

Scientists review Arabic manuscript containing lost works of Apollonius and shed light on Islamic scientific tradition

Scientists spell out Islamic scientific traditions in a new a volume dedicated to unlocking the secrets of oriental manuscripts.

SHARJAH, EMIRATE OF SHARJAH, UNITED ARAB EMIRATES, February 5, 2025 /EINPresswire.com/ -- Leon Barkho, University of Sharjah

Scientists say that the two lost, but extremely important books by Apollonius, the Greek mathematician known to the ancient world as “The Great Geometer”, have survived in an Arabic manuscript kept under lock and key as part of the prized possessions of the Leiden University Libraries in Holland.

The revelation is made in a new volume of 50 chapters titled Prophets, Poets and Scholars and published recently by Leiden University Press. (<https://lup.nl/publications/history/prophets-poets-and-scholars/>).

Apollonius (262 BC - 190 BC) is believed to be one of Greece’s greatest mathematicians and is renowned for his hugely influential book the Conics of Apollonius in which he introduces the terms hyperbola, ellipse, and parabola.

According to the volume, “The Conics of Apollonius (c. 2.00 BCE) was one of the most profound works of ancient Greek mathematics. The work deals with the theory of ellipses, parabolas, and



Three cuttlefish and other marine and terrestrial animals. From an Arabic manuscript of Dioscurides’ Book of Herbs. Credit: Leiden University Libraries.



Table of geographical longitude and latitude in (a later reworking of) the astronomical handbook of Ulugh Beg. Credit: Leiden University Libraries.

hyperbolas - the curves which you can see if you shine a flashlight on a wall." Apollonius's work comprises eight books, but only the first four were available to European scholars during the Renaissance.

The lost books – 5 and 7 – were brought to the Leiden University by the famous Dutch orientalist and mathematician Jacob Golius who had bought them for the university as part of a collection of nearly 200 manuscripts during his various voyages to the Middle East.

The 50 chapters in the book touch on the history of the Netherlands' relationships with the orient, particularly the Middle East and North Africa, emphasizing that the first encounters with Arabic manuscripts occurred in the early 17th century.

The 17th century saw the first Dutchman, Thomas Erpenius, gaining pre-eminence in oriental studies. "He concentrated on Arabic text editions, primers for students and most importantly an Arabic grammar that would remain in use as a standard work for more than two centuries," the volume's editors write in their introductory chapter.

But the first Dutch "to have ever set foot in the Middle east or North Africa was ... Jacobus Golius (1596-1667). On his travels he bought more than 200 Middle Eastern manuscripts for Leiden University," say the editors. However, "Golius's fame rests mainly on his lexicon Arabian-Latinum, a large folio volume printed by the then firm of Elzevier in 1653. The work is based on the Arabic lexicographical manuscripts that he had acquired on his travels."

It is the manuscripts which Golius purchased for the Leiden University Libraries that attract the attention of numerous scholars who have contributed to the volume. For instance, a chapter focuses on an 11th century Arabic manuscript, which is a translation of the lost mathematical works attributed to Apollonius.

In the meantime, the essay dwells on four other Arabic manuscripts bought by Golius to present



Al-Biruni's full Discussion of All Possible ways to construct an Astrolabe, figure for the "boat astrolabe", and discussion of the hypothesis of a rotating earth. Credit: Leiden University Libraries.



Illustration of a plane tree (cinar) and a manna ash, in Kitab al-Hasha'ish or De Materia Medica by Dioscorides. Credit: Leiden University Libraries.

some aspects of the scientific traditions prevalent in the heyday of Arab and Muslims civilization.

The Arabic translation of Apollonius is fascinating, Dutch mathematician and historian of science, Jan Pieter Hogendijk, says in an email interview, adding that besides its exact science, it is adorned with colored images and written in skillful Arabic calligraphy. "The calligraphy in some of these manuscripts is wonderful and also the geometrical figures were written with extreme care.

"They (manuscripts) are a witness of the mental abilities, discipline, power of concentration, will power and so on which the scientists and also the scribes possessed, and which modern people, spoiled by their gadgets, mobile phones, and so on, do not possess anymore."

The volume, according to the editors, "serves as an introduction to more than fifty contributions of scholars and librarians who are intimately familiar with diverse aspects of the collections (of Leiden University Libraries), both ancient and modern."

The volume is a nice read as it is written for the public. It is luxuriously illustrated with ancient maps, images, and extracts from Arabic, Turkish and Persian manuscripts. Besides accounts and analyses of scientific traditions prevalent among Arabs and Muslims in the Middle Ages, the volume narrates some fantasy tales from Arabic travel literature, which still captivate the mind.

In their studies and analyses, the scientists find that their authors would often add an entertaining touch mingled with fantasy to their narrative. "They (the texts) were often mixed with legendary accounts, especially in reports about the outer edges of the known world, where the laws of nature were no longer fixed and strange things might occur.

"There women might grow on trees, people might have arms where we have our ears, and might come across islands exclusively inhabited either by women or by men. All this has left its traces in the Middle Eastern written heritage, and also in the accompanying pictorial tradition."

In the section dedicated to Arabic manuscripts and titled "The Great Arabic Heritage," there is emphasis on cosmography besides astronomy, mathematics, zoology, botany, planetology,



Hand-Coloured Map of Europe in Katib Cele-bi, Kitab-i CiHAN-NUMA (The Cosmorama), Printed by Ibrahim Muteferrika, Istanbul, 1145 AH (1732 CE). Credit: Leiden University Libraries.

among other sciences.

There is emphasis on a renowned Muslim cosmographer Ibn Muhammad al-Qazwini's "Ajaib al-Makhluqat wa Khraib al-Mawjudat (Wonders of Creations and Rarities of Extant Beings), an encyclopedic work which, according to the volume tackles "the humble creatures such as fleas, worms and lice to exotic animals surrounded by mystery and legends."

Some creatures can be merely fantasy beings like the turtle which "sailors moored their ship on it, taking the motionless animal that had become overgrown with vegetation for an island" - reminiscent of the creatures one comes across in the famous Travels of Sindbad the Sailor.

However, as one of the fascinating chapters in the volume underscores, "sometimes one has to rid oneself of preconceived ideas to understand the descriptions. Such a case is a sea creature described by Qazwini, ... its face is like that of man, it has a white beard, its body looks like that of a frog, its hair is like a cow's and its size like that of a calf. It takes us a moment to see that this is a perfectly adequate description of some kind of seal."

Mostafa Zahri, University of Sharjah Professor of numerical analysis and mathematical modeling, says the prized possessions of "Arabic manuscripts in Western libraries like Leiden University Libraries serve as invaluable records of Islamic civilization's intellectual achievements, especially in mathematics and geometry.

"Western institutions, besides Leiden University, namely the British Library, and the Bibliothèque Nationale de France, house thousands of Arabic, Persian, and Ottoman manuscripts containing rare geometric treatises. These collections bridge historical and modern scholarships."

However, and despite the wealth of knowledge they hold, many manuscripts remain understudied and only greater collaboration, digitization, and accessibility between Western and Arab scholars could unlock their full historical and mathematical value, says Prof. Zahri.

In an email interview, Wilfred de Graaf, Education Coordinator at Utrecht University concurs, emphasizing that only a small portion of collections of Arabic and Islamic manuscript texts have been studied. He attributes the scarcity of studies in this sphere to the lack of scholars in the West who are fluent in oriental language like Arabic, Persian and Turkish, in which most Islamic manuscripts are written.

Nonetheless, he adds that more and more ancient texts are unraveled assisting scholars to obtain "a general view of the development of science in the Islamic tradition. "In the West, there is an interest in the Islamic scientific tradition, not only because of it being crucial for the development of science in Europe between the 11th and 14th century, but also because of the intrinsic nature of its contributions."

Mesut Idriz, Sharjah University's Professor of Islamic civilization, says bringing Arabic and Islamic

manuscripts to life is among the hardest labors social science researchers face. "Islamic manuscript studies require a nuanced understanding of both the textual and scientific traditions they encapsulate.

"The study of Islamic manuscripts demands specialized knowledge, encompassing paleography, historical context, linguistic expertise, and scientific specialization—areas that are often underdeveloped among contemporary researchers and academics."

Drawing on Leiden University Libraries' Arabic manuscripts, a team of Western scientists held a workshop at the University of Sharjah in the United Arab Emirates in January 2025 to teach participants the method by which Arab and Muslim scientists wrote numbers in a numeral system called abjad, in reference to the Arabic alphabet, a right-to-left script.

The abjad is a numeral system in which the first of the 28-letter Arabic alphabet 'alif' represents 1, and the second letter 'baa' is 2 up to 9. The other letters stand for nine intervals of 10s and then those of 100s ending with 1000.

"The scientists in the Islamic tradition used abjad in combination with the sexagesimal system which is still used today for time (hours, minutes and seconds) and angles (degrees, arc minutes and arc seconds)," Wilfred, who organized the workshop, said.

This is the second workshop in nearly two months Western scientists hold at the University of Sharjah to present Arabic manuscripts to the Arab academic community and demonstrate the uses Arab and Muslim scientific instruments were put to in the Middle Ages. In them, the participants were made to read in detail the abjad numbers on an early astrolabe, an Arabic astronomical instrument.

Besides the Arabic manuscript in which the two lost works of Apollonius were found, there are extracts and studies in the volume tackling a variety of scientific traditions prevalent among the Arabs in the Middle Ages.

One chapter analyzes a figure from an 11th century manuscript attributed to al-Mu'taman ibn Hud, King of Saragossa between 1081 and 1085. The chapter shows how Muslim scientists managed to solve an ancient Greek geometry puzzle nearly half a millennium before a solution to the same problem was found in Europe. Muslim scientists' solution of the puzzle, according to the chapter, "is part of a huge mathematical encyclopedia called the Book of Perfections of which a small fragment has been preserved."

Quoting from yet another 14th century Arabic manuscript, the chapter shows how Muslim scientists could determine the geographical coordinates of no less than 160 cities with a high degree of accuracy and minimum error margin.

"The names of the cities appear in black and the numbers in red are the longitudes in degrees

and minutes, and the latitude in degrees and minutes," says Prof. Hogendijk. "The numbers are written in the alphabetical abjad system used by most astronomers, in which a numerical value is attributed to each letter. The first column begins with localities in the two provinces of Western and Eastern Azerbaijan in modern Iran."

LEON BARKHO

University Of Sharjah

+971 50 165 4376

[email us here](#)

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