

# MARAGHA OBSERVATORY AND ITS SCIENTISTS

*Nasiraddin Tusi - the founder of the Maragha Observatory*

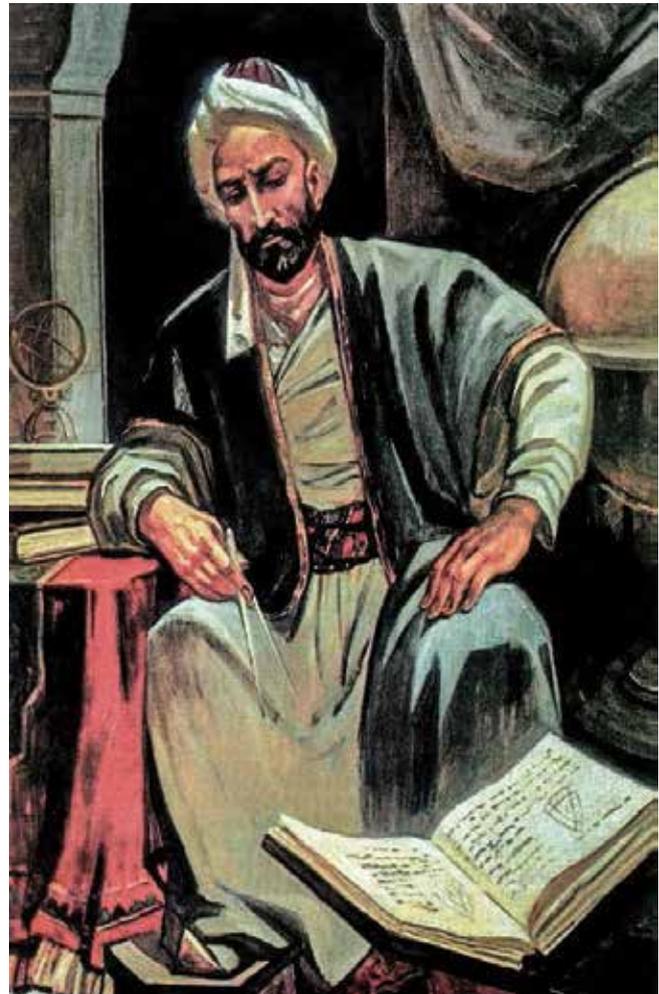
According to the remarkable Azerbaijani scientist Rashidaddin, more than 100 scientists and other employees worked in the Maragha observatory. Most of them were Nasiraddin Tusi's (1201-1274) students.

Later they became well-known scientists in their countries and got jobs in rulers' palaces. Some of them even tried to get their rulers' permission for the construction of similar observatories in their own countries. But as the realization of such projects required plenty of money, they did not succeed.

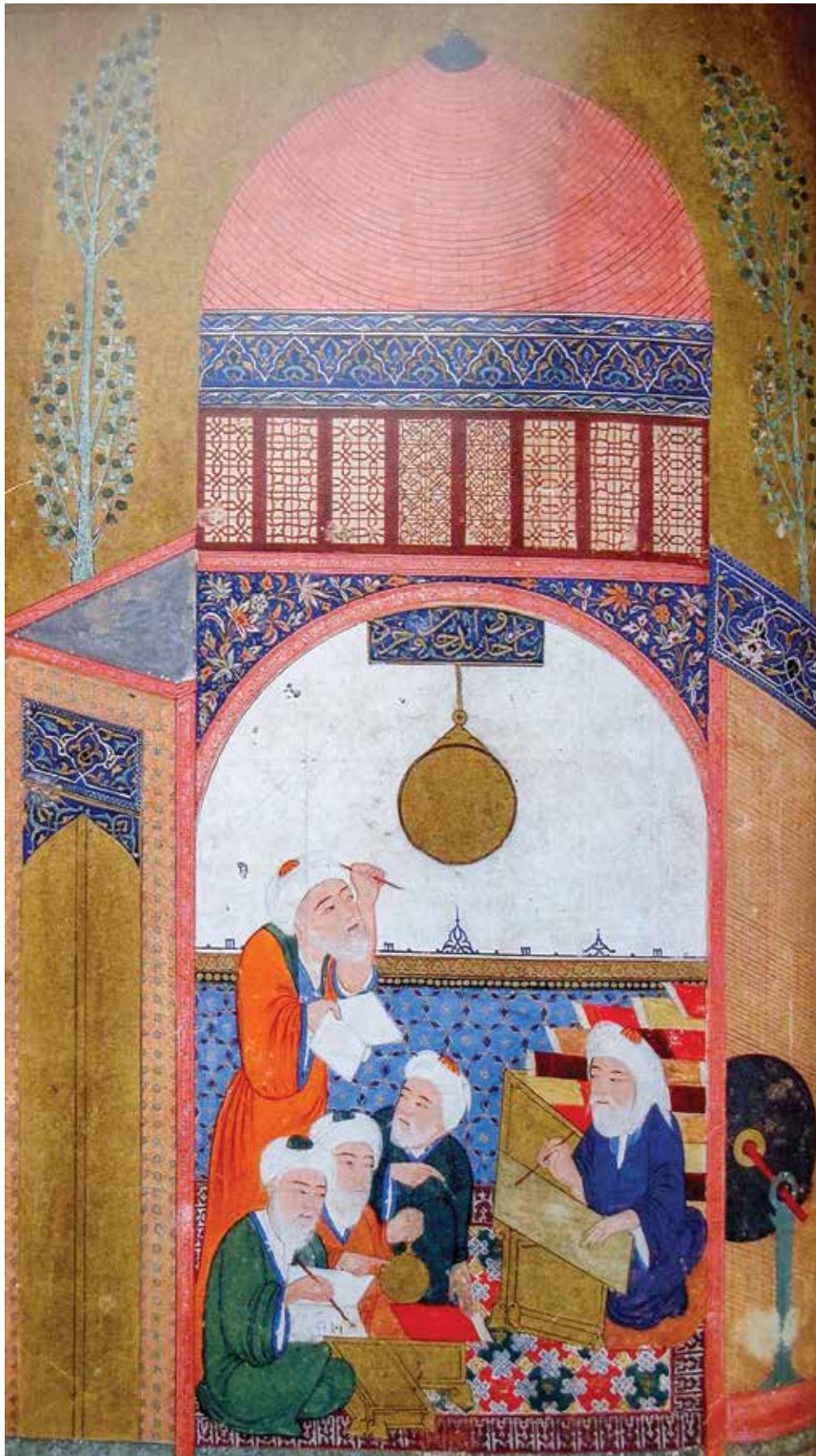
Hulagu khan ordered the allocation of funds for construction materials and equipment necessary for construction (observatory – R. D.) before he left Baghdad. Besides, he ordered that all Islamic foundations be mobilized for Nasiraddin Tusi and one tenth of their incomes be spent on the construction of the observatory.

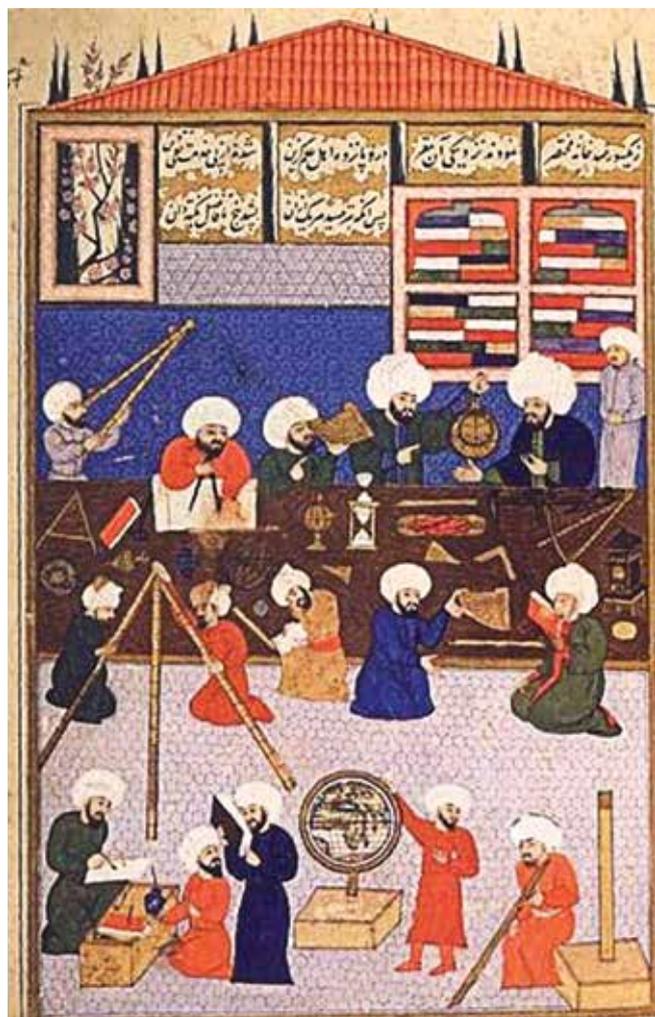
Nasiraddin started working without wasting his time. He ordered that all books about mathematics and astronomy (including books stolen from Iran and Iraq during attacks) be found and sent to Maragha. Nasiraddin Tusi visited Baghdad several times to monitor this process.

Nasiraddin looked for scientists carefully. According to various sources, he brought Najmaddin Ahmad Ibn Ali Ibn Abil Faraji (his pseudonym was Ibn Al-Bavvab Al-Baghdadi Al-Katib), Amidaddin Abul-Fadail Saib Ibn Izaddin Muhammad Ibn Abdin As-Salmi Al-Omudaddin Baghdadi, Najmaddin Ibn Huab Baghdadi, Kamaladdin



*Image of the observatory in a medieval miniature*





*Image of the observatory in a medieval miniature*

Sufi Baghdadi Abu Azizi, Gavamaddin Baghdadi and 14-year-old Al-Fuvati Al-Baghdadi to Maragha from Baghdad. Nasiraddin was a protector of Al-Fuvati and taught him Persian. Later Al-Fuvati learned philosophy and worked as a treasurer at the library of the Maragha observatory (1).

The names of some well-known and influential experts of the Maragha observatory were established after several sources were investigated.

Besides, I want to note that a lot of well-known personalities of Azerbaijan and neighboring regions visited the observatory when it was being used and various meetings were organized with scientists of the scientific center.

Ibn Al-Fuvati, who was a guard of the library for ten years, listed thousands of local and foreign scientists and specialists in his work **«Tazkire mai qasada al-rasadkhana»**. A brief version of that fundamental work has survived to this day. There are names of several great Azerbaijani scientists in the work...

Safadi wrote about the observatory in his work **«Al-Favi bilvafayat»**: «Shamsaddin Al-Jazari delivered a message from Al-Ibrahimli to Hasan Ibn Al-Hakim: I went to Maragha and saw that observatory (observatory headed by Sadraddin Ali Ibn Khajeh Nasiraddin Tusi). He was a young and worthy scientist who knew astrology and Persian poetry very well. Besides, I met Shamsaddin Muhammad Al-Ordi, Shamsaddin Ash-Shirvani, Sheikh Kamaladdin Al-Ilygi and Husamaddin as-Shamani there» (2).

Mahmud ben Masud Gutbaddin Shirazi (1236-1311) was born in Shiraz and spent his youth there. He was a student of Nasiraddin Tusi and learned astronomy and mathematics. Gutbaddin worked in Maragha till 1282 and then was sent to Egypt as an ambassador of Mongols. He made a map of the Mediterranean Sea and lands located around it in Egypt. The scientist is the author of a very valuable work – **“End of knowledge”** written in Arabic about the astronomic and geographical achievements of his time. After it, he wrote an encyclopedic book titled **“Durratul taj” (Pearls of the crown)**.

Another scientist of the Maragha observatory – a Jew named Johanna Gregory Abul Faraj Bar Hebraeus (1226-1286), who had adopted Christianity, was born in the eastern part of the Anatolian Peninsula. Abul Faraj, who was a bishop in Malatya and head churchman in Aleppo, came to Maragha in the 1260s and worked there under the leadership of Nasiraddin Tusi. He is the author of a valuable work, which includes brief information about the basics of astronomy and geography and was written in Arabic. Abul Faraj became popular in Europe for his book **“History of dynasties”** or **“Brief history of states”** written in Arabic. This work describes the lifestyle of a multinational team that worked and lived in the Maragha observatory.

The chief engineer and builder of the Maragha observatory was Muayyidaddin Ordy. There isn't enough biographical information about Ordy. Only two manuscripts of his treatise about **“Astronomic equipment of the Maragha observatory”** written in Arabic have survived as historical documents. They are kept in the national libraries of Paris and Tehran. The first manuscript was found by the teacher of the special school of eastern languages A. Jurden in Paris at the beginning of the 19<sup>th</sup> century and was translated into French. The book was published in Paris in 1809 and 1810. It was translated into German in 1811.

*Models of astronomical instruments of the Maragha Observatory  
in the Museum of Science and Technology in the Islamic World  
(Istanbul, Turkey)*



The book includes a description of ten pieces of astronomic equipment prepared by Ordy under the leadership of Nasiraddin Tusi. At a result of analysis of information given in Ordy's tractate, researchers came to the conclusion that the equipment of the Maragha observatory was more perfect than that in other observatories. It is known that the equipment invented by Ordy was used in most observatories of the world. Further astronomic equipment was also improved using Ordy's equipment.

Muhammad Ordy worked on the preparation of astronomic equipment in the observatory and was the author of the most ancient star globe of the world (1279). The positions of stars were accurately shown on the globe.

A rich man established a museum titled **"Picture Gallery"** in Dresden, Germany, in the 16<sup>th</sup> century and the globe made of bronze, silver and gold was kept in that museum.



*Hill on which remains of the buildings of the Maragha Observatory were discovered. Photo before excavations started*



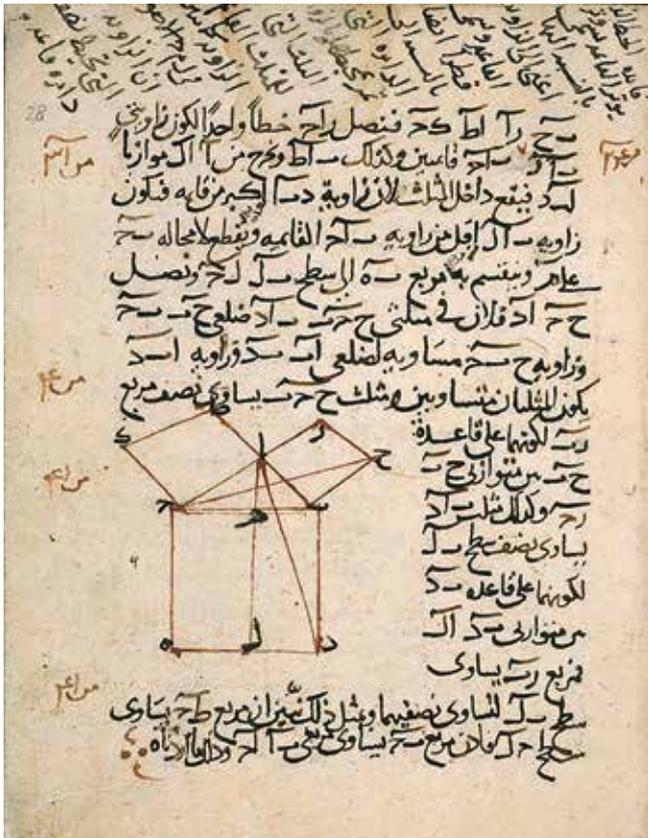
Sadraddin Ali Tusi was the head of the observatory after his father's death. His brother Asiladdin is the author of one manuscript of *"Zij-i Ilkhani"* kept in the national library in Paris.

Mahiaddin Maghribi was a Spanish Arab. He came to Aleppo before the construction of the observatory and worked in the field of astronomy there. When the troops of Hulagu khan entered Aleppo, Mahiaddin used his privileges as an astronomer. Hulagu khan, who was

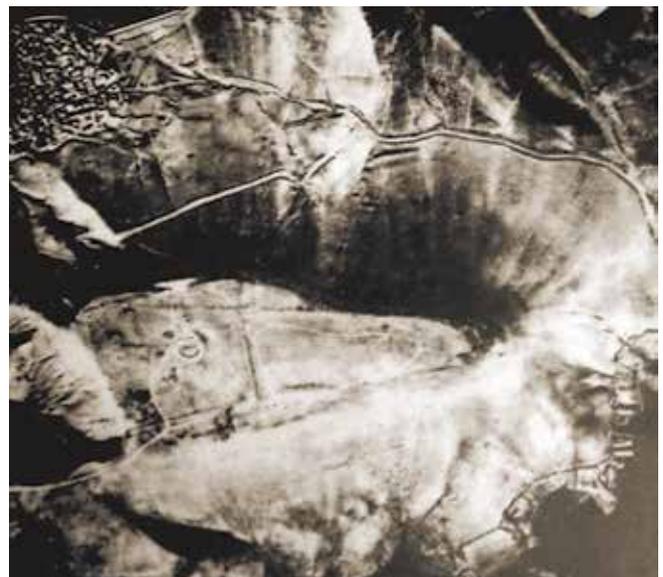
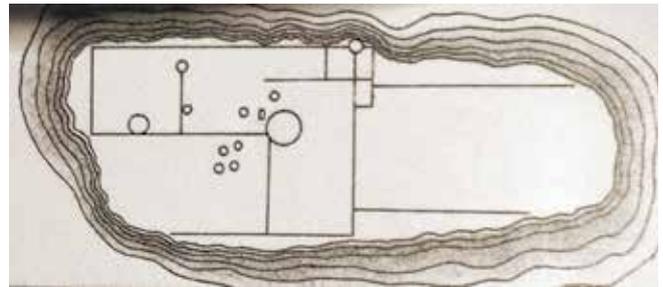
aware of Nasiraddin Tusi's respect for astronomers, rescued Mahiaddin and sent him to Maragha.

Well-known scientist Fao Mun-Chi had come from China, Isa from Mongolia and Fakhraddin Ikhlati from Tiflis.

*Hill on which remains of the buildings of the Maragha Observatory were discovered. Scheme and aerial photography*



*Page from the astronomical treatise of Nasiraddin Tusi*



### *Model of the central building of the observatory*

Scientists of the Maragha observatory were of different religions. Besides Muslim scientists, Christians, Nasranis and Buddhists also worked in the observatory and were always welcomed there. Besides Azerbaijanis, there were Persians, Arabs, Jews, Uzbeks, Chinese, Turks, Mongols and others among scientists of the Maragha observatory. It turns out that the Maragha observatory was a multinational cultural center and there was real emancipation there. This factor was one of the most advanced features of the observatory.

The head of the Shamakhi Astrophysical Observatory – Academician Hajibay Sultanov mentioned that the Maragha observatory stimulated the development of physics and mathematics in Western Europe, China, Middle Asia and India. ✪

### **References:**

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2. Rzayev B. Bəşəri düha: Mühəmməd ibn Mühəmməd ibn Həsən – Nəsirəddin Tusi (XI) "ADPU nəşriyyatı", Bakı, 2014. s. 78

*Dome over the remains of the structures of the Maragha Observatory. Contemporary photo*

