

The Medieval Period in the History of Science: Conquest of the Space by Eastern Philosophers as an Important Topic in Pedagogy

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Abstract

The main aim of the article is to study conquest of the sky (space) by Arabian Turkish, Eastern philosophers in the Middle Ages as an important topic in teaching and learning process.

During the period of stagnation caused by the church rule in Europe in the Middle Ages, the Abbasid caliph in the East moved the capital of the empire from Sham to Baghdad and founded the first Oriental Academy called "Beit al-Hikma", known as the "House of Wisdom" in Europe. As a result of the activities of Eastern philosophers, "Beytul Hikma" has become a world-level scientific research center in the fields of science, philosophy, medicine, and education. Many scientific works related to the civilizations of ancient Greece, China, India, Iraq, Egypt and Byzantium were translated into Arabic in "Beitul Hikma", Arab and Turkish scientists improved the information in these works and became the founders and promoters of many fields of science in our time.

Thus, since the mother tongue of scientific research in the Middle Ages was Arabic, that period is known as "Arab Science" in the history of world science. Many European and American experts, such as Robert Brifolt and George Sarton, well-known researchers of the history of science, have also highly appreciated the work of medieval Muslim Arab-Turkish philosophers and inventors in their works. The article mentions the role of Arab-Turkish inventors of the Middle Ages in the creation of the history of world aviation, a field of science history that confirms the conclusions of well-known historians. Here, it is mentioned that they conquered the sky with the hang glider invented by the Andalusian inventor Abbas Gasim Ibn Firnas, the authors of the revolutionary studies, the simple airplane developed by the Turkish inventors Hezarfen Ahmed Chelebi, and the first jet rocket developed by Laqari Hasan Chelebi.

Results: To sum up, the inventions of these scientists should be brought to the attention of students in physics classes of secondary schools, in the "Laws of Conservation" teaching program.

Methods of comparison and analysis had been used while conducting the research. Scientific novelty: Literatures in different languages had been conducted to the research. Relevance of application. The material can be used at lectures and seminars in educational institutions. It will be useful to everyone who is interested in the pedagogy of physics and history.

Keywords: Middle Ages, Eastern science, inventors, physics, pedagogy, history, methodology

Середньовічний період в історії науки: завоювання неба (простору) східними філософами як важлива тема в педагогіці

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Анотація

Основною метою статті є дослідження завоювання неба (простору) арабо-турецькими східними філософами середньовіччя як важливої теми у навчально-виховному процесі.

У період стагнації, викликаній церковним правлінням у Європі в середні віки, аббасидський халіф на Сході переніс столицю імперії з Шама до Багдада і заснував першу Східну академію під назвою «Бейт аль-Хікма», відому як «Будинок мудрості» в Європі. Внаслідок діяльності східних філософів «Бейтул Хікма» став науково-дослідним центром світового рівня в галузі науки, філософії, медицини та освіти. Багато наукових праць, що стосуються цивілізацій Стародавньої Греції, Китаю, Індії, Іраку, Єгипту та Візантії, були переведені арабською мовою в «Бейтул Хікма». Арабські та турецькі вчені вдосконалили інформацію в цих працях і стали основоположниками та популяризаторами багатьох областей науки.

Таким чином, оскільки рідною мовою наукових досліджень у Середньовіччі була арабська, цей період відомий в історії світової науки як «арабська наука». Багато європейських та американських фахівців, таких як відомі дослідники історії науки Роберт Бріфолт та Джордж Сартон, також високо оцінили у своїх працях роботу середньовічних мусульманських арабо-турецьких філософів та винахідників. У статті відзначається роль арабо-турецьких винахідників Середньовіччя у створенні історії світової авіації – галузі історії науки, що підтверджує висновки відомих істориків. Тут згадується, що вони підкорили небо дельтапланом, винайденим андалузським винахідником Аббасом Касімом ібн Фірмасом, авторами революційних досліджень, простим літаком, розробленим турецькими винахідниками Хезарфеном Ахмедом Челебі, та першою реактивною ракетою, розробленою Лакарі Хасан Челебі.

Підводячи підсумки, як загальну пропозицію можна зазначити, що винаходи цих вчених мають бути доведені до відома учнів на уроках фізики загальноосвітніх шкіл, в розділі «Закони збереження».

При проведенні дослідження використовувалися методи порівняння та аналіз. Наукова новизна: до дослідження залучалися література різними мовами. Актуальність застосування: матеріал може бути використаний на лекціях та семінарах у закладах освіти. Буде в нагоді всім, хто цікавиться педагогікою фізики та історії.

Ключові слова: Середньовіччя, східна наука, винахідники, фізика, педагогіка, історія, методика

Introduction.

The Middle Ages are known as "Arab Science" in the history of science, because during this period the language of world science passed from Ancient Greek philosophers to Arab philosophers and Turkish inventors. For this reason, the Arabic language has been accepted as the mother tongue of scientific research and inventions at the world level (Abdus Salam, 1984).

Thus, the well-known researcher of the history of science, Robert Briffault, wrote in his book "The Creation of Mankind": "... As a result of a new spirit of inquiry, new research methods, experiment, observation, measurement methods, improvement of mathematics in a way unknown to the Greeks, our science in Europe what we say has emerged. This spirit and these methods were brought to the Western world by the Arabs" (Briffault, 1919, p. 191).

George Sarton, who is one of the founders of the history of science, expressed the services of Arab philosophers and inventors in the history of science as follows: "The most important success of the Middle Ages is the emergence of the spirit of experience, and this was actually thanks to the Muslims until the 12th century" (Sarton, 1927, p. 3).

Formulation of the problem.

These were the first attempts to manufacture missiles or projectiles in the history of Islamic civilization and the Ottoman Empire, as well as the first experiment with gliding, and according to the descriptions of historians and travelers who witnessed these accidents and were familiar with them, both experiments succeeded in a success witnessed by even some specialists in aviation and flight sciences in our time.

The medieval period in the history of science is a period in which the services of eastern philosophers were widespread. During this period, a number of our inventive scientists played an important role in the creation of world aviation history. One of the directions of medieval revolutionary studies is that Arab and Turkish engineers were the first people to conquer the sky with the first hang glider and jet engine they invented.

The authors of the revolutionary research are conquering the sky with the hang glider invented by the Andalusian inventor Abbas Gasim Ibn Firnas, the simple airplane developed by Turkish inventors Hezarfen Ahmed Chelebi, and the first jet rocket developed by Laqari Hasan Chelebi.

One of the directions of medieval revolutionary studies, which prove that these claims of well-known researchers of the history of science are not accidental, is that Arab and Turkish engineers were the first people to conquer the sky with the first hang glider and jet engine they invented. Let's meet these inventors.

Abbas Gasim Ibn Firnas (810-887). He was born in Andalusia (Spain) and lived and created in the Emirate of Córdoba. His contributions to the history of practical science are the following inventions.

- Invention of a new model of water clock.
- Invention of metronome.
- Invention of the technique of obtaining colorless glass.
- Invention of an improved glass lens called the "eyestone".
- Invention of crystal cutting mechanism.

- Development of the "system of rings" applied to explore the Celestial Sphere.
- Inventing the hang glider and making the first flight with it in the history of aviation.

Thus, the greatest service of Abbas Gasim Ibn Firnas in the history of science is the invention of the first flying machine in the history of world science - hang glider. The hang glider made by Ibn Firnas was a heavier-than-air device consisting of a body made of wooden sticks and covered with fabric and bird feathers. He made his first daring flight in 852 by strapping himself to a hang glider and jumping from the high minaret of the Mosque of Córdoba. Ibn Firnas, who floated in the air like a bird for some time, successfully landed on Earth and received minor injuries (Levi-Provenchal, 1986, p. 8).



Hang glider and flying minaret by Abbas Qasim Firnas: Córdoba City Mosque, 852 and its current appearance.

The inventor was not satisfied with this, he further improved his invention and was able to create a controlled wing. Ibn Firnas made the second flight with the new device he improved at the age of 65. He jumped from the Jabal al-Arus mountain and stayed in the air for about ten minutes and gained considerable height. During the landing, the apparatus crashed with the scientist, and he was seriously injured (Terias, 1964, p. 365-369; Vernet, 1981, p. 5).



Abbas Ibn Firnas' monument (Baghdad city, Irak)

However, if it can be said that way, Abbas Qasim Ibn Firnas developed the first controlled simple airplane and made the first flight with it 1023 years before the French Wright brothers. The memory of the inventor has been immortalized in history as the person who made the first flight. Thus, the bridge on Cordova Mountain was called "Ibn Firnas Bridge". In Iraq, a monument to Ibn Firnas was erected in the square in front of the Baghdad International Airport, and the Baghdad domestic airport was named

after him. The International Astronomical Union named one of the craters on the lunar surface "Abbas Gasim Ibn Firnas Crater" (Kolonchinskiy, Korsun, & Rodrigues, 1986).

700 years after the flight of Ibn Firnas, the second person who conquered the sky was the Turkish inventor named "Hazarfan" (Persian "hezar"-min and Arabic "fenn" - art: thousand art owner) Ahmed Chelebi (1609-1640). Ahmad Chalabi, who conducted various experiments and research at home, continued the work of Ibn Firnas and was able to create the primitive form of today's airplane. For this purpose, he was able to increase the stability of the wings he prepared by carefully researching the flight of birds (Salim, et al., 2006).



According to the Turkish traveler Evliya Chelebi (1611-1682), Hezarfen Ahmed Chelebi was the first to make a fixed-wing aircraft. Around 1632, he jumped from the Galata Tower in the European part of Istanbul with the device he attached to himself, flew over the Bosphorus and landed in the Uskudar region in the Asian part of Istanbul (Evliyya Chelebi, 2013, p. 670-671).



Hezarfen Ahmad Chalabi. Flight from Galata Tower. Istanbul, 1632. (Internet Encyclopedia, 2013)



Lagari Hasan Chalabi (Laghari Hasan Shalabi) is considered the first person in the history of aviation to take to the sky with a rocket. We have very little information about his life and work. This information consists only of what was mentioned in Evliyya Chelebi's "Travel Note". According to what is written there, during the birthday celebrations of the daughter of Ottoman Sultan Murad IV, in 1633, Laqari Hasan Chalabi was able to fly from the surface of the Earth to the sky with a seven-container (nozzle) rocket filled with gunpowder at an unprecedented speed. The traveler describes the incident roughly as follows: "...The seven-cubit (about 3.5 meters) high rocket packs 50 ounces (about 64 kg) of gunpowder into a seven-handled container to launch the rocket. Then he boarded the rocket, and his assistants lit the fuse. A rocket was launched from the cannon, the gunpowder containers exploded one by one in the air, lighting up the sky and raising Chelabin 300 m into the air. After remaining there for 20 seconds, after the gunpowder in the rockets ran out, he descended into the sea with the help of wings attached to him. It is said that the face of the sea was painted golden that night... The event took place in Sarayburnu Cape, not far from Gülhane Park,

surrounded by Sultan Ulemas and distinguished guests" (Evliyya Chelebi, 2013, p. 670-671).

It should be noted that Laqari has been reflected in the writings of various authors that Hasan Chalabi is the world's first rocket inventor (Harding, John, 2006, p.9; Winter, 1992).



Author of the picture: Shukru Chaghlayan. Yashilkoy Air Command Museum library



Lagari Hasan Chalabi
Sculptor: Eray Okkan,
Ankara Turkish Air
Force Museum

That Ottoman Turkish craftsman or master who wanted his action to be a happy surprise to Sultan Murad IV (reigned between 1612-1640 AD) and those with him among the senior men of the Ottoman Empire was called Lagari Hasan Chalabi, the first Ottoman Muslim to build a missile and fly it over the Bosphorus nearly Four centuries later, Ahmed Chalabi "Hazarfen", who is considered the first to fly paragliding, was followed shortly afterwards.

Historians of Ottoman history tell us that the available knowledge about mathematical and industrial sciences that were taught in the Ottoman schools centuries ago was not enough to establish private institutes to teach "engineering." However, this knowledge continued to be inherited and developed in order to meet the need for specialists in military and civil affairs at the time until the emergence of modern institutions during the eras of renewal in the nineteenth century.

This process was carried out through the relationship between the teacher and the novice, or through the relationship between the master and the boy, and in this way, the gun experts "Topgeller" and the experts in casting and plumbing "Dokugler" were raised inside the "Tobkhana" i.e., the cannon-making house, then they were tested and sent to various plumbing houses. Dokumkhaneh and castles all over the country, and there is no doubt that education for this type of craft was also present in the naval arsenal and the Gambarjian (cannon-shooters), and among the educated in those or barracks were those who revealed their ingenuity in constructing ships and manufacturing the weapon was very prominent in that.

There is no evidence for this from what we know today that the development of artillery since the beginning of the fifteenth century, and the success of the Ottomans in making the largest cannon in Europe in the middle of the fifteenth century AD, was one of the important reasons for the demolition of the forts of Constantinople at the hands of Sultan Mehmed the Conqueror in April

1453. Later, the Ottomans' progress through the Balkans, Central Europe, the Levant, Egypt, North Africa, Iraq and even the Caucasus and northwestern Iran was all based on the "Topjiyeh", i.e., artillery and its men. For centuries, the artillery of the Ottoman land forces, and the navy supplied their needs of gunpowder and ignition materials. The dates of the Ottomans prove the existence of the first "gunpowder khana" next to the horse yard in Istanbul during the era of Sultan Murad II, and it was burned and moved to another area of the city in the late fifteenth century AD.

In these institutions, Usta Lagari Hassan Chalabi learned many secrets of gunpowder workmanship and his ability to throw projectiles into the sky, and from here his story and his dream of flying began.

Lagari Hassan took advantage of the occasion to celebrate the Aqeeqah "Rock" the daughter of the Ottoman Sultan Murad IV in 1633 AD and decided to manufacture the first manned missile to be launched into the sky by designing its base, which contained seven arms (small rockets) filled with gunpowder paste. The famous Ottoman traveler Evliyya Chelebi recorded the details. This incident was a contemporary of her.

Lagari Hassan prepared his missile and wore wings like the wings of an eagle that looked like a parachute for landing. Then he approached the Ottoman Sultan Murad IV, saying and jokingly: "My Sultan, I entrust you to God, I ascend to heaven to talk with the Prophet of God Jesus." The audience was amazed at this confidence, and Lagary Hassan mounted his rocket, then ordered his assistants to light a wick of gunpowder in some of the seven arms at his base, each arm of which had put 50 ounces (1.4 kg) of gunpowder paste, in the courtyard of the Sultan's Palace in Saray. Borno in Istanbul, Europe. In the evening of that day, the missile set off, igniting the sky of Istanbul, attracting tens of thousands of people to watch it from the public and private, and when the missile reached its highest estimated height and began the process of landing, Hasan Chalabi decided to ignite some other arms so that the missile began heading straight parallel to the waters of the Bosphorus.

When the gunpowder ran out and the missile began to fall, Lagari Hassan threw himself and opened his wings or umbrella, which the traveler Evliyya Chelebi described as the wings of an eagle, and then he was able to land in the waters of the Bosphorus close to its Asian shore, close to the palace of Sinan Pasha, the Grand Vizier, who swam. From there, he turned to the crowd of attendees, led by the Sultan in his palace, saying, jokingly: "My Sultan... the Prophet of God, Jesus, sends peace upon you." The Sultan was very impressed by this experience and decided to gift Lagary Hassan a box full of money, and then decided to appoint him to the cavalry (knights) in the Ottoman army, but Lagary Hassan Chalabi soon left Istanbul for the Crimea, where he spent his last years before to be killed by it (Aljazeera, 2021).

It is worth mentioning here the testimony of the

Norwegian scientist "Mauritz Roffavik", director of the Norwegian Aviation Museum, in an interview with the newspaper "Weekly World News" on December 15, 1998, in which he said that the first attempt of a man to climb To space, it was not Russian or American, but rather Turkish, and it belonged to Laghari Chalabi, who rode a missile and flew 900 feet from the surface of the Earth, or more than 275 meters.

The Norwegian scientist added that the missile consisted of two parts, the lower part is a base in which 6 small rockets were installed so that the rocket could launch into the sky, and the second part is the part that is pushed to the top by the previous six rockets (Aljazeera, 2021).

Hazarfen and the first successful test of paragliding.

The experience of the first missile launch - albeit primitive - had an impact on the souls of the contemporaries of Al-Agari Hassan Shalabi. Another Ottoman man named Ahmed Shalabi, known as "Hazarfen", tried to launch attempts to fly, which initially numbered nine attempts for short distances in "At Maidan" - a square. Horses in Istanbul - and he succeeded in all of them, in 1045 AH / 1636 AD, then he began preparing for the great flight, from above the "Galata" tower on the European side to the "Uskidar" area on the Asian side of Istanbul, a distance of no less than seven kilometers.

On that memorable day, the people of Istanbul gathered on the coast, accompanied by Sultan Murad IV, the Grand Vizier and the ministers in the "Saray Borno" Palace, watching and waiting, where Ahmed Shalabi decided to jump from the top of the "Galata" tower, which is more than 60 meters high.

Heading towards the Bosphorus with the wings that he installed around his body and taking advantage of the wind that blew in the same direction, crossing the strait, to finally land in "Doganciler" in the Uskudar region.

Conclusions.

We investigated the services of Abbas Gasim Ibn Firnas and found that he had several inventions before the invention of the hang glider.

1. Invention of a new model of water clock.
2. The invention of the metronome.
3. Invention of the technique of obtaining colorless glass.
4. Invention of the improved glass lens called "eye stone".
5. Invention of the crystal cutting mechanism.
6. Development of the "system of rings" applied to explore the Celestial Sphere.
7. The invention of the hang glider and making the first flight with it in the history of aviation.

Thus, we can say that Abbas Gasim Ibn Firnas developed the first controlled simple airplane and made the first flight on it.

After researching we came to a conclusion that Ahmad Chalabi, who conducted various experiments and

research at home after Abbas Gasim Ibn Firas, was able to create the primitive form of today's airplane. For this purpose, he was able to increase the stability of the wings he prepared by carefully researching the flight of birds. Based on the research, it was highlighted that Hezarfen Ahmed Çelebi was the first to make a fixed-wing aircraft.

We researched Lagari Hasan Chalabi and determined that he was considered the first person in the history of aviation flied on the sky by a rocket. Although having a little information about him, it has been reflected in the

writings of various authors that Laqari Hasan Chalabi is the world's first rocket inventor.

To sum up, as a general suggestion, I can mention that the inventions of these scientists should be brought to the attention of students in physics classes of secondary schools, in the "Conservation Laws" teaching unit.

Approbation of research results: related points of this topic had been published in conference materials books. But this material is presented to the journal in abroad the first time.

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