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REMARKABLE PREDICTIONS IN AZERBAIJANI SCIENCE FICTION LITERATURE

In the article, the topic of predictions, which is one of the factors that form the basis of science fiction works written in Azerbaijani literature, is covered in a wide and detailed manner, historical and scientific evaluation is given to them.

Azerbaijani science fiction works are closely related to Western European science fiction literature and have reached certain achievements in this field. It is known that one of the main themes of science fiction works is the predictability factor.

The article has analized the important predictions described in the works of "The Future City" written by Y.V. Chamanzaminli and "RT-1", "Polar Lights in Mughan", " When Missouri Overflowed", "Symphony of Life", "The Spaceship" by Emin Mahmudov, "The Adventures of a Little Cyber" by Namig Abdullayev and the predictions that have been confirmed according to the period of writing are revealed and studied. In the work of "The Future City" Y.V. Chamanzaminli predicted an effective method of the distance examination and treatment through the Internet; possibility of artificial rain; a special device with a safety sensor installed in cars used in our days, which is the latest achievement of modern technology, electronic billboards and monitors displaying announcements, political and public information, city events, and weather information; medical innovations such as USI – medical examination with the help of ultraviolet rays, CT – computer tomography, laser crushing of kidney stones into small pieces and removing them by laser, transplantation of organs such as heart and liver, artificial eye and other new technologies.

The predictions described in the work shows that the well-known Azerbaijani prose writer Y.V. Chamanzaminli gave deep information about the innovations in medical sciences, significantly anticipating the writing period in the first half of the last century.

The results obtained on the basis of the analyzes carried out in the research are of both theoretical and practical importance.

Key words: Science fiction, prediction, genre, scientific and technological progress, imagination, idea.

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Әзірбайжан ғылыми фантастика әдебиетіндегі көрнекті болжамдар

Мақалада әзірбайжан әдебиетінде жазылған фантастикалық шығармалар негізін құрайтын факторлардың бірі – болжау тақырыбы кеңінен және жан-жақты қамтылып, оларға тарихи-ғылыми баға берілген.

Әзірбайжандық ғылыми-фантастикалық шығармалар Батыс Еуропа ғылыми-фантастикалық әдебиетімен тығыз байланыста дамып, осы салада белгілі жетістіктерге жетті. Болжам – фантастикалық шығармалардың негізгі тақырыптарының бірі екені белгілі.

Мақалада Ю.В. Чаманзаминлидің «Болашақ қаласында» сипатталған маңызды болжамдар талданады, сонымен қатар «RT-1», «Мұғандағы полярлық шағылыс», «Миссуридегі су тасқыны» «Өмір симфониясы», Эмин Махмудовтың «Ғалам кемесі», Намиг Абдуллаевтың «Кішкентай Кибердің шытырман оқиғалары» және өзге де жазылу мерзімімен сәйкес келетін болжамдар ашылып, талданады. Ю.В. Чаманзаминлидің «Болашақ қала» шығармасында интернет арқылы қашықтан тексеру мен емдеудің тиімді әдісін болжады; жасанды жаңбырдың мүмкіндігі; қазіргі заманғы техниканың соңғы жетістігі саналатын, қазіргі уақытта қолданылып жүрген көліктерде орнатылған қауіпсіздік датчигі бар арнайы құрылғы, саяси және қоғамдық ақпараттарды, қала оқиғаларын, ауа райы туралы хабарландыруларды көрсететін электронды билбордтар мен мониторлар; УДЗ – ультрадыбыстық зерттеу, КТ – компьютерлік томография, бүйрек тастарын лазермен ұсақтау сияқты медициналық жаңалықтар; жүрек пен бауыр сияқты органдарды

трансплантациялау, жасанды көз және басқа да жаңа технологиялар туралы болжамдарды кездестіруге болады.

Түйін сөздер: ғылыми фантастика, болжау, жанр, ғылыми-техникалық прогресс, қиял, идея.

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Выдающиеся предсказания в азербайджанской научно-фантастической литературе

В статье широко и подробно освещается тема предсказаний, являющихся одним из факторов, лежащих в основе научно-фантастических произведений, написанных в азербайджанской литературе, и им дается историческая и научная оценка.

Азербайджанские научно-фантастические произведения сложились в тесном контакте с западноевропейской литературой научной фантастики и достигли определенных достижений в этой области. Известно, что предсказание – одна из главных тем научно-фантастических произведений.

В статье проанализированы важные предсказания, описанные в произведениях «Будущий город» Ю.В. Чаманзаминли и «РТ-1», «Полярное сияние в Мугане», «Затопление Миссури», «Симфония жизни», «Корабль Вселенной» Эмина Махмудова, «Приключения маленького Кибера» Намика Абдуллаева и предсказания, которые были подтверждены в соответствии с периодом написания и изучены.

В произведении «Будущий город» Ю.В. Чаманзаминли предсказал эффективный метод дистанционного обследования и лечения через Интернет; возможность искусственного дождя; специальное устройство с датчиком безопасности, установленное в автомобилях, используемых в наши дни, которое является последним достижением современной техники электронных рекламных щитов и мониторов, отображающих объявления, политическую и общественную информацию, городские события, информацию о погоде; медицинские инновации, такие, как УЗИ – ультразвуковое исследование, КТ – компьютерная томография, лазерное дробление камней в почках; трансплантация органов, таких, как сердце и печень, искусственный глаз и другие новые технологии.

Ключевые слова: научная фантастика, предсказание, жанр, научно-технический прогресс, воображение, идея.

Introduction

Science fiction is a genre of literature that has its own place, reflects science and the possibilities of the future, is based on intuitive awareness and scientific foresight. The pecularity of science fiction is that the scientific-prediction method is logically subordinated to the artistic imagination. New ideas and images arize in the creativity of fantasy writers regularly enable the transformation of previous ones and the formation of new scientific and cultural traditions.

One of the main factors that form the basis of science fiction is the factor of foresight.

The Dictionary of Philosophical Terms explains the term "prediction" premonition as "an unfounded and inexplicable feeling". "The unknown, especially what is related to the future, is felt from the beginning, considered as true" (Nəzərova, 2014: 150).

Another Philosophical vocabulary explains the term as: "the transference of known laws of nature and society to events that are unknown or have not yet occurred, but which nevertheless take place within the framework of the enumerated laws" (Философовский словарь, 1991: 283).

Since the predictions presented in the works of many writers who writes in this genre are ahead of time in terms of history, in most cases these works are called fantastic. Only after a certain period of time, after those predictions have been confirmed in reality, the author's work is awarded the title of "scientific" by the public. As usual, the writer's predictions come true after a few years or decades, while some do not come true for centuries. In other words, science fiction as a genre is always controversial.

Experiment

In the world literature, there are various examples written using fiction, fantastic plots and images. A similar case applies to Azerbaijani literature. As in the literature of peoples and nations of the world, in most of the science-fiction examples created in the Azerbaijani literature, there are aspirations for the

progress of humanity, sociological problems, issues related to the fate of the Earth, positive and negative aspects of scientific and technical progress, etc.

The first example of the science fiction genre in Azerbaijani literature is the story of the "The Future City" written by Yusif Vazir Chamanzaminli in 1930. In this work, the author mainly touched on the topic of describing life in an alien world and put forward many scientific hypotheses covering many fields, especially medical science. In the story, the writer described the city he wishes to see in the future. As we know, one of the specific characteristics of true science fiction works is related to the facts that get ahead of time. The famous writer Y.V. Chamanzaminli took the first step in this field in Azerbaijani national literature, and in his work "The Future City" he skillfully coped with this task and managed to be ahead of the time, gave valuable predictions about the future and gave a complete description of the intelligent electronic devices used in our days.

Each part of this twelve-part story describes a new scientific hypothesis, or fantastical ideas and predictions. In our opinion, although the story "Future City" written by Y.V. Chamanzaminli is small in volume, it can be called even a small story due to the direction of the topic but broad and weighty for the content of the idea.

The first science-fiction work by Y.V. Chamanzaminli, "A City of the Future" is involved to the wide analysis.

The author skillfully described the possibility of artificial rain, anticipating the period of writing of the story.

"– Here the clouds are brought to the sky by machines,

– It rains twice a day to clean the city." (Çəmənzəminli, 1966: 283).

As a result of research, we found that artificial rain was first attempted by Irving Langmuir and Vincent Schafer and later improved and implemented by Bernard Vonnegut (Vonnegut, 1993) This method, which was successfully practiced in the United States for the first time in the 1960s, was later spread to 24 countries and is still used today. In order to make artificial rain, cloud balls are destroyed by means of special air balls and certain chemicals are thrown into the air from airplanes. This eliminates the damage caused to agriculture by preventing drought (Bacanlı, 2017).

In the story, the author also made valuable predictions involving medical science:

"– There are many different machines in the hospital. Each of the travelers is placed in front of a machine and images of their bodies are reflected in front of the screen. As the machine works, the pictures change and every single cell under their skin, muscles, veins, bones and all internal organs, heart, liver, stomach, kidneys are visible to the smallest point. The doctor determines that there is a small spot on Hasan's lung and takes him to another room where a light is passed on his lung. During the examination, a small stone is found in Sandro's kidney, and it is also melted with a special light...

"– There is no disease in our city. Surgery has advanced so much that they remove a person's heart and liver and replace it. Even artificial eyes perform the tasks of the natural ones" (Çəmənzəminli, 1966: 284).

In this part, all the medical innovations described by the author are USM – medical examination carried out with the help of ultrasound rays, CT – computer tomography, laser crushing of kidney stones, transplantation of organs such as heart and liver, implantation of artificial eyes.

"– Eternal life has not yet been discovered. But they keep a person alive for a long time. For example, by changing the cells of an old man, they make him young. You will meet 200-year-old people at every step. They are 4-5 times younger" (Çəmənzəminli, 1966: 284).

As a result of research, it was found that at the end of each chromosome of a human cell, there is a particle called "telomere" that protects it during division. It was the discovery of the process of protecting chromosomes through telomeres that was awarded the Nobel Prize in 2009, and later, as a result of the efforts of Spanish scientists, it was discovered that the lengthening of telomeres is possible by changing stem cells. In 2012, the Japanese scientist S.Yamanaka was awarded the Nobel Prize for the successful implementation of the cell rejuvenation process (Riley, 2017).

"*– These towers are for collecting the electricity in the air. Lightning provides us with a great service. The light of our city and the heat of our factories depend on these towers. There are many such towers in our country*.

We get heat from the sun. Machines have been installed at certain points of the country. These machines collect the summer heat and turn it into liguid. The heat supplied for three months completely covers the country's nine-month needs" (Çəmənzəminli, 1966: 286).

As in every part of the story, in this part as well, the author put forward his scientific hypothesis, ideas or fantastic ideas and described the technology of obtaining energy from sunlight, which is convenient

in terms of keeping the environment clean and economic efficiency as a result of the development of science and technology in modern times. Climate change, which is one of the main problems of global politics today, is related to the realization of the transition to ecologically clean and renewable energy sources.

An interesting point to note is that according to the Global Footprint Network, whose reports we often see today, the world's population currently uses not 1, but 1.5 Earths, and many critics believe that this figure is much lower than the truth. Because this calculation takes into account carbon emissions. The world's forests and oceans absorb a lot of carbon dioxide, but we're currently emitting more gas than the planet can handle. As a result, scientists believe we need an extra half planet. At the moment, global footprint studies prove that if the world lived as a US citizen lives, then we would need 5 Earths; as an Australian citizen 4.1 Earth; as a Russian citizen 3.2 Earth and as a German citizen only 3 Earths. Y.V. Chamanzaminli's use of the sentence "The heat supplied for three months completely satisfies the needs of the country for nine months" in his work shows that humanity will bring up the issue of such a footprint in the future long before his concept of sustainable development, and by moving forward in this field, even by using less resources of the Earth, we will meet more of our needs (Abdullayeva, 2017: 339).

After the work "The Future City" by Y.V.Chamanzaminli, it is possible to find scientific predictions in other works written in the genre of science fiction in Azerbaijani literature. An example of this is the story "RT-1" written by Emin Mahmudov in 1952. Here is a description of a train powered by the conversion of electromagnetic waves into electrical energy:

"– *Scientists have been able to generate electromagnetic waves so strong that when they are captured by an antenna and converted into electricity, enough energy is obtained to run a large electric motor*" (Mahmudov, 1987: 37).

Although these types of trains do not currently exist, the mechanism mentioned by Emin Mahmudov, i.e., the implementation of the idea of converting electromagnetic waves into electrical energy through the antenna, is one of the directions that are being improved today. It is known that in September 2015 Paul Drayson, the former science minister of Great Britain, once used as a laboratory the brilliant English physicist and chemist Michael Faraday (Faraday was the inventor of processes used in industry such as electromagnetic induction and electrolysis during experiments.) demonstrated the device he called "Freevolt" to the audience who came to watch his invention at the Royal Institute of Great Britain.

Frivolt is a device that consists of a multi-band antenna and a rectifier (a type of battery that converts alternating current into direct current), and its main advantage is the ability to convert radio frequency waves generated by wireless networks such as mobile phones, Wi-Fi, 4G into electrical energy. Even during the show, Drayson was able to positively surprise the audience by skillfully converting the signals from the audience's mobile phones into electricity. The uniqueness of Frivolt's working mechanism is also the fact that it is one of the 17 points of the "Sustainable Development" program designed to solve the global problems currently affecting the world, and it is considered favorable in terms of obtaining clean and cheap energy, a substitute for fossil fuels that cause ecological imbalance. Even if the energy capacity of Paul Drayson's invention is only designed to charge various small devices, the £8 million investment in it last year suggests that the development prospects of this idea are great. This scientific innovation, described by Emin Mahmudov in the story "RT-1" in 1952 and causing a sensation at the time of writing, will lighten and save a lot of human labor in the future, in addition to the above, in industry and agriculture.

In the author's story "Polar Lights in Mughan" published in 1954, the idea of artificial rain is described in the smallest details:

"– *Look, these are the devices that make it rains, – he said, – their conventional name is "rain balls". See, these devices create powerful beams and release them into the sky. These rays form a special layer in the atmosphere, approximately at the distance of rain clouds. This layer attracts and condenses the clouds towards the center of the beam, or rather the point where this apparatus stands. After the clouds cover the surroundings, the ball of the apparatus releases a firecracker filled with calcium chloride salt into the sky. Calcium chloride is the most commonly used method for artificial precipitation from clouds. The firecracker explodes inside the clouds, releasing calcium chloride, creating centers for the saturated vapor in the cloud to turn into rain, and soon, it starts to rain*" (Mahmudov, 1987: 12).

Here, Emin Mahmudov has indeed theoretically correctly predicted the working principle of artificial rain. The main mistake of our writer-fantasist is technically related to the description of the initial stage. Ray-emitting devices are not used

for the organization of artificial rain. The means of raining, which the writer calls "rain balls", are also expressed in a very appropriate way. So, today, artificial rain is rained in three ways: by airplanes, rockets, and chemical substances released from air defense systems. Conventionally, the so-called devices are more compatible with missile and air defense systems. In addition, the author correctly identified the role that calcium chloride ($CaCl_2$) will play in this work. The chemicals currently used for artificial precipitation are mainly silver iodide (AgI), potassium iodide (KI) and solid carbon dioxide (CO_2), also known as "dry ice". However, what makes Emin's prediction correct is that calcium chloride is the main chemical used for artificial rainfall, mainly in semi-desert and even desert-type areas that are not suitable for farming, such as Mugan's climate (http://www.nytimes.com/1993/07/28/obituaries/vincent-j-schaefer-87-is-dead-chemist-who-first-seeded-clouds.html). Although the scientific community does not appreciate the effectiveness of artificial rain (https://cen.acs.org/articles/94/i22/Does-cloud-seeding-really-work.html), China, which has a monsoon climate (climate conditions with dry winters and rainy summers), which hosted the 2008 Summer Olympics, managed to successfully test this method so that the rainy season does not negatively affect sports events (http://www.nytimes.com/1993/07/28/obituaries/vincent-j-schaefer-87-is-dead-chemist-who-first-seeded-clouds.html).

In his short story "When Missouri Overflowed", the author claims a smart chess board, which was not invented until the date of writing of the work. So, the fiction writer associated this idea with the board being equipped with special electronic devices, and that is why the board was called "chess machine" in the story. This machine tells the owner which moves to use as cues, relaying this to the owner via a small device (chip) implanted under the owner's scalp. It should be noted that this idea is also similar to the working principle of today's Bluetooth wireless communication technology. As a result of the rapid development of science and technology, we can boldly say that similar chessboards exist today, and Emin Mahmudov has successfully predicted a smart chessboard ahead of time in his work. The writer described that part in the work as follows:

"*– My father bought a special chess machine for me for two million dollars...my chess machine was not like the ones we have today. He spoke with a human voice when it comes to play. The chess machine saw the situation on the board from a distance, analyzed the moves, and then gave me instructions with the sound of the machine... Even the devil himself could not hear this voice. A small device the size of a pea was sewn under my scalp. It was called a brain stimulator"* (Mahmudov, 1987: 181).

The existence of such a chess machine is purely due to the improvement of intelligent computer programs. Every year from 1984 to 1993 (except 1992) due to the same chess engine installed by the famous British programmer Richard Lang, the creator of the Mephisto program (a computer program designed to calculate all possible options in the next move during a chess game), was able to win the world chess championships in computer programs.. It was Richard, who later turned this program into a powerful system, in 1992 he founded the ChessGenius computer program, creating one of the world's first master level programs. Since then, Lang has developed a product called the Millennium Chess Computer, which is now publicly available (http://www.top-5000.nl/matches/1994.html).

In the story "Symphony of Life" by E.Mahmdov, the writer highlighted the method of treatment with music. Sahib Mansurov, the protagonist of the work, claims the possibility of treating cancer patients through music during a debate with the famous oncologist Professor David Robertson in India. Considering that at the time when the author wrote this work, music therapy was not sufficiently studied, and its main benefits were considered to be the stress and blood pressure reduction, later this claim of Dr. Mansurov would cause a sensation in science. Emin Mahmudov described this feature of music therapy in the story in this way

"– I want to heal the patient with music"

... They [cancer cells] are deranged cells that do not obey the general rules of the body. They absorb nutrients and grow rapidly, starving the remaining cells. These raging cells often win the battle. But sometimes the opposite happens. Cancer tumor is absorbed by the body itself. More than a hundred such cases are known in medicine. The reason for this has not been properly studied. I think it's because of the higher nervous system. It can mobilize the general strength of the body and win over all kinds of diseases. Sometimes it is necessary to use an external stimulus to activate it... up to seventeen diseases can be treated by inserting needles into the body. But I think that brain cells need to be stimulated in a different way. It doesn't work to stick the needle here. Another stimulus is needed to mobilize them, to fight against the cancer tumor. I think the best tool for that is music" (Mahmudov, 1987: 58).

The study of the real possibilities of music therapy is far from ideal, and it has a positive effect on the treatment of cancer patients. So, according to a study conducted by scientists from Drexel University in Philadelphia, the largest city in the state of Pennsylvania, which is located in the northeast of the United States, daily music therapy patients experience analgesia ("analgesia" is a Latin word that means "painless" in addition to reducing the need for pain relief methods used in medicine) and anesthetics ("anaesthesia" is a Greek word that means "unfeeling" a broader concept in medicine, the process of temporary loss of sensations and even consciousness of the patient, especially during surgery). From this, we can conclude that Emin Mahmudov was 50 years ahead of his time with his short story "Symphony of Life", which he wrote in 1966. Although science has not yet fully confirmed this fact, our late writer was able to anticipate even modern scientific reasoning by claiming that cancer patients can be cured through music therapy. In this regard, we would like to mention one more interesting fact that when we reviewed the traditional Chinese hieroglyphs, we discovered that music has a healing effect on people's imagination since ancient times. Thus, in traditional Chinese, which is considered the philosophical language of the East, the character for the word "medicine" (藥) took its origin from the character for the word "music" (樂). The Chinese believed that beautiful music that soothed the soul kept the human organs in harmony and had a healing effect on the body (http://www.visiontimes.com/2015/10/20/music-is-medicine-in-shen-yun-performing-arts.html).

We should also mention that it was Emin Mahmudov who first touched on the subject of space research in our national literature. As proof of this, we can mention the author's short story "The Spaceship" published in 1957. In this work, the writer-fantasist devoted a lot of space to the topics of discovering new planets, studying the local nature there and revealing signs of life.

Another prediction of the writer is the fact that liquid water is found on the surface of Mars. In the spaceship, the science fiction writer stated that the existence of water was already known to the space travelers in the scene after the completion of the landing on Mars, but they managed to find the water much later after a long search and careful expenditure:

"– They knew long ago that there was water here [on Mars]. This planet was very close to the native Earth in its nature" (Mahmudov, 1957: 130).

"*Suddenly, through the branches, a lake appeared in the distance, shining like a mirror. They both loudly:*

"– Urra, water, – they shouted and started to run forward with all their might" (Mahmudov, 1957: 164).

As a result of the research, it was found that during the research conducted by a group of scientists in 2015, the necessary conditions for water to remain liquid on Mars exist in the hot season, and this can also be seen from the pictures taken by NASA's MRO (Mars Reconnaissance Orbiter) station five years ago. Thus, a well-known study confirmed that the streaks that form from time to time on the surface of Mars are due to salt water flowing in liquid form under the right conditions, causing many scientific hypotheses to be proved (http://inosmi.ru/world/20150929/230525341.html).

Emin Mahmudov predicted the existence of an ocean on Mars in ancient times in this work. 58 years later – in 2015, a group of scientists managed to prove it. The writer-fantasist described this discovery in the story exactly as follows:

"– Garay, who was digging the bottom of the well, suddenly heard the shovel touching something and crunching. He carefully plowed the ground. It was an ordinary limestone that touched the edge of shovel. After taking a bag of soil, the bottom of well reached lump of stone. Geray started hacking it with hoe. He knew very well that these pieces of limestone that were rubbed and spilled were witnesses of the distant past of Mars. These silent stones could tell more about the mysterious history of the planet than any living creature".

"Half an hour later, they were examining the shells of ancient marine animals, corals, and fish ears among the pieces of limestone. The empty pea-sized milky globules, the shell resembling a turtle shell covered with pieces of bone like a chessboard, were probably the remains of the ancient inhabitants of the Martian Sea. Timur was very happy. Geray could clearly see how her eyes shone with excitement on her pale face".

"*– There was a sea here millions of years ago," he said, pointing to the barren ravine. Then the water of the sea slowly evaporated and dried up, and the winds filled its place with sand"* (Mahmudov, 1957: 169).

Although the story "The Adventures of a Little Cyber" written by another writer in Azerbaijani literature, Namig Abdullayev, does not belong to the science fiction genre, some scientific predictions that precede the writing period can be found here at various points:

"– Now science creates miracles, but for this you need to be a scientist, not a magician".

"– Each person's body consists of small particles called cells. The body of this doll is made of small cells. However, they are artificial cells" (Abdullayev, 1966: 2).

Although the machine described by the author does not have an analogue today, the mentioned processes are true. As you know, the creation of artificial cells is not a concept alien to science. The artificial cell was first invented in the world at the end of the 60s of the 20th century by Thomas Chang, a Canadian medical scientist of Chinese origin. Working with existing materials in his lab, such as perfume bottles, Chang was able to create a special absorbent plastic bag that carried the hemoglobin substance found in red blood cells – erythrocytes – with nearly the same efficiency. Long before the era of regenerative medicine, gene therapy, stem cell therapy, artificial blood, modern nanotechnology, Chang's original ideas were ahead of their time, and for their services he for these services, he was highly appreciated by the Canadian Academy of Medical Sciences (Ricard, 1996: 22). The fact that he is a two-time Nobel laureate is a clear proof of this fact.

We would like to remind you that Namig Abdullayev's work on artificial cells was published in 1966.

Result and discussion

Although the critics of that time called the story "Future City" "gossip about the future city", as it can be seen from the analysis, this story is an example of literature written in the true science-fiction genre. Because all the scientific ideas and assumptions listed in the work were described long before the time it was implemented. And that's the best feature of true science fiction. The optimistic thoughts about the future described here and the feelings of confidence that they will one day come true are a clear example of the writer's successful writing of this story.

For known reasons, Y.V. Chamanzaminli, who was forced to live outside of Azerbaijan as one of the victims of political repression of the thirties of the last century. The reason for his writing such works should be sought precisely in the psychological impact of the socio-political events of the time on the writer.

We can definitely note that the fantastic assumptions and ideas used in "Future City", especially the innovations shown in medical science, are at the level of the most advanced traditions of the world science-fantasy literature according to the period of its writing. We can say with certainty that the story "Future City" by Y.V. Chamanzaminli played a major role in the formation of authors who wrote in this genre after him as the first example of Azerbaijani science fiction literature.

Conclusion

Y.V. Chamanzaminli put forward his scientific hypothesis or fantastic ideas in the story and described the technology of obtaining energy from sunlight, which is considered in terms of keeping the environment clean and healthy. The economic efficiency is a result of the development of science and technology in modern times. In his work, the author skillfully described the underground transport equipped with the most modern technologies, the underground pedestrian crossings that meet the latest standards and the modern sensor escalators installed there, which are built for the safe passage of pedestrians from one side of the road to the other.

Climate change, which is one of the main problems of global politics today, is related to the transition of ecologically clean and renewable energy sources. Y.V. Chamanzaminli was the first Azerbaijani writer to make a prediction on the topic of ecology by proposing a sustainable energy solution to eliminate environmental problems.

In accordance with the requirements of the modern era, attention to ecology, as well as the need to apply energy efficiency, have been recognized by world leaders only in the last decade. As an Azerbaijani, the fact that Y.V. Chamanzaminli contributed to this process with the work he wrote in 1930 deserves to be mentioned in the introduction of the Strategic Road Map for the effective energy transition that the Republic of Azerbaijan is currently preparing.

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