

## Archaeological clocks in the mosques of Vuh are an artistic archaeological study in light of a group published for the first time

**Dr. Magda Ali Abdul Khalek EL Sheikha**

Lecturer, Department of Islamic Archeology, Faculty of Archeology, Cairo University

[magdaali1982@yahoo.com](mailto:magdaali1982@yahoo.com)

### Abstract

The clock is a tool for knowing and measuring time, and the medieval Muslims, was in dire need to know the time and determine it, because the prayers imposed on them were linked to specific times of the day. Therefore, Muslim scholars at that time worked hard on astronomy, as they worked on creating machines and tools with which they could know the times of their prayers. Until they succeeded in creating a Science for watches, they called it the science (Benjamat) and this science reached the height of its development in the 2 \_ 3 AH / 8\_ 9 AD centuries. Where a number of scholars appeared during this period who were credited with developing it and bringing it to the global stage, and from scientists who have contributed significantly to the field of clock science. The scientist Al-Jazari, Sons of Musa Ibn Shaker, Who have greatly contributed to the development of tricks (mechanics) Al-Jazari has developed watchmaking, where several forms of watches appeared, including water, sand, wax and mechanical watches. Down to the small clocks that are hung on the walls inside mosques and schools, and other tools that help to tell the time with extreme accuracy.

### Key words

Clock, Pendulum, Wall Cupboard, Decorations, Mosque, Wooden Box

### Introduction

In the pre-Islamic era, the Arabs knew the times by defining shadows, such as the shadows of walls and mountains and the stature of man, but after the advent of Islam and the strong need of Muslims to know and determine the time, because the prayers imposed on them were linked to specific times of the day, we find great interest by Muslim scholars in astronomy, planets and stars due to their connection. Direct timings related to the rituals of Islam and its pillars of prayer, fasting, pilgrimage and zakat ().

The Arabs meant by mazawil () from horizontal, vertical and moderation, so they installed them in mosques and schools because of their importance in determining the time in that period, as it was like the local time clock at that time (), but due to its inaccuracy and being limited to daytime times only water clocks appeared. Al-Jahiz mentioned that the Muslim rulers and scholars used to use the astrolabe during the day and at night the pankamat, which is the chiming water clock. King of France (742\_ 814 AD) (124\_ 198 AH) ().

The use of chiming water clocks was common throughout the Islamic state, and it was one of the wonders of the world at that time and a destination for visitors and travelers, including the Bab Jeroun clock (it is the second door of the Umayyad Mosque in Damascus, which was called Bab al-Sa'at). The traveler Ibn Jubayr described it in detail, but this clock was exposed to a fire. The year (618 AH / 1221 AD) was renewed after that, and when the traveler Ibn

Battuta visited Damascus, he described those hours, but his description differed from that of Ibn Jubayr ( ).

Hourglasses were also used, which worked in the same style as water clocks. Perhaps the Roman army was the first to use them to measure the duration of the night watch. The Arabs were also familiar with wax clocks, and perhaps the most famous of them was the one made by Al-Jazari in 1206 AD, which included a numbering that displays the time it burns at a known rate, and the lower part of the candle is placed on a flat plate that has a ring on its side and is connected through rollers with a counterweight. Whenever the candle burns, the weight pushes it upwards at a constant speed. Throughout history, no wax hours have been known that exceed this development.

The basis for the advancement of astronomy among the Arabs was the observatories they established. The Arabs did not stop at the limit of theoretical study, but were interested in the practical aspect of observing the planets and celestial bodies ( ), and among the Arab scientists who were interested in astronomy and clocks, the Egyptian astronomer and mathematician Ali bin Abdul Rahman bin Yunus Al-Sadafi (399 AH / 1009 AD), who transferred the clock technology a qualitative leap by inventing the pendulum (the pendulum clock) and was used to calculate the time periods during monitoring, as it was used in the ticking clocks. Galileo the Italian (1564-1642 AD) (971-1051 AH) preceded the Arabs by six centuries, and the Arabs had an idea on the law of the pendulum, which Galileo devised after practical experiments and through which he proved that the period of oscillation of the pendulum depends on the length of the pendulum and the value of the gravitational wheel. Expand the scope of use of dancers ( )

Then came one of the most prominent Muslim scholars in the science of tricks (mechanics), who contributed greatly to the development of Arab technology in the Middle Ages, the scientist Ibn Al-Razzaz Al-Jazari (6th century AH / 12th century AD), who recorded his innovations and inventions in writing the important (combining science and useful work in crafting tricks). Al-Jazari contributed greatly to the development of the science of clocks (the science of clocks). He invented the drummers' clock, with which drummers beat their drums after every passing hour. These are the huge clocks that he designed, built and explained in his book (On Knowledge of Engineering Tricks). Al-Jazari's invention is the basis for water clocks. That spread in Europe later, which paved the way for the emergence of technology in various fields. The island scientist also invented his famous watch, the "Elephant Clock" and proved it in his first book, "The Combined Science – and Useful Work in the Craft of Tricks" ( ) The Arabs also kept improving and developing clocks, shortening their size and increasing their accuracy until they made it a wall clock no larger than half an arm's size. Among the Muslim scholars who contributed to the development of clocks and specialized in the manufacture of mechanical clocks was Ali Ibn Ibrahim, known as Ibn al-Shater (777 AH / 1375 AD), to whom he is credited with He invented the first mechanical wall clock, and all its parts were made of metal and did not include wooden parts. It was also small in size, not more than 30 cm after it was several meters, where he inserted metal machines and dispensed with water and its large wooden machines. This invention is an early model for mechanical wall clocks. Thus, he dispensed with hourglasses, water clocks, and their large, long wooden instruments, which were several meters in length. Ibn al-Shatir created a machine for setting prayer times, which he called simple and placed in one of the minarets of the Umayyad

Mosque, and Ibn al-Shatir wrote a letter he called (Working in minutes with different visual horizons). .

Thus, we see that Muslim scholars had the greatest credit for the world's knowledge of the different clocks. Rather, they contributed greatly to the development of the science of clocks, as these scholars invented water, solar and mechanical clocks. They also knew wall clocks and other clocks and invented the pendulum clock or pendulum, which confirms that they reached knowledge The law of the vibration period The Europeans transferred this technique from the Muslims and it was one of the foundations on which the European Renaissance was based in the modern era.

Some of the mosques of the city of Fuwa ( ) keep a number of archaeological clocks preserved inside wall cupboards that were dedicated to telling the time, and the following is a detailed description of the hours under study.

**search limits:**

\_ Analytical study of a number of archaeological clocks preserved in some mosques in the city of Fuwa.

**Research Methodology:**

\_ Descriptive analytical method.

**Research problem:**

\_ It lies in the absence of a previous study of those watches to determine the time period they refer to, their composition and the raw material they are made of.

**research importance:**

\_ Study and publication of a number of distinctive pieces of art dating back to the era of the Muhammad Ali family, represented in the clocks preserved in the mosques of the city of Fuwa

**Research goal:**

A study of a number of clocks in the mosques of the city of Fuwa that have not previously been studied, with the aim of proving their antiquity or not, determining the historical period to which they belong and studying it from a technical and industrial point of view, both in terms of the general design, the method of preservation, its location in the mosque, its components from the inside, the method of operation, and decorations implemented, and the materials used in their manufacture.

**Results:**

After studying the topic of "Ancient clocks in the mosques of the city of Fouh, an archaeological and artistic study in light of a group published for the first time", we conclude the following:

- The study published six (6) wall clocks for the first time, and they are clocks with an important amount of decorative richness and archaeological value, despite their presence in the mosques of the city of Fuwa and not in the mosques of the capital, Cairo.

- The study proved that with the exception of the clock of the Abu al-Makarem Mosque, all the clocks in the mosques of the city of Fuwa - although they are devoid of writings and slogans - took the same configuration in terms of placing them inside a wall wheel on the qibla wall and its composition represented by a clock disk attached to a pendulum and kept inside a wooden box, and the time bars On the dial of the clocks, all of them took the shape of the crescent from the base. We believe that it also dates back to the era of the Muhammad Ali family, even if it did not include the crescent insignia with the star inside.
- The study indicated that the clocks of the ancient Fuwa mosques proved the extent of interest and care of the Muhammad Ali family in mosque architecture and providing them in a way that suits the spirit of the age despite its geographical distance from the capital, Cairo.
- The study demonstrated the Muslims' interest in time and their compatibility with technical and industrial development, which reflects the extent of their civilization at that time.
- The study proved that those clocks were added to mosques during their renovation or construction during the era of the Muhammad Ali family.
- The study indicated the diversity of materials used in the manufacture of these watches, including copper, wood, and glass, as well as the diversity of decorations used in decorating them, such as geometric, botanical, and Arabic and foreign inscriptions.
- The study indicated that the position of the clocks in the mosques of Fuwa is fixed on the southeastern wall, which is the qibla wall, except for the clock of the mosque of Da'i al-Dar, which was fixed on the northeastern wall due to the narrowness of the space designated for placing the clock on the qiblah wall.

### Recommendations:

The study recommends urgent intervention by the Ministry of Antiquities represented by the Islamic and Coptic Antiquities Sector in the Ministry to maintain and preserve these clocks and transfer them to the Museum of Islamic Art in Cairo or to one of the museums near the city of Fuwa, given their historical, archaeological and artistic value, instead of leaving them in the mosques of Fuwa subject to neglect and loss, especially After the terrible development in the watch industry and the disappearance of the job for which it was placed in the mosque.

### References:

- awala: alqaranalkarim  
 abnmanzur (abaaalfadljamalaldyinnmuhamad bin mukrim bin ealaa bin 'ahmad t 711h), lisanalearabi, ja4,dar 'iihya' alturathalearabi, t3,birut,1999.  
 abn 'iias , muhamad bin 'ahmad bin ayasalhanafiialmisrii , badayiealzuhur fi waqayiealdahawr, j2, matabie alsheb1960m , alhayyataleamatlilkitaab, alqahrt , 1982m/1404h .  
 alsakhawiu (shmasaldyinnmuhamadeabdalrahmn, ta"902ha/1497m) , aldaw' allaamieli'ahlalqarnaltaasiei, ja2, maktabatalquds, alqahrt , 1353h.  
 muayidaldyinnaleardi (t 664 h/ 1266m ), tarikheilmafalkalearabii, tahqiqjurjsalibaan , t1 , bayrut , 1990m .  
 'ahmadalmufti , mawsueatalzakhrifataltaarikhiatu, dirasattarikhiatfaniat, dardimshq, 2001m.

- \_ 'ahmadriadeabdalaadi, altahafalkhashbiat fi easr 'usratmuhamadealaa fi daw' majmueataaltahafialththabitatwalmanqulatalmahfuzatbimatahafqasralmunilbialqahirati, "draasat 'athriatwafaniata", majstir, ghyrmunshur, kuliyyatalathari, jamieatalqahirat, 2010m. ayatsaeidnabiluhu, altahafualmaedaniataleuthmaniatalmahfuzatbialmutahifalwataniililatharalqadimati, dirasat 'athriatfaniati, majstir, ghyrmunshuir, maehadalathar, jamieat aljazayir, 2008m.
- \_ jamaleabdaleatikhayrallah , alssaeatalsamsiat fi misral'iislati , risalatandukturah , kuliyyataladabjamieatantanta 1995m
- hanafieabdalahimeabdalahim ,minjanat (mzawl) almasajidaltuwnisiat fi alfatrat min alqarnayn ( 12\_13 h / 18\_19 m) risalatmajstir , kuliyyatal'athar , jamieatalqahirat , 2013m
- \_ hasanalbasha , mawsueataleamaratwalatharwalfununal'iislamiata, almudkhili, alnashir 'awraqalsharq, alqahirati, t1, 1999m .
- khalideazb, fawhadinatalmasajid "drrasateanlmalinatwaeamayirihaaldiyniatwalmadania", daralnashral'iiliktruniu .
- khalid bin mahmud bin eabdalqadirbiradata, altaqniataltanfidhiatli'akhshabwatawzifiha fi alsinaeatwalharafalyadawiatalsaghiratwadawriha fi altarbiatalfiniti, majstir, ghyrmanshur, kuliyyaltarbiatalfaniati, jamieatan 'amaalquraa, almamlakatalearabiatalsaueadiat1429h/2008m.
- ramizairmiajundayi, dirasatfaniyatathariatanli'asqufalkhashbiat fi aleasralmamlukiibimadinatalqahirat, mukhtawatrisalatmajstir, kuliyyatalathari, jamieatalqahirat, 2003m.
- rawiatebdalmnemmuhmd, 'adwatalziynatalturkiat fi daw' majmueatayinmathafqasralmunil, wamutahafalmujawahiratalmalakiatbial'iiskandariati, makhtutrisalatdukturatkuliyyatalatharjamieatalqahirat , 2004m .
- \_ rawiateabdalmuneimkhulayl , alssaeat fi eahd 'usratmuhamadealaa fi daw' majmueatmathafqasreabidin ,jamieateayan shams ,mrakuzaldirasatalbardiatwalnuqush ,mj 3 , 2016.
- rbyehamidkhalifat ,alfununal'iislamiat fi aleasraleithmanii, maktabatzuhara' alsharaq, alqahirat, t1, 2001m.
- rahhab
- 'ahmadalseydy,alhuliyatalmiemariatwaktaxiatalkhazfiataleaaaleamayiraldiyniatbimadinat 'asfahan fi eahdialshaheabbasal'awalwalththani, makhtutrisalatmajstir, kuliyyatalathari, jamieat alqahrt,2005m .
- ridwan bin muhamadalssaata, muqadimatan fi eilmalssaeatwaleamalbiha , tahqiqmuhamad 'ahmaddahiman , maktabataldirasatal'iislamiat , dimashq , 1981m.
- zikaamuhamadhasan, fununal'iislam, al'aamal alkaml,j1, daralrrayid allearabi, birut1401h/1981m .
- \_ sueadmahir ,albahriat fi misral'iislamiatwa'atharuhaalbaqiat, daralkatibearabiuliltabaatwalnashri, aljayzat, 1976.
- sueadmahir, masjidmisrwa'awliawuhaalsaalihun, j4, almajlisal'aelaalilshuyuwal'iislamiat , 1974m.
- sihameabdallahjadin ,alatqiasalwaqtmundh 'aqdamaleusurwusulaanli'abrajalssaeatleithmaniatal , majalatalaitihadaleamililathariaynalarab , almujalid 20 , aleadad 1 , yanayir 2019m
- easimmuhamadrizqa, maejammustalahataleamaratwalfununal'iislamiat, alqahirati, maktabat madbuly2000m .

eabdalmunasifsalimnajim, sharatalmalikwalramzwashiearalmamlakatealaaalfununwaleamayir fi alqarnalTtasieeasharwahataanihayatal'usrataleilawiati, majalatdirasat fi 'atharalwatanalearby, aleadad 11.

eabdallaheatiateabdalfafiz , dirasat fi alfanaltarki, maktabatalnahdataalmisriat, 2007m.

eabdalnnasiryasin, alramziataldiyniat fi alzakhrifatal'iislamiati, dirasatmitafiziqtatalfanal'iislamii, zuhara' alsharq, t1, 2006m.

eabdaleaziz 'ahmadjawdat ,aleanasiralnabatialeithmaniatwa'iimkaniattatbiqiha fi batik maeasira, majstyr, ghyrmanshur, kuliyatalfununalttbyqyt, jamiethulwan ,1979m

elaa 'ahmadalttayish, alfununalzakhrifiat'islamiatalmubakirat fi aleisrinal'umawiiwaleabasi, t1, zahara' alsharq, 2000m

ealaa 'ahmadalttayish , almansujat fi misraleuthmaniati, majstyr, ghyrmanshur, kuliyatalthari, jamiatalqahirat 1985 m.

faridshafieiu , aleamaratal'iislamiatu, mj1, easralwala .

muhamad 'ahmadzahran ,funun 'ashghalalmaeadinwalthafi, maktabatal'anjilualmisriat , 1965m.

muhamadeabdaleazizmurzuq, alfununal'iislamiat fi aleasraleuthmanii, alhayyatalmisriataleamat lilkatiba1978m.

muhamadfathieiwadallah , al'iinsanwaltharawatalmaeadaniatu, alkuaytu, silsilatalamalmu'erifati, aleidd33.

mahaaaldiynatalu ,alfununalzakhrifiat , t1, dardimashq, 1994m .

mustafaamahmudsulayman , tarikhaleulumwaltiknuluja , alhayyataleamatlilkitaab ,2006 .

mustafaabdalfathghanimatan , mayadinalhadaratalearabiatal'iislamia "alfununal'iislamia", daralfununaleilmiata, al'iiskandariati, 1994m .

wizaratalthaqafat , kitabqitaeal'atharal'iislamiatwalqibtiat , tarmim 'atharfawh , almajlil'alaelalil'athar ,fuh , 1997m.

\_ Eric, Bruton : The History of Clocks and Watches, Crescent Books, New York, 1979.

\_ Donald R., Hill; Mechanical Engineering in the Medieval Near East, Scientific American•1991.

\_ John Richard, Hayes;The Genius of Arab Civilization, Source of Renaissance, 2nd edition, MIT Press,.

Ibn al-Razzaz Al-Jazari; The Book of Knowledge of Ingenious Mechanical Devices. Translated and annotated by Donald R•Hill•1974.