основні напрями перекладу містились також, у праці «Послання про перекладу».

Починаючи з XII-XIII ст., збільшується, також частина світських перекладів. Завдяки перекладам поширюється лицарський роман в Англії, Іспанії, Італії, Німеччині, Норвегії, насамперед перекази французьких лицарських романів. Особливо популярним став старофранцузький епос "Пісня про Роланда".

Формуються засади усного перекладу. В XIII ст. юрист Петрус де Боско домагається заснування в Парижі спеціальну Вищу школу усних перекладачів зі східних мов та пропонує в посланні до Філіпа IV орієнтовну програму навчання [10, с. 28].

III період розвитку перекладу в епоху барокко. XVII-XVIII ст. ст. Епоха бароко характеризується значною кількістю перекладів. Представниками

класичного німецького перекладу та перекладознавства цього періоду став М. Опіц та Ю.Г. Шоттель.

Барочний переклад релігійних та світських текстів зазнав особливого розвитку на Україні. Осередками перекладацької цього періоду стала Острозька та Києво-Могилянська академії. Перекладацьку діяльність провадили багато видатних діячів Острозької академії, а саме: Л. Зизаній, К. Острозький, Д. Наливайко та інші.

Завдяки національному відродженню України та національно-визвольній боротьбі нового розквіту зазнав український переклад того часу, центр якого знаходився в Києво-Могилянській Академії (1632). Доцільно виділити таких видатних діячів перекладознавства як: І. Величковський, Д. Туптало, І. Максимович, Т. Прокопович, що відстоювали мовно збагачуючу функцію перекладу [8, с. 173].

IV етап. Перекладацька діяльність епохи класицизму і просвітництва (1700-1800 рр.). У XVII-XVIII ст. ст. найбільш відомим представником цієї тенденції в Німеччині був Й.К. Готтшед. Він рекомендував модернізувати і націоналізувати твір оригіналу, використовувати діалекти в перекладі, тобто практикував вільну інтерпретацію. У другій половині XVIII ст. дискусія між прибічниками дослівного перекладу і вільної інтерпретації досягла свого апогею. Активну участь у ній брали Джон Кемпбелл і Александр Тайтлер в Англії.

Після входження значної частини України до складу російської імперії наприкінці XVII ст. в силу низки об'єктивних чинників перекладацька діяльність в Україні майже зникла й почала відроджувалася ближче до завершення першої половини XIX ст. [11].

З кінця XVII – початку XVIII ст. російські гусидари забороняли використовувати українську мову, що призвело до змінення української культури та обмеження кола користувачів перекладів українською мовою.

Таким чином, зазначений період став несприятливим для розвитку культури та перекладу у зв'язку з політикою гноблення українського народу, проведеною Петром I, а згодом і Катериною II.

Вагомий внесок у формування української літературної мови на різних етапах зробили: І. Вишенський, Х. Філалет, Герасим та Мелетій Смотрицький, Л. Зизаній, П. Могила, Ф. Прокопович, Г. Скворода та інші.

V етап. Український переклад епохи романтизму XVIII ст. – початку XIX ст. В Україні кінця XVIII ст. – початку XIX ст., яка стала складовою російської імперії, посилювався вплив російської культури, що призвів до русифікації вищих верств українського суспільства. Зазначена тенденція мала наслідком певну специфіку тогочасного романтичного українського перекладу, який часто позначають терміном "котляревщина", представниками якої стали (І. Котляревський, П. Гулак-Артемовський, Є. Гребінка, М. Старицький, Ю.Федькович та ін.).

Доцільно виділити діяльність таких перекладачів як: А. Метлинський, який перекладав твори із німецької та французької мов, Є. Гребінки, Г. Квітка-Основ'яненко, Ю. Федьковича, що здійснював переклади німецької, австрійської поезії, а також творів Шекспіра.

IV етап. Українська перекладацька діяльність XIX–XX ст. Для цього періоду характерний інтенсивний розвиток художнього перекладу, що припадає на 20–30-ті роки XIX ст.

У 40–50-ті роки XIX ст. важливе місце в історії українського художнього перекладу належить Т.Г. Шевченко, який істотно збагатив український художню літературу перекладами «Давидових псалмів», фрагментами з Осії, Ісайї, Ієзекіїля. Для перекладів Т.Г. Шевченка характерне збереження образів оригінальних творів.

Друга половина XIX ст. ознаменувалася розквітом діяльності М.П. Старицького, який увійшов в історію українського художнього перекладу як вдумливий інтерпретатор «Гамлета» У. Шекспіра. М.П. Старицький вніс значний вклад в розвиток перекладу, перекладаючи твори Шекспіра, сербські балади, поезію Гайне, Байрона, Міцкевича. Необхідно звернути увагу на творчість першого професійного перекладача України XIX ст. – П. Куліша. Так, П. Кулішу вдалося сформулювати унікальну перекладацьку мову, де для передачі внутрішньої драматичності оригіналу органічно поєднувалися вигранений перекладачем високий та розмовний стилі [12, с. 18].

Значну кількість творів, демонструючи «пасіонарний прояв особистості митця» здійснив І. Франко, що переклав 15 найкращих драм Шекспіра, поему Байрона, вірші Гете, Шіллера, Гайне. Переклад його творів характеризується вмінням передати зміст оригіналу, образи, дух і настрої твору, відтворити задум автора, досягти прагматичних функцій оригіналу [13].

Українська поетеса Л. Українка здобула славу в історії українського перекладу своїми перекладами прозових творів Гейне, Гоголя і Горького, поезій Гомера, Данте Аліґ'єрі, Байрона, давньоєгипетських гімнів, гімнів із давньоіндійської «Рігведи» тощо. Інший відомий поет П. Грабовський виконав численні переклади на основі підрядкових перекладів зі східноєвропейських, мов американських народів і народів російської імперії, здійснюваних його друзями, що перебували в заслання. П. Грабовський казав: «Для мене важливими в кожному творі є його загальна ідея і загальне враження, деталі для мене нічого не варті» [11].

П.О. Куліш переклав 15 п'єс Шекспіра, твори Й. Гете, Ф. Шіллера, Дж. Байрона, Г. Гайне та ін. Частина його перекладів наближається до переспівів. Згодом розгортається перекладацька творчість великого поета і вченого І. Я. Франка – автора численних перекладів з багатьох мов світу. І. Я. Франко переклав першу частину «Фауста» Й. Гете, «Мертві душі» М. Гоголя, політичну лірику Г. Гайне. Чільне місце як теоретик і практик українсь-

кого художнього перекладу посідає Максим Рильський, якому належать блискучі переклади поеми А. Міцкевича «Пан Тадеуш».

У період незалежної української держави 1918 р., доцільно звернути увагу на перекладацьку діяльність таких діячів України як Івана Огнієнко (Митрополит Іларіон) - науковця, історика, філолога, філософа, міністра національної освіти, патріота та духовного лідера незалежної України, що здійснив переклад Біблії.

VII період етап перебування України у складі СРСР. Зростання української самосвідомості дало сильний поштовх оригінальній та перекладацькій творчості. У 1920-х роках XX ст. після розпаду російської імперії та формування після жовтневого перевороту радянського союзу, перекладацька діяльність на території України певною мірою активізувалася. Так, наприкінці 1920 р. у сфері перекладу працювали такі відомі особистості, як І. Кулик, перекладач творів В. Уїтмана, М. Зерова, перекладач творів античних і сучасних поетів, Г. Майфет, дослідник перекладів Т.Г. Шевченка англійською і французькою мовами, В. Державін, літературний редактор і український перекладацький критик [11].

Міцне підґрунтя розвитку українського перекладознавства заклали перший в Україні та в усьому радянському союзі систематичний підручник із питань перекладу О. М. Фінкеля «Теорія й практика перекладу» (1929). У 30-х рр. XX ст. – попри започаткування нових наукових періодичних видань – теорія перекладу пережила значний спад на східно-українських теренах унаслідок репресій [10, с. 71].

Післявоєнний (50-ті р. XX ст.) і пострадянський періоди можна назвати «століттям перекладу». Виникає лінгвістична теорія перекладу, перекладознавство як особлива наука.

Послаблення ідеологічного тиску Москви у роки «відлиги» наприкінці 50–60-х рр. дало можливість створити у видавництвах відділи перекладної літератури. Таким чином, на підставі теоретичних поглядів і практичної діяльності перекладачів утворюється українська школа художнього перекладу, найвизначнішими представниками якої стали Г. Кочур і М. Лукаш. Найбільший внесок у розвиток теорії перекладу цього часу зробив В. В. Коптілов. Розглядаючи непоодинокі історичні факти, а систематизуючи історію перекладів зі світових класиків, він зміг охопити і проблеми перекладацької множинності, і перекладацької інтерпретації, і видозміни текстового перевираження (стилізації). Також, упродовж 50–60-х рр. XX ст. спостерігається зародження мовознавчого підходу до вивчення перекладу, чому сприяли періодичні видання «Мовознавство», «Лексикографічний бюлетень», наукові збірники.

Необхідно зазначити, роботах 50-60-х рр., були закладені основи лінгвістичної теорії перекладу (Федоров, 1953; Jakobson, 1959) та поняття адекватності [14, с. 71].

Зміни, що відбулися в мовознавстві та перекладознавстві впродовж 50–60-х рр. XX ст., значно

вплинули на розвиток перекладу у 70-х рр. Основними здобутками перекладознавства у період із середини 70-х рр. і до кінця XX ст. стали: розширення та стабілізація терміносистеми; уточнення класифікації перекладознавчих дисциплін; вироблення методик перекладознавчого аналізу; закладення основ теорії жанрів перекладу; розвиток дидактики перекладу.

Таким чином, зазначений період можна охарактеризувати як становлення перекладознавства як самостійної міждисциплінарної галузі [10, с. 76].

VIII етап Формування інституту перекладу у незалежній Україні. З отриманням Україною незалежності, інститут перекладу стає вкрай актуальним. Значного розвитку отримує переклад художніх творів. Сформувалися такі основні принципи перекладу, характерні для української перекладацької школи: дотримання авторської концепції, що поєднано із змістом твору, збереження в тексті основних рис синтаксичної організації, стилістичних засобів експресії тексту.

Також, значного розвитку отримав юридичний переклад, як різновид перекладу текстів, що мають відношення до сфери права і призначені для передачі юридичної інформації.

Актуальність дослідження цього різновиду перекладу зростає з кожним роком, пропорційно зростанню ділових відносин із представниками інших країн і розвитку бізнесу на міжнародному рівні. Серед основних документів, які є предметом перекладу, можна виділити договори, контракти, довіреності, закони, нормативно-правові акти, установчі документи, нотаріальні свідоцтва, угоди, сертифікати. Переклад юридичних текстів є одним із найскладніших, оскільки для перекладу, як з української мови іноземною, так і навпаки, необхідні не лише навички володіння лексикою країн перекладу, а й знання особливостей використання юридичною термінологією [15, с. 164].

Висновки. Враховуючи вище наведене, доцільно зробити наступні висновки. Переклад це особливий вид діяльності, що являє собою відтворення оригіналу засобами іншої мови із збереженням єдності змісту і форми.

Процес перекладу є важливим аспектом побудови міжкультурного спілкування на засадах взаєморозуміння, конструктивного діалогу, взаємодопомоги, взаємообміну культурним і науковим надбанням.

Історія перекладу є невід’ємною частиною культурної спадщини нашого народу. Розвиток перекладацької діяльності в Україні та у світі має багатовікову історію від найдавніших часів до сьогодення.

Доцільно виділити наступні етапи розвитку перекладу, які поділені на періоди, а саме: *I етап розвитку перекладу у стародавні часи.* 1.1. Період формування перекладу у шумерів. 1.2. Період греко-римський період розвитку перекладу. *II етап розвитку європейського перекладу IX–XIII ст. ст.* *III етап розвитку перекладу в епоху бароко.* *IV етап. Пперекладацької діяльності епохи класицизму і просвітництва.* *V етап. Український переклад*

епохи романтизму XVIII ст. – початку XIX ст. VI етап. Українська перекладацька діяльність XIX–XX ст. VII етап перебування України у складі СРСР. VIII етап Формування перекладу у незалежній Україні.

Зародження перекладацької діяльності спостерігається у давніші часи в Месопотамії, Єгипті, Греції та Римі.

Історія українського перекладу зародилась ще за часів Київської Русі та досягла значного розвитку. Водночас, у період татаро-монгольське завоювання 1240 р., значно уповільнили перекладацький процес на Україні.

Незважаючи на значну історію, формування перекладознавства, як окремої галузі почало формуватися лише з XVII–XVIII ст. та досягла значного розвитку у XX ст., що пов'язано із заборонами та утисками перекладу у часи перебування українських земель у складі російської імперії та радянського союзу.

У незалежній Україні, нарівні із перекладом літературних творів, значне місце займає юридичний переклад, що стає на сьогоднішній день є одним із найбільш затребуваних видів перекладу. Таким чином, перекладознавство юридичних текстів є порівняно новим напрямом наукової і практичної діяльності у сфері філології.

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TECHNICAL SCIENCES

ВПЛИВ РЕАГЕНТІВ ЗНЕЗАРАЖЕННЯ НА ПАТОГЕННІ ВКЛЮЧЕННЯ МІКРООРГАНІЗМІВ У ВОДНОМУ БАЛАСТІ

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THE IMPACT OF DISINFECTION REAGENTS ON PATHOGENIC MICROORGANISM INCLUSIONS IN BALLAST WATER

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Анотація

В статті розглянуто особливості використання методів знезараження баластних вод. Також увага приділяється застосуванню хелату заліза для знищення організмів у баластних водах. Розглянуто необхідні концентрація, час дії вище зазначених реагентів та їх вплив на патогенні включення мікроорганізмів. Проведено порівняння таких методів знезараження як: електроліз, озонування та ультрафіолетове опромінювання. Приведенні данні дослідження впливу озонування та ультрафіолетового опромінювання на розроблених в Дунайському інституті Національного університету «Одеська морська академія» системи очищення баласту.

Abstract

The article explores the peculiarities of ballast water disinfection methods. Special attention is given to the application of iron chelate for the eradication of organisms in ballast waters. The necessary concentrations, exposure times of the mentioned reagents, and their impact on pathogenic microorganism inclusions are discussed. A comparison of disinfection methods such as electrolysis, ozonation, and ultraviolet irradiation is provided. The research data on the impact of ozonation and ultraviolet irradiation on the ballast water treatment system developed at the Danube Institute of the National University "Odesa Maritime Academy" are presented.

Ключові слова: методи очищення, баластна вода, реагенти знезараження, хелат заліза, хлор, ультрафіолет, озон, хлорит натрію, електроліз.

Keywords: purification methods, ballast water, disinfection reagents, iron chelate, chlorine, ultraviolet, ozone, sodium chlorite, electrolysis.

Постановка проблеми

The International Convention for the Control and Management of Ships Ballast Water and Sediments (міжнародна Конвенція по контролю і управлінню баластними водами і осадами) вступила в чинність 8 вересня 2017 року. До вересня 2017 конвенція була ратифікована більш ніж 60 країнами, що представляють більш ніж 70% світового тоннажу.

Конвенція вимагає від суден управляти баластними операціями таким чином, щоб прибрати, знешкодити або уникнути забору або відкатки шкідливих організмів з баластними водами та осадами.

Згідно міжнародної Конвенції по контролю і управлінню баластними водами і осадами існує два стандарти (D-1 і D-2), рис. 1.

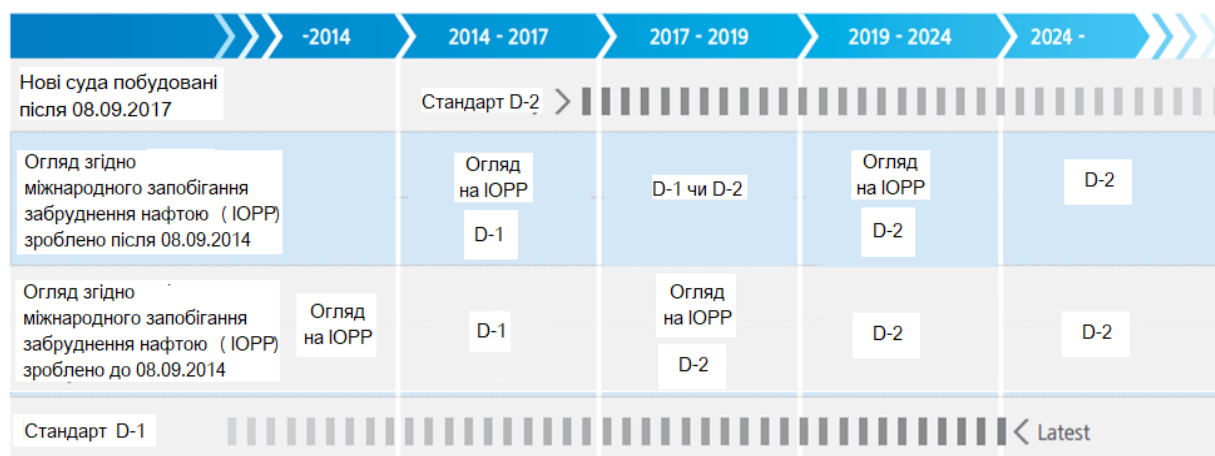


Рис. 1. Етапи впровадження «Конвенції з контролю та управлінням баластними водами й осадами»

Стандарт D-1 вимагає від суден робити заміну баласту у відкритому морі, не ближче 200 миль від берега і на глибині не менше 200 м, що дозволяє знешкодити більшості потенційно небезпечних організмів.

Стандарт D-2 визначає максимально допустиму по відкатці кількість шкідливих організмів, включаючи певні мікроби небезпечні для людського здоров'я.

Враховуючи що до 8 вересня 2024 всі судна повинні відповідати стандарту D2 (рис. 1) тому дослідження, що направлені на аналіз впливу реагентів знезараження на патогенні включення мікроорганізмів у водному баласті є актуальні.

Аналіз останніх досліджень та публікацій.

Серед методів очищення баластних поширення отримали механічні, фізичні та хімічні або також комбінювання цих методів [1, 2], при чому сегмент дезінфекції, що включає обробку баласту, для остаточного знищення мікробів і вірусів, а також спор рослин за допомогою різних реагентів знезараження: обробки ультрафіолетом, електролізу, озонування і хлорування.

Такі комбіновані способи дезінфекції, як механічна обробка з додаванням методу обробки ультрафіолетовими хвилями, озону або хімічного методу хлорування, є в даний час найбільш поширеними на судах.

Питанню впливу реагентів знезараження на патогенні включення мікроорганізмів при дослідженнях пов'язаних з очищенням баластних вод приділяється особлива увага [1-6], але не в повній мірі приділяється увага комплексному аналізу впливу реагентів при очищенні баластних вод, що дозволить усвідомити загальні напрямки очищення баластних вод, попередньо визначити необхідні витрати ресурсів при їх використанні та провести їх порівняльну оцінку.

Мета статті. Дослідити різноманітні методи знезараження баластних вод у судноплавстві, зокрема їх вплив на патогенні включення та мікроорганізми, а також порівняти методи знезараження за їхньою ефективністю та безпекою.

Виклад основного матеріалу. Обробка хлором відбувається при прийомі баласту, подачею в систему проточним способом. Хлор на судні отримують внаслідок протікання процесу електролізу чи безпосередньо завантаженням зовні.

При безпосередньому додаванні хлору в баластну воду, ефективно хлорування баластної води згідно експериментальних досліджень [3] можна отримати при значеннях концентрації хлору близьких до 5 ppm. При цьому даний спосіб хімічної обробки має декілька істотних недоліків [4]: хлор при високих концентраціях є отруйною речовиною, хлор значно прискорює корозію металу, необхідно дотримуватися високих заходів безпеки, необхідно постійне поповнення хлору при експлуатації, необхідно проводити додаткове дехлорування баласту при його скиданні, а також необхідно мати запас речовини дехлоранту (зазвичай для цих цілей використовують сульфід натрію Na_2SO_3).

Серед позитивних сторін можна віднести, незначні енергозатрати при експлуатації, менший займає простір, відсутність при великих подачах баласту (більше 8000 м³/год) складних конструктивних рішень при впровадженні у систем очищення баласту, хлор зберігає бактерицидну активність у воді (пригнічує подальше розростання мікроорганізмів в баластних танках).

Недоліки що пов'язані з біологічною небезпечністю частково знижують шляхом використання таких хлорвмісних реагентів як гіпохлорит натрію. Використання гіпохлориту натрію обумовлено наступними перевагами: легко дозується через використання таблеток або порошку, з часом розкладається на безпечні сполуки NaCl та кисень, більш безпечний при використанні та менша корозійність (практично в 6 разів порівняно з хлором). Час розкладу гіпохлориту натрію залежить від багатьох факторів: РН – води, температури води, концентрації гіпохлориту натрію, наявності ультрафіолетового випромінювання (сонячного світла), наявності гідрооксиду натрію та інших факторів [5]. Зазвичай рекомендується додавати гіпохлорит натрію в концентраціях 1-5 ppm.

Експериментальні дослідження [6] використання гіпохлориту натрію показали що концентрація гіпохлориту натрію понад 3,0 ppm з фільтрацією або без неї зменшує кількість бактерій більш ніж на 99,999%, а мезозoopланктону та фітопланктону більш ніж на 99 %. При чому фільтрація підвищує ефективність лише тоді, коли концентрація гіпохлориту спочатку була менше 1,5 ppm. Також ті самі дослідження показали, що при використанні гіпохлориту натрію з концентрацією менше 1,5 ppm після обробки та подальшого зберігання баласту в ньому можливе поступове збільшення концентрації бактерій та після 8 діб в досліді бактерії знову вирости до рівня, рівного рівню до обробки [6]. Що обумовлює необхідність підтримувати мінімальний рівень загального залишкового окислювача (TRO), щоб запобігти розмноженню бактерій.

Ще одним критичним недоліком вище розглянутих методів додавання хлору чи хлорвмісних реагентів є їх нездатність працювати при відсутності

хімічних реагентів, тобто в разі тривалого рейсу або логістичної помилки при завантаженні судна в порту, система обробки баластних вод стає повністю непрацездатною.

Для зменшення впливу цього недоліку при обробці морської води замість використання хлору або хлорвмісних реагентів можливо їх отримання під час електролізу морської води.

Тому в сучасних системах очищення баластних вод також отримали поширення електрохімічні реактори отримання гіпохлориту натрію, а витрати електроенергії за аналізом даних [7, 8] в середньому складають 2,2÷5 кВт потужності на кожні 100 м³/год подачі баласту.

На рис 2, [4] показано експериментальні данні впливу озону на зменшення кількості бактерій, при дозуванні 2,5 г озону на 1 м³ баласту.

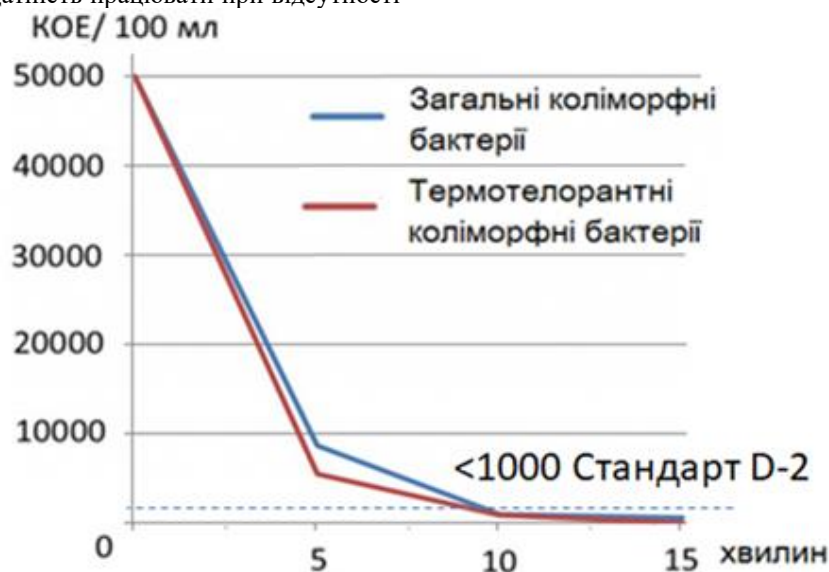


Рис 2. Вплив озону на зменшення кількості бактерій

Як видно з графіка досягнення значення 1000 КОЕ/100 мл, що є вимогою стандарту D2, відбувається після 10 хвилин озонування. Тобто система озонування повинна бути сконструйована таким чином щоб контакт баластної води з озоном відбувався протягом цього часу. Треба зазначити, що необхідний час контакту озону з баластною водою можна скоротити шляхом збільшення дозування озону, але мінімальний час обмежений стійкістю мікроорганізмів до озону, наприклад, для *Mycobacterium tuberculosis* він складає 6 хв. Так в моделях NK- O3 [9] дозування озону в середньому складає 2,5 г/м³. А максимальні витрати електроенергії за аналізом даних [10] в середньому складають 9÷14,4 кВт потужності на кожні 100 м³/год подачі баласту.

Пристрій очищення баластових вод озоном в більшості своїй застосовується на судах з середньою місткістю баласту, так як виробництво озону є досить енергоємним. Також слід не забувати що озон є досить отруйною речовиною при високих концентраціях, а також може утворювати додаткові

умови для інтенсифікації процесів корозії металу. Але незважаючи на те що спосіб знезараження озоном є реагентним він не створює додаткової небезпеки отруєння навколишнього середовища, так як озон достатньо швидко у воді рекомбінується у кисень.

Ультрафіолетове опромінення використовується в більшості випадків з механічним способом обробки - фільтрацією. Після того як забортної вода пройшла перший ступінь очищення фільтрами, судновий баласт піддається ультрафіолетовому випромінюванню, внаслідок чого утворюються гідроксильні радикали, які остаточно вражають мікроорганізми, що залишилися після фільтрації. Вражаюча дія даного способу є чинним лише протягом процесу обробки, не надаючи руйнівного впливу на конструкції баластної системи судна.

На основі даних приведених фірмами виробниками [7, 8, 10] було проведено порівняльний аналіз споживаної потужності різних типів установок по обробці баластних вод, рис. 3.

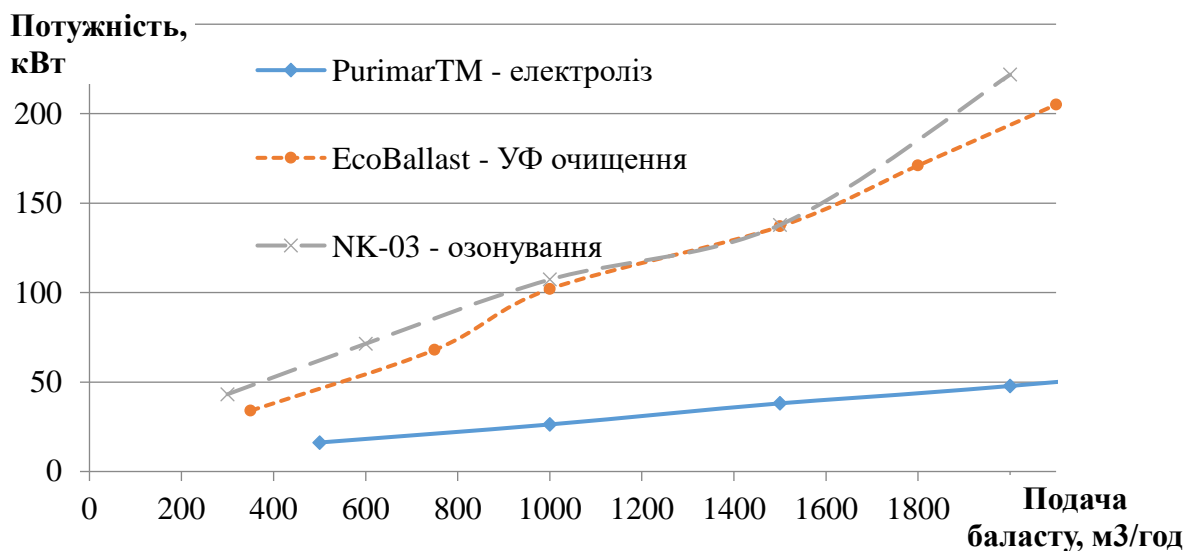


Рис. 3.

Споживана потужність установки по обробці баластних вод в залежності від способу їх обробки

Як можна побачити з рис. 3. потужність установок з ультрафіолетовою дезінфекції практично в 4 і більше разів більше ніж потужність установок з електролізом, потужність установок що використовують озонування або ультрафіолетове очищення практично одного порядку, незначно вище при озонуванні. Але незважаючи на те що: установи з електролізом мають значно менші витрати електроенергії, можуть працювати з великими подачами баласту (понад 8000 м³/год) та на їх якість очищення не впливає прозорість та мутність баластної води (що є критичним для ультрафіолетового знезараження), вони також мають суттєві недоліки, що зазначались раніше, серед яких: необхідність наявності соленої води, підвищення корозії, необхідність дехлорувати перед дебаластуванням, підвищені вимоги до безпеки при використанні і т.п.

Одним з інноваційних напрямків є використання халату заліза в знезараженні та знищенні (очищенні) живих організмів у баластній воді, який пройшов успішні випробування зі знищення шкідливих моллюсків у рослинництві [11]. У якості халатів частіше використовується комплекс заліза з діетилентріамінпентаоцтовою (Fe-ДТПО) та поліетиленполіамінполіоцтовою (Fe-ПППО) кислотами. Це розчини темно-коричневого кольору густиною 1-1,3 г/см³. У препараті Fe-ДТПО антихлорозину міститься не менше 10%, а у Fe-ПППО – не менше 7% залізного комплексу. Головна перевага хелатів перед використовуваними раніше формами - це те, що рослинами вони засвоюються набагато ефективніше.

Також при обранні концентрації реагентів при знезараженні патогенних включень та мікроорганізмів треба враховувати, що за даними наукових досліджень, за останні 15 — 20 років стійкість патогенної мікрофлори до хлору підвищилася в 5 разів, до озону — в 3 рази, до УФ випромінювання — в 4 рази [12].

На базі Дунайського інституту Національного університету «Одеська морська академія» було

проведено дослідження впливу озону та ультрафіолету на очищення баластних вод [13]. В досліді використовувались баластна вода з ріки Дунай та баластна вода з Чорного моря. Довжина хвилі в ультрафіолетовій камери становила 254–260 нм, а доза озону $O_3 = 8$ мг/л, швидкість потоку води змінювалась від 1,6 до 0,8 м/с. Аналіз результатів обробки баластної води з ріки Дунай при оптимальній швидкості 0,8 м/с показало зниження наступних показників: індекс ЛПР з 1800 до 300, фаговий індекс з 125 до 0, ентерококів з 2300 до 700, кількість мезофільних аеробних і факультативно анаеробних мікроорганізмів з 1500 КОЕ/см³ до 5 КОЕ/см³.

Аналіз результатів обробки баластної води з Чорного моря при оптимальній швидкості 0,8 м/с показало зниження наступних показників: індекс ЛПР з 3900 до 780, фаговий індекс з 500 до 90, ентерококів з 7500 до 500, кількість мезофільних аеробних і факультативно анаеробних мікроорганізмів з 5000 КОЕ/см³ до 600 КОЕ/см³.

Висновки та пропозиції.

Ефективне знезараження баластних вод є критично важливим завданням для збереження морського середовища. Різноманітні методи, такі як додавання рідкого хлору або гіпохлориту натрію, електроліз, озонування та ультрафіолетове опромінювання, мають індивідуальні специфічні переваги та недоліки, так наприклад електроліз є найменш енерговитратним але при цьому більше екологічно небезпечним та корозійним. Всі вище зазначені способи знезараження демонструють свою ефективність але кінцеве обрання методу потребує комплексної експертної оцінки з урахування особливостей експлуатації та конструкції судна.

Також важливо приділяти увагу інноваційним методом знезараження, наприклад, використанню хелату заліза, що виявилось успішним у знищенні живих організмів у баластних водах.

Врахування стійкості мікроорганізмів до хлору, озону та ультрафіолетового опромінювання є ключовим аспектом при виборі часу проходження

баластної води при її обробці. Також треба враховувати, що стійкість мікроорганізмів з часом збільшується, що потребує періодичного перегляду конструкцій вже існуючих систем очищення баластних вод.

Можливо інтеграція різних методів і використання нових реагентів може бути важливим кроком у напрямку забезпечення ефективного та екологічно безпечного контролю за мікробіологічною безпекою баластних вод.

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CHOICE OF OPTIMAL MODES OF PLASMA-ARC SPRAYING USING DIFFERENT TYPES OF CONDUCTIVE WIRES

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Abstract

The work is devoted to the study of the process of plasma-arc sputtering using a conductive wire as a moving anode. It was established that this process provides effective control of the technological parameters of the plasma jet, increases the utilization rate of materials up to 72%, reduces the porosity of sprayed coatings to less than 3%, and allows to achieve adhesion strength of coatings to the base of more than 40 MPa. The specified increase in the material utilization factor significantly increases the cost-effectiveness of plasma-arc spraying with anode wires with a diameter of 1.2-1.6 mm made of carbon steels 1020 and 1070, stainless steel AISI304, nichrome NiCr80-20, copper Cu99, aluminum alloy 5083 and others, and increasing the adhesion strength of coatings to the base expands the limits of application of this process. The use of optimal parameters of plasma-arc sputtering with anode wires makes it possible to obtain non-porous copper coatings with increased adhesion strength to the base, which can be used to create electrical contacts and intermediate layers when making soldered joints of aluminum and steel parts.

Keywords: plasma-arc spraying, moving wire-anode, wire melting, use of material, adhesion strength of coatings.

At the current stage of the development of science and technology, there is a need to apply functional coatings with specified properties without the risk of residual deformations or stresses [1]. Examples can be the restoration of overall parts such as axles or shafts, with a fairly insignificant (0.1...0.5 mm per diameter) production of seats, increasing the service life of friction pairs due to increasing the wear resistance of their components, reducing fuel consumption due to improving the coefficient of thirds sliding of certain parts of internal combustion engines, etc.

To solve such problems, the process of plasma-arc spraying with the use of a current-conducting wire-anode can be applied. The essence of the plasma-arc spraying process consists in the melting of the current-conducting wire-anode, which is introduced into the zone of the high-speed plasma jet, and the further crushing of the melt that breaks off from the end of the wire [2, 3]. But in order to fully use the advantages of this process, it is necessary to optimize its technological parameters, taking into account the materials of the sprayed wires. This work is dedicated to this problem.

The purpose of the work is to optimize the parameters of plasma-arc spraying of a compact metal wire-anode from various types of steels and alloys based on the determination of technological features of the process according to the criteria of increasing the coefficient

of material utilization and increasing the indicators of the density of coatings and the strength of their adhesion to the base.

A number of technological studies were carried out to achieve this goal. For this, the methodology proposed in [4] was chosen as the basic approach to conducting research. In addition, research was conducted on the change in the material utilization factor depending on the change in the parameters of the spraying mode when using different materials of sprayed wires, and also determined the porosity and adhesion strength of the coatings applied from those wires.

According to the applied technological scheme, the arc burns between a non-fusible tungsten cathode and a current-conducting wire-anode, which is fed through the section of the plasmatron nozzle. The working (plasma-forming) gas entering the working chamber is heated by an electric arc and flows out of the nozzle in the form of a plasma jet. The open area of the discharge, outside the plasma-forming nozzle, is blown by the gas stream flowing from the annular gap between the plasmatron nozzles. The features of this method include the fact that the melting and jet spraying of the wire material is carried out by an argon plasma, while the crushing of the melt and the acceleration of dispersed particles is carried out by a stream of cold, accompanying gas. This ensures minimal losses due to evaporation of the wire material (up to 2%) and

obtaining the optimal fractional composition of the dispersed phase. Technological experiments were carried out in an open atmosphere using the PLAZER 30 plasma-arc spraying installation [3, 4], in which a conductive electrode wire is used as a fusible anode (Fig.

1). In order to catch the sprayed titanium particles, the wire was sprayed into a vessel filled with water from a distance of 500 mm.

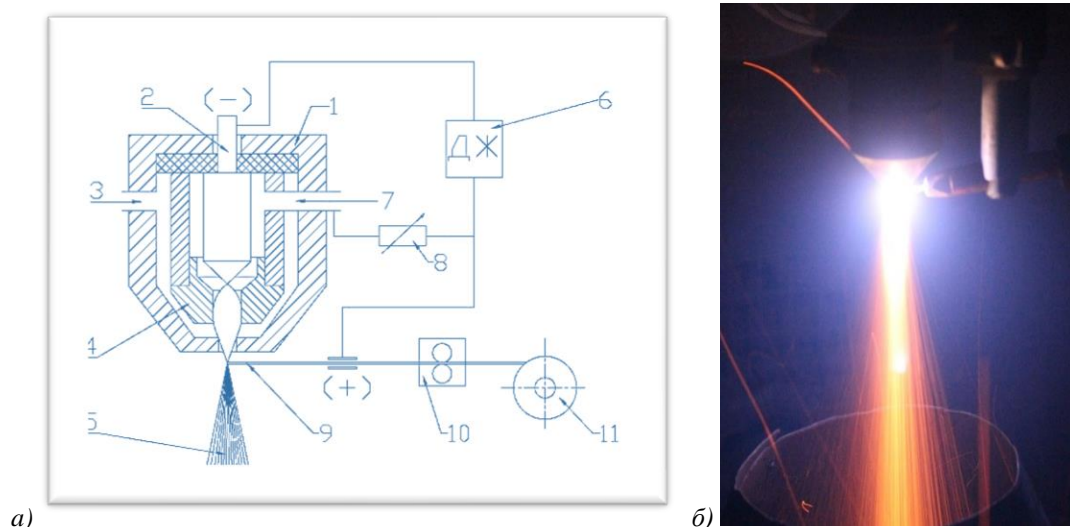


Fig. 1. Scheme of the process of plasma-arc spraying and spheroidization of the conductive wire (a) and the appearance of the spraying process (b), where: 1 – the working chamber of the plasmatron; rod electrode (cathode); 3 – accompanying gas supply channel; 4 – plasma-forming nozzle; 5 – stream of sprayed particles; 6 – power source; 7 – plasma-forming gas supply channel; 8 – current limiting resistance; 9 – wire (anode); 10 – feed mechanism; 11 – coil with wire.

The optimization of the modes of plasma metallization with a moving wire-anode for the investigated compositions of the wires used as the anode was carried out using the methods of mathematical planning of the experiment [5]. The following wires with a diameter of 1.2-1.6 mm were used: carbon steels 1020 and 1070, stainless steel AISI304, nichrome NiCr80-20, copper Cu99, aluminum alloy 5083.

The technological parameters were changed in the following intervals: plasmatron operating current – 160-300 A; arc working voltage 60-80 V; consumption of plasma-forming gas (argon) 1.0 -1.5 m³/h; air consumption to create an accompanying flow that cools the nozzle and compresses the high-temperature jet, 0-20 m³/h; spraying distance – 150-250 mm; feed speed of anode wire 2-10 m/min.

As an optimization criterion, we used the parameter of the material utilization ratio (MUR), which is determined by the formula:

$$\text{MUR} = (m_w / m_c) \times 100\%,$$

where m_w is the mass of the anode wire sprayed per given unit of time; m_c is the mass of the sprayed coating applied per given unit of time.

To determine the coefficient of material utilization, the coating was applied to 1020 structural steel plates measuring 100×100×4 mm. Plates were pre-weighed to the nearest 0.1 gram. The coating time was 10 seconds. Before applying the coating, the surface of all samples was subjected to jet-abrasive treatment with electrocorundum.

The values of MUR in the process of optimizing modes for selected types of materials varied in the range of 58-72%. Such parameters as pressure and consumption of working gases, current strength, and spraying distance significantly affect the value of MUR.

The conclusions and recommendations made in the process of mathematical modeling of the processes of gas dynamics and heat transfer in the plasma jet were experimentally confirmed. Namely: the most significant influence on the quality of the coating and the value of MUR depends on the pressure or flow of air used to form the accompanying flow. The transition from the turbulent to the laminar regime of the plasma jet exit and, accordingly, the degree of interaction of the sprayed material with oxygen and nitrogen depend on this parameter.

As a result of the conducted research, the optimal modes of applying coatings from the studied materials were selected, which are listed in Table 1. Using the example of a stainless steel coating, it is shown that plasma-arc spraying using modes different from the parameters given in Table 1 does not provide the required quality of the coating. Coatings applied under suboptimal regimes are characterized by increased structural defects, namely: porosity of 3% and above, the presence of a large number of oxide layers, defects at the boundary between the sprayed particles (lamellas) and at the boundary between the coating and the base, as well as an increased share of spherical particles (Fig. 2, 3).

Table 1.

Optimum regimes of plasma-arc coating of the investigated wire-anode materials, determined by the criterion of MUR increase.

Material of the wire-electrode	Naming parameters of plasma-arc spraying							
	Gas pressure when the plasmatron is switched on, MPa			Gas pressure in the metallization process, MPa	Voltage, V	Strum, A	Electric power, kVA	Coating spraying distance, mm
	air	Ar	air	Ar				
1020	0,64	0,52	0,31	0,44	70	220	15,4	104
1070	0,64	0,52	0,31	0,44	70	220	15,4	104
Stainless Steel AISI304	0,64	0,44	0,31	0,38	75	220	16,5	104
Nichrome NiCr80-20	0,64	0,44	0,31	0,38	70	220	15,4	104
Copper Cu99	0,64	0,44	0,31	0,38	80	180	14,4	104
Aluminum alloy 5083	0,64	0,44	0,31	0,38	70	200	14,0	104

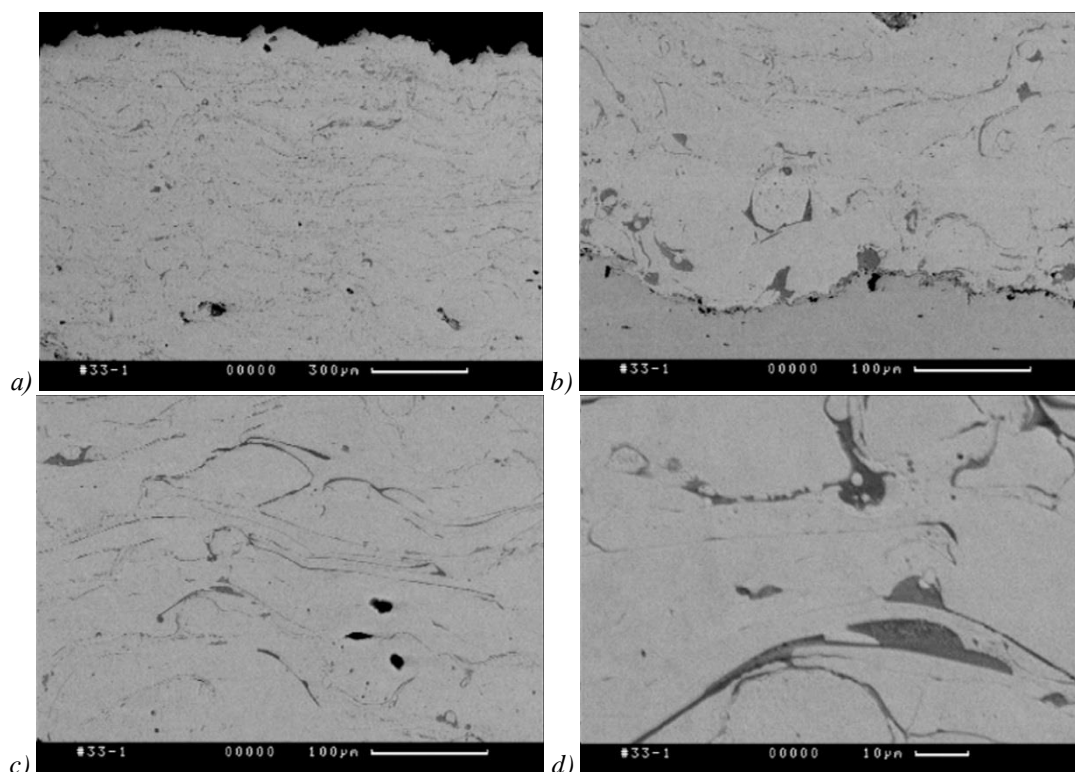
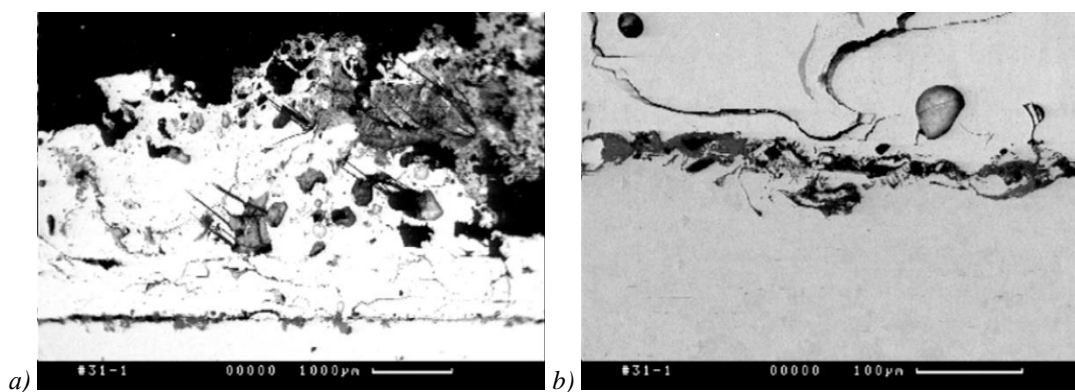


Fig. 2. The microstructure of the coating applied by plasma-arc spraying of a moving anode wire made of stainless steel AISI304 at optimal modes (Table 1).



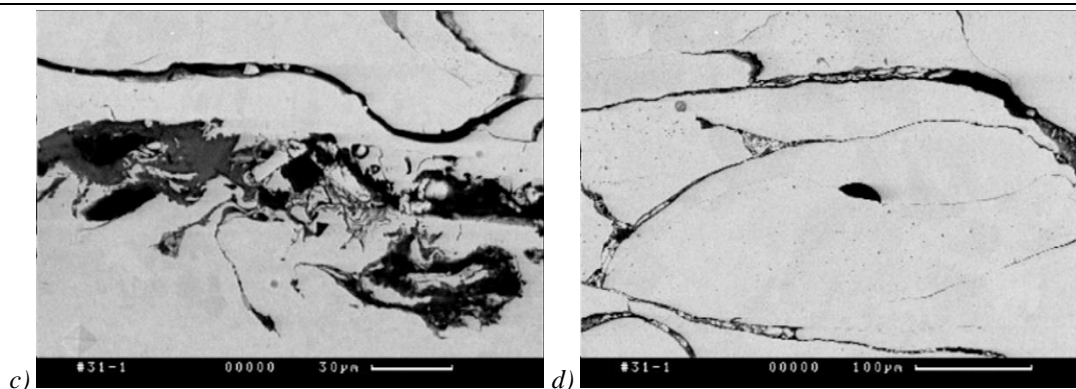


Fig. 3. Microstructure of the coating applied by plasma-arc spraying of a moving anode wire made of AISI304 stainless steel under suboptimal conditions.

The adhesion strength of the coatings to the base was determined by the pin method described in sufficient detail in the paper [6]. It was established that the adhesion strength of the coatings to the base depends on the technological parameters of the application of the material. Thus, when using the optimal parameters indicated in Table 1, the strength of AISI304 stainless steel coatings applied to a similar base is 35-40 MPa, and the strength of Cu99 copper and aluminum alloy 5083 coatings is 40-60 MPa. At the same time, the adhesion strength of plasma-arc coatings applied under suboptimal technological parameters is 30-35% lower than the given values corresponding to the application of optimized modes.

Conclusions.

1. The researched process of plasma-arc sputtering using a conductive wire as a moving anode provides effective control of the technological parameters of the plasma jet, increases the utilization rate of materials up to 72%, reduces the porosity of the sputtered coatings to less than 3%, and makes it possible to achieve adhesion strength of the coatings to the base of more than 40 MPa.

2. An increase in the material utilization rate of more than 70% significantly increases the cost-effectiveness of the process of plasma-arc spraying with anode wires, and an increase in the adhesion strength of the coatings to the base expands the application limits of this process.

3. The use of optimal parameters of plasma-arc sputtering with anode wires makes it possible to obtain non-porous copper coatings with increased adhesion

strength to the base, which can be used to create electrical contacts and intermediate layers when making soldered joints of aluminum and steel parts.

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