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The sciences in middle ages

العلم □ العصور الوسطى

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Abstract:

to specify the time a certain era is to determine the pattern of life of the various aspects of the political, economic, social, scientific, cultural and religious...This pattern is different from the various patterns of life in other times, or in other words, the beginning of an era or the end does not specify a certain year, therefore, the overlap between the historical ages did not allow discrimination including only through turns root causes in the Human walking on the basis of changed political concepts, frameworks and the economic and social relations and rollover intellectual property, these shifts need to centuries of time.

Keywords: science / medieval / Science in Europe / science when Muslims and Arabs.

ملخص :

إن تحديد فترة زمنية لعصر معين هي تحديد لنمط حياة بمختلف جوانبها السياسية والاقتصادية والاجتماعية والعلمية والثقافية و الدينية وما إلى ذلك...وهذا النمط يكون مغاير ومختلف عن أنماط الحياة في عصور أخرى ، أو بمعنى آخر فإن بداية عصر أو نهايته لا تحدد بسنة معينة ،لذلك فإن التداخل بين العصور التاريخية لا يسمح بالتمييز بينها إلا من خلال الانعطافات الجذرية في سير البشرية على أساس تغير الأطر والمفاهيم السياسية وتبدل العلاقات الاقتصادية والاجتماعية والانقلابات الفكرية ، وهذه التحولات تحتاج إلى قرون من الزمن .

الكلمات المفتاحية: العلم / العصور الوسطى / العلم في أوروبا / العلم عند المسلمين والعرب.

I. Introduction:

For a medieval town which is the subject of this article, it extended between the fourth and fifth centuries AD until the 15th and 16th centuries A.D, because with the beginning of the fourth and fifth centuries AD political, economic and intellectual developments cultural landmarks appeared different from what it was in the preceding time period.

In ancient times, we note the emergence of global tendencies for control between nations, which led to a great empires such as the Persian, Assyrian, Egyptian..and others, however, the Roman Empire was the largest and most powerful empire, was the human constitution and continued until the 15th century A.D. where the fall of Rome fell at the hands of East Timor, which was formed in separate kingdoms of barbarism, the unit was replaced by the many place .¹

In other words, the transformation of the world of unity under the Roman Empire in ancient times to the multiplicity of the Warring States, among them in the Middle Ages. In economic, social and applied the Roman Empire in ancient times, the method of slavery in production in the sense that slaves were the major production class in the fourth and fifth centuries A.D. the Colón have emerged as tier applied major production (COLÓN were farmers who work the land in return for a share of the production).

Gradually established the foundations of the feudal system, thus applied the SERFS who worked in the feudal property layer is the main producing countries in Europe in the Middle Ages, thus prevailed in the feudal relations in the economy and society in the Middle Ages after the relations of slavery is prevailing in ancient times.

In terms of intellectual property has been characterized ancient pagan worship multiple gods control, as influenced by the ancient creeds in the various cultural manifestations, but in the 4th and 5th century A.D. were deployed in Europe and the new religion is Christianity, which has had a significant impact on various aspects of political life and manifestations of artistic, literary, scientific, and social relations, in the sense that Europe printed christian nature instead of idolatry in ancient times.

. Through this comparison between human life before the fourth and fifth century A.D. and skin life beyond it is clear that there is a difference makes us differentiate between different modes of life, and therefore the possibility of separation between two epochs or different historic costumes.

The same thing for the end of the middle ages, where we find that its features changed from the late 15th century and the beginning of the 16th century CE, from the political standpoint the empire fell, additions in

¹. نعيم فرح. تاريخ أوروبا في العصور الوسطى. مطبعة طربين. ص 09-10.

1453 AD by the Turks, and thus still Christian empire and replaced by Islamic Ottoman Empire differs from its predecessor, with their DOGMAS, followed by several events, i.e., the Hundred Years War between France and England, Russia joined the bank to Bologna the year 1466 AD, as Spain was liberated from the Arabs, the year 1492 AD and other events

In terms of economic and social development, the transformation of the economy from an agricultural activity to the total industrial and commercial activities, in addition to agriculture, and began marching toward the capital and international trade-offs and the bourgeois revolution overthrew the feudal serfdom. And increased trade between Europe and the Levant as a result of the openness of the Mediterranean Sea which was chained in Europe by the Arab Muslims in the first era of the Middle Ages, they also discovered the roads leading to the year 1492 AD and India.

In terms of intellectual property has changed, and the usual religious concepts in the middle ages and released the European mentality of control of religion¹.

In the middle ages use the FIEFS of Christianity and the teachings of the church to deploy intellectual concepts that matched the economic interests and privileges of caste and monopolized the church cultural and fought the scientific concepts and ideas and progressive free contrary to their interests, either in the European Renaissance Movement has replicated the classic culture and art match the glories of Greek monuments gained a liberal tendency science writers and philosophers began attacking the backward ideas born of the feudal relations, they also demanded the dismissal of the political power of the religious, and helped in the dissemination of progressive ideas the advent of printing, as well as a global uproar as a result of the geographical discoveries and the opening of the American continent and to identify the roads leading from the south of the African continent to the east of India, all of these cultural features of the prediction of the birth of a new era.

We aim through this article to identify the most important intellectual and scientific stations in a specific time period and different from previous stages and later, as we aim to identify the extent of the interest in science and to contribute to the intellectual, scientific, and it shows that our means in a specific time period, the stage of the middle ages, but add that we are dealing with science in medieval town in all of the European countries and the Islamic State at that time, we have chosen some scientific stations for each of the European Union and Islamic worlds as models for science and scientific thinking at that stage.

Science in medieval times:

Historians agreed that the science in medieval stage over three stages:

1.نعيم فرح.مرجع سابق.ص ص 11-14.

The first stage: the first beginnings of the age of the mediator and extends from the 04 century to the 10th century AD and learn about the dark ages, this phase was characterized by political, military and economic disturbances, where many races struggle for looted the Roman Empire such as :the Goths, Huns, ..., and in the midst of conflict and fighting and the remains of the Roman Empire and the political, social and economic turmoil, the church is growing slowly, meaning that at the time of the state authority to deteriorate the authority of the church is growing and more, these circumstances impact on science.

On the one hand, the European Community was suffering from instability in various political, economic and social levels, and on the other hand, increasing the authority of the church has led to the predominance of Religion, thought and became the people's attention to the AFTERLIFE at the expense of the worldly life, restricted scientific thinking in the eyes of Church authority in the search for logical evidence to support religious belief¹.

Typically the canon thought prevailing in this fun and can deal with the ideas of St. Augustine, who is considered a landmark in this period.

St. Augustine was born in Thagaste (Souk Ahras in Algeria currently) in 354 AD, and died in 430 AD , Italy.

St. Augustine was a prolific science widely thought, arthuis principles of Christianity and became one of the largest Catholic,split of the christian church to the Church of the Roman Catholic Church and Eastern Orthodox) dedicated his life to resist the doctrines which could impede the progress of the Christian religion.

Augustine has many authors, which established an integrated religious philosophical theory still taught and discussed to this day in the theological and intellectual forums, and attributed to him under the name augustinienne.²

Augustine was very spiritual foundations for require two types of worldly knowledge and theology.

The worldly knowledge is composed of two groups:

- a. The Tripartite Group: which include as sanitation oratory and any all arts say the discourse , this group is necessary to read the Bible and the teachings of the church and annotate it.
- B. The Quartet: Account include engineering and astronomy and music, this group is indispensable to rituals and calculation of religious holidays³.

¹.الشيخ كامل محمد محمد عويضة. أوغسطين فيلالعلمية.ر الوسطى. دار الكتاب العلمية. ص 07.

².www.ahewar.org(مارس 2010).

³.فوزي خليل الخطيب. تصنيف المعارف والعلوم عبر العصور. القاهرة، طبعة 01. 2002. ص 55.

Many of the works of Augustinus recall his confessions about himself (in which he narrates his biography), the book of the City of God (in the Augustinus to respond to those who attributed the fall of Rome was ushered to Christianity, the Augustinus that the fall of Rome was the result of the lack of religiosity in the AEOLIAN and corruption and obscene material vices), writers of the Trinity la Trinité (and studying the Christian conception of the diagnosed God in three persons, Father, Son, and Holy Spirit).

According to Augustinus, the absolute real knowledge comes through the sunshine, Sunshine Nour divine mind on the human mind in the sense that Augustinus wanted to make the facts of faith in Christianity philosophical facts also was to say: "I believe in order to Prohibition in Marriage.

".Indicated that the approach of Augustinus first on WHO SECONDLY faith faith is not intended to ratify all the naive and is intended to avoid the attitude of rejection and intransigence of the building of the Absolute, and self-doubt to believe what the evidence Handout¹.

Stage II: From the 11th to the 13th centuries A.D., this phase was characterized by a kind of relative stability.

The second century was an era of political and social progress, in which cities grew and commerce was active, and a community emerged, the bourgeois class that sent in people a tendency to personal freedom, and the movement of translation from Arabic and Greek, and this stage also witnessed the emergence of universities such as the Sorbonne and others, which contributed to the advancement of theology and philosophy².

As for the authority of the church, it was living an internal conflict that led to the deterioration of its position and the reduction of its authority despite the reforms carried out by the faithful to the church such as: Pope Gregory VII 1037 - 1058 AD and Pope Leo IX 1014-1054 A.D.

A conflict emerged between the religious and civil authority over the precedence of either one of them and appeared as their supporters, as there are those who were looking at the Pope as the successor and servant of the Lord on the earth, including those who were seeing the Emperor derive his power from the Lord; He may not be isolated unless he comes out of the Christian religion³.

In other words, this phase witnessed the emergence of a scientific movement at the beginning of the 11th century; However, it soon disappeared due to church reforms.

¹. الشيخ كامل محمد محمد عويضة، مرجع سابق. ص 38-101.

². فوزي خليل الخطيب. تصنيف المعارف والعلوم عبر العصور. القاهرة. ص 57.

³. (04.02.2010).ww.weltareekh.com.

The most important is the establishment of the Inspection Courts in 1233 A.D. to fight the heresy (heresy is every deviation, even simple, from the Christian doctrines).

People were being taken to the Inquisition, even with suspicion, or even with the tattooing of a neighbor, where the suspect was being interrogated until he confessed to his body and asked for repentance.

The Inquisition continued until the late 17th century, and among those who appeared before it were the Italian philosopher Giordano Bruno 1548-1600 A.D .

He was originally a monks and then moved from theological studies to philosophy, he was sentenced to eight years' imprisonment and then cut his tongue and burned on the charge of blasphemy because of his adherence to the theory of Copernicus Nicolaus Copernicus on Earth's rotation .The famous scholar Galili, who followed the same reason, preferred to retreat and escape the death sentence, also Nicholas Copernicus, characterized his position with great caution since he was not allowed to publish his book until the day of his death ;*The importance of Cornelius's theory lies in the fact that it is based on the reversal of the concept of the historical theory of the Earth's center of the universe, and that it was able to formulate a negation theory, in which the Sun was the center of the universe and the planets revolved around it, including Earth.*

Through these events we seek freedom from prevailing ideas that were based on non-scientific grounds .Thus, the period between the 14th and 15th centuries A.D. is a period that is set up for a period contrary to the earlier stages of the Middle Ages ,This is The Third Stage in which the signs of modern science in Europe appeared through contact with the Arab and Greek sciences, and this stage was the first roots of the age of enlightenment.¹

From the above, we conclude that the contributions of medieval Europe in the field of knowledge and science have not been extreme, and this is due to two main factors: Political upheavals that have spread to social and economic conditions ; These were reflected in their totality on cognitive scientific mode ; The second factor is represented in the church, which represented an obstacle to the progress of science.

On the other hand, in the same time span, we find that the Arabs were living in stable conditions in different fields This is due to the emergence of the Islamic State in 629 what had the most significant effect on the enrichment and promotion of scientific research.

The contributions of Muslims in the scientific field are so many that they cannot be limited to a few pages ; We will therefore look at examples of those contributions and we chose, Medicine, geography, and mathematics as a representation.

فوزي خليل الخطيب .مرجع سابق.ص ص 57-58.¹

Medicine in Arabs:

The Arabs knew the medical medicine (the medical doctor's craft) before the appearance of Islam and its development with its appearance .Arabs and Muslims were interested in medicine in addition to their great interest in their language and knowledge of the provisions of their Sharia and their religion .

In accordance with the commandments of the Messenger, God bless him and grant him salvation ,The Prophet Muhammad advised God's prayer and peace be upon him to use honey and Qur'an in the treatment, as he advised to use the black pill for its importance in healing many diseases ; The method of treatment was for the Prophet Muhammad (God's prayer) based on three types: Natural medicines, divine medicines, i.e. the Holy Quran, or both.

In the early days of the Muslim era, the doctors of religion appeared to deny them the plowing of the Ibn Kalda al-Thaqafy, el malik of Abu abjar al-Kanani, abn Anal al al-Nasrani, Abu al-Hakam, hakam el damshki, Jacob Ibn Ishaq el kindi, Abu al-Hasan ibn Thabit ibn kora, and Sinan ibn Thabit ibn kora

Some Moroccan doctors include, for example, Isaac Bin Omran, Isaac Ibn Suliman and others, Among the doctors of Al-Sham, abo Nasr Al-Farabi, Isa Al-Raqi, Kamal Addin Al-Homsi ¹ .

It should be pointed out that Muslim Arabs worked in different branches of medicine and surgery and in all matters related to the human body .In addition, they were able to link physical diseases to psychological diseases ; He was also the son of Abu Ala bin Zahr, known as Abu Marawan, carried out a detailed study on cancer in the stomach and the pharynx . The scientists and doctors of the modern age were astonished, and the Arab doctors were able to clean the equipment that was poisoned by the stomach tube ;. It is worth mentioning, that Arab Muslim doctors are the first to know that some diseases are transmitted by infection such as smallpox and cholera , In addition to the plague disease, they were the first to set up the medical examination system and to give a certificate under the supervision of a specialized medical committee.

Women also had a prominent role in the field of medicine, including doctor Zainab and the ophthalmologist And The doctor Rofaida who was famous for the surgery in the time of the Prophet, peace be upon him .In addition to some women Al Zahr who worked in the field of medicine ² .

The Arab contributions to medicine are summarized in the following points:

- The first person to establish hospitals was known as bimarstans, and the medical services were provided free of charge, and Muslims also initiated clinical examination to diagnose the disease,
- Give away the blood circulation as its discovery returns to Ibn Nafis ,

حسان الحلاق. تاريخ العلوم والتكنولوجيا عند العرب. دار النهضة العربية. بيروت. ص 17.

حسان حلاق. مرجع سابق. ص 22.

- Make use of ironing by fire in the treatment of some diseases ,
- The removal of tumors in many parts of the body as well as the extraction or dispersion of stones in the urinary tract,
- the discovery of the lines used in surgery and making her From the intestines of some animals, especially cats ,¹
- He devised several surgical instruments that were not known in the same way as the wheels used for tooth extraction ,
- Give away the sins of a needle to absorb the eye's water from the tip of Ammar Bin Ali Al Mawsili

Muslim contributions to geography

Muslims were interested in geography and wrote many writings about it ,They helped them, as they were the most important traders, and they visited various regions east and west , Their interest and geographical knowledge increased because of Islamic conquests in addition to other factors such as pilgrimage, journey to science, and this requires knowing places and regions, In addition to the need for the Islamic state to know the major roads that reach its territories and know its wealth.

For these and other reasons many have developed the love of the journey and the risk of overseas, and Muslims have been able to visit many countries from East to West, including China, India, Europe and others.

Muslim geographers have provided many geographic information about the wonders of the countries they visited, relying mainly on viewing, experimenting and mixing, not on quoting and transportation. Among the Muslim geographers We remember the Chalbe, AlKhawarizmi, el kindi , Ibn al-Fakih, al-Jacobi, al-Gharnati, Ibn Jubayr, Ibn Batuta and others geographers have worked in other sciences .²

As a model, we are addressing the contributions of Ibn Jubeir , He is Ibn Jubeir, Abu al-Hasan Muhammad ibn Jubeir el kinani el andalussi 540 AD/614 Hijri , He wrote a book, "Ibn Jubeir's journey as a reminder of the news about the agreements of travel", which he published in English William Wright in 1852, and then reviewed after De Goije .

Jubeir's son recorded his memoirs and watching him on a pilgrimage , He started his journey in 578 Hijri, corresponding to 1183AD, during which he visited Islamic and Christian countries. Among the countries visited are Sicily, Alexandria, Cairo and Jeddah, where they crossed the Red Sea ; then he went to Mecca, Medina, and completed his journey by visiting the Prophet's Mosque, then went to Iraq, Khorasan, Kurdistan, and Sham and arrived in Madaen, the capital of the Persian state before Islam, and many Islamic and Iranian countries.

¹.www.kids.islamweb.netg(04/02/2010).

².حسان حلاق.مرجع سابق.ص ص 95-97.

The importance of his book is that it contains much of both geographic and historical information, as well as many political and military situations for Muslims and crusaders ; It also includes many traditions and customs of the peoples it visited, and Ibn Jubeir's book is considered as a historical and anthropological encyclopedia for the different countries it visited ¹.

Mathematics in Muslims:

The 9th and 10th centuries A.D. is considered the intellectual period of mathematics in Muslims' sense of religion, seeking to preserve and adapt it at a time when Europe was experiencing a period of scientific decline. The Muslims translated, added, and transferred Greek mathematics to the European, Islamic and Arab world.

In terms of calculations, the Arabic or foreign numbers that are known today were not used by Egyptians, Babylonians, Greeks and Romans, but the numbers used by Greece and Romans in general are known as "Roman symbols" or "Roman numerals " : I. II. III. IV. V. VI. VII. VIII. IX. X..... ; It is numbers that can be used in the counting process or addition, but it is difficult or impossible to use in the multiplication or even addition of numbers of thousands and millions, especially since Europe has not yet known the zero that solved mathematical problems .

Muslim and Arab mathematicians were able to find two kinds of numbers:

1) Indian numbers : ١, ٢, ٣, ٤, ٥, ٦, ٨, ٧, ٩...

2) Arab numbers : 1,2,3,4,5,6,7,8,9 ...

Indian numbers have spread to the eastern countries, while Arab numbers have spread in the western Arab regions and in Europe ², The Arabs have transferred them from India and developed it and put a scientific system for it, and they have changed their transfer to Europe and continued using it till now.

It is worth mentioning that the Arabs, before and under the advent of Islam, used symbolic characters for reasons of mathematics, trade, military, economic and social, and each letter had a special number to indicate :

¹. حسان حلاق. مرجع سابق. ص 98.

².. حسان حلاق. مرجع سابق. ص ص 58-59.

ط	ح	ز	و	هـ	د	ج	ب	أ	احاد Units
9	8	7	6	5	4	3	2	1	
ص	ف	ع	س	ن	م	ل	ك	ي	عشرات Dozens
90	80	70	60	50	40	30	20	10	
ظ	ض	ذ	خ	ث	ت	ش	ر	ق	مئات Hundreds
900	800	700	600	500	400	300	200	100	
طغ	حغ	زغ	وغ	هغ	دغ	جغ	بغ	ع	الآف Thousands
9000	8000	7000	6000	5000	4000	3000	2000	1000	
صغ	فغ	عغ	سغ	نغ	مغ	لغ	كغ	يغ	عشرات الآلاف Tens of thousands
90000	80000	70000	60000	50000	40000	30000	20000	10000	
ظغ	ضغ	ذغ	خغ	ثغ	تغ	شغ	رغ	قغ	مئات الآلاف Hundreds of thousands
900000	800000	700000	600000	500000	400000	300000	200000	100000	

Examples include:

$$3000 = 200 + 100 = \text{ق ر}$$

$$210 = 200 + 8 + 2 = \text{ب ح ر}$$

The Arabs also reported using zero and its development, in the eastern Arab regions it was in the form of a point." "The Arabs of Morocco used zero in the form of a vicious circle "0", and the Arabs realized the zero importance because the five were different from the 50 and different from the 500.

Muslims introduced many advanced theories and methods to the science of algebra , This science was linked to the name of the famous scholar Al-Khwarizmi who invented theories and methods of constraint, especially those related to inheritance science, and he wrote a famous book entitled "The book that is abbreviated in calculating reparation and midwife" ,In addition to the fact that the book was important in the science of algebra, the English scientist Robert Schuster in 1940 translated it from Arabic to Latin, and this book had a prominent impact on Europe's awareness and knowledge of algebra.

The contributions of Al-Khwarizmi have had the profound effect on algebra and mathematics in general, and he explained six types of second-degree equations with their solutions, as he explained the four processes in algebra and addition, subtraction, division, multiplication.

The term is used to refer to a number of different types of objects, such as a trivial, a quadratic pyramid, and a cone, so that the name algebra is given to Muhammad ibn Musa al-Khwarizmi and has been referred to by Europe by the same name as algebre ,The name Al-Khwarizmi became synonymous with the various

mathematical processes in different terms of Algorithm, and it should also be noted that Muslim scholars realized the relationship between algebra and engineering .They used algebra techniques to solve engineering operations and vice versa, and they began to lay the groundwork for analytical engineering .

In addition to al-Khwarizmi, there is a large group of Muslim mathematicians such as : Tabit Ibn Kora , Abou Kamil El Massri , Omar El Khiam , Ibn Elbanaa , El Marakichi , Ibn Hamza El Mareribi And Others ¹.

In the course of his study, it is clear that Islamic Arab civilization contributed greatly to the enrichment of scientific knowledge , The scientific knowledge that was accumulated and stored in the Arab Islamic civilization moved to the West through the great efforts of translation , Modern science is the product of interaction between the civilizations of the West, Muslims, Christians and ancient civilizations.

In this regard, the American Dr. Toby E. Huff: In his book "The Rise of early modern science islam, china and the west" , This book was translated into Arabic.

Says Toby E. Huff : “ Perhaps the most astonishing thing was that the Arab-Islamic civilization had the most advanced science in the world before the 13th and 14th centuries ,

Its achievements in optics, astronomy and medicine have been surpassed “

However, the deterioration of the contributions of Arabs and Muslims after the thirteenth century raised several problems among the researchers regarding the reasons that led to the Muslims' stagnation.

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¹. حسان الحلاق .مرجع سابق .ص ص 61-62.