

Stages of Map-making in Arab-Islamic Heritage: Historical Approach

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Abstract

According to popular narratives in the Arab world, maps reflect the history of nations. The map is an important tool in geography in particular and in many other scientific disciplines, especially engineering, astronomy and urban planning.

Explicitly, the history of cartography prioritizes accuracy in representing the correct distances and directions of familiar places. Historically, cartography and map-drawing dated back to ancient times. Due to the human need to represent various and important phenomena in ancient civilizations, one can argue that man's knowledge of map-drawing may have preceded his knowledge of writing.

In the Middle Ages, Muslims made great progress in cartography, through which, they preserved the heritage of previous nations and added to them what suited the expansion of the Muslim empire in that period. Muslim cartography and map-painting came under the impact of civilizations that occurred in the pre-Islamic era. Therefore, the investigation of the various stages of development of the geographical map in the Arab-Islamic world should be approached in association with a scrutiny of the maps of ancient civilizations. Islamic cartography passed through seven stages and the maps of each stage are distinguished by special features.

On this basis, the paper aims to explore the development of Islamic cartography in the past in details by investigating the pre-Al-Mamouniya¹ Maps (first stage) and Al-Mamouniya maps² (second stage). The paper will also examine the astronomical maps (third stage), the

¹ Reference here to the Seventh Abbasid caliph Al-Ma'mun who reigned from 786 to 833 AD.

² The map is considered one of the most famous Muslim maps. It is a colored map that surpassed Ptolemy's map.

regional maps (fourth stage), ³Al-Idrisi's maps (fifth stage), the maritime maps (sixth stage) and the religious maps (seventh stage) in order to illustrate the importance of these maps. The ambiguity of the information that often appears on some maps and the inaccuracy of some data did not diminish the importance of Islamic maps and their unique position in Islamic heritage.

Keywords: Pre-Islamic Maps; Islamic maps; stages of development of Islamic maps; features of Islamic maps.

الملخص:

وفقاً للروايات الشائعة في العالم العربي ، تعكس الخرائط تاريخ الأمم. تعتبر الخريطة أداة مهمة في الجغرافيا على وجه الخصوص وفي العديد من التخصصات العلمية الأخرى ، وخاصة الهندسة وعلم الفلك والتخطيط الحضري .بشكل صريح ، يعطي تاريخ رسم الخرائط الأولوية للدقة في تمثيل المسافات والاتجاهات الصحيحة للأماكن المألوفة. تاريخياً ، يعود تاريخ رسم الخرائط ورسم الخرائط إلى العصور القديمة. نظراً لحاجة الإنسان إلى تمثيل ظواهر مختلفة ومهمة في الحضارات القديمة ، يمكن للمرء أن يجادل في أن معرفة الإنسان برسم الخرائط ربما سبقت معرفته بالكتابة. في العصور الوسطى ، حقق المسلمون تقدماً كبيراً في رسم الخرائط ، حيث حافظوا من خلاله على تراث الأمم السابقة وأضافوا إليها ما يناسب توسع الإمبراطورية الإسلامية في تلك الفترة. جاء رسم الخرائط ورسم الخرائط الإسلامية تحت تأثير الحضارات التي حدثت في عصر ما قبل الإسلام. وعليه ، فإن دراسة مختلف مراحل تطور الخريطة الجغرافية في العالم العربي الإسلامي يجب أن تقترن بفحص خرائط الحضارات القديمة. مرت رسم الخرائط الإسلامية بسبع مراحل وتتميز خرائط كل مرحلة بسمات خاصة. على هذا الأساس ، تهدف الورقة إلى استكشاف تطور رسم الخرائط الإسلامية في الماضي بالتفصيل من خلال التحقيق في خرائط ما قبل المأمونية (المرحلة الأولى) وخرائط المأمونية (المرحلة الثانية). كما ستدرس الورقة الخرائط الفلكية (المرحلة الثالثة) ، والخرائط الإقليمية (المرحلة الرابعة) ، وخرائط الإدريسي (المرحلة الخامسة) ، والخرائط البحرية (المرحلة السادسة) ، والخرائط الدينية (المرحلة السابعة). لتوضيح أهمية هذه الخرائط. غموض المعلومات الذي يظهر في كثير من الأحيان على بعض الخرائط وعدم دقة بعض البيانات لم يقلل من أهمية الخرائط الإسلامية ومكانتها

³ Al-Idrisi, born and died in Islamic Spain (1100-1166 AD), was a notable Muslim cartographer and geography scholar. His maps were very famous during the Renaissance.

الفريدة في التراث الإسلامي. الكلمات المفتاحية: خرائط ما قبل الإسلام. الخرائط الإسلامية؛ مراحل تطوير الخرائط الإسلامية. ملامح الخرائط الإسلامية.

Introduction

A map is a representation of terrains and details of the Earth's spherical surface on flat plates of paper. Accordingly, it is a geographical reduction method that includes one or several phenomena according to the purpose for which it was designed. Not only that, but the map may show invisible phenomena such as political borders. Etymologically, the origin of the word map in the Latin language (mappa) means a piece of cloth the size of a handkerchief (Satiha 1974 p. 18). The Romans used the term (forma) to refer to a map. According to a thirteenth century AD Latin dictionary, the term (mapa mundi) means the map of the world (Muhammadin 1401 AH, p. 187).

The ancient Arabs used several expressions to denote the map or map-painting including the word geography, which at the beginning of its use did not mean anything more than drawing a map of the earth. Additionally, the Arabs used the words picture, geographer, or drawing board to denote the map. As for the term map, it is used in Arabic language in relatively recent times. Some researchers argued that the term is a replica of the Arabic translation of the French word (charte) whereas others attributed it to an Arabic word meaning (roaming the earth) (Muhammedin 1981, p. 187). Nevertheless, the modern concept of cartography means the science and art of map-making. The English word cartography was derived from the French word cartographie (the science of making maps) or (the making of charts or maps). The French cartographie came from the Greek (carte) meaning "map" and (graphie) meaning (to draw).

The Importance and Origin of Maps:

Geographical thinking is as ancient as humanity and maps are older than history. Given that the knowledge of writing coincides with the beginning of history, map-making preceded the awareness of writing. This was confirmed by travelers who knew cartography and who roamed in primitive societies. They were drawing on the sand or engraving on pieces of leather simplified drawings to illustrate the paths they went through. The map is the cornerstone of cartography. Geographers use maps as interfaces to distribute available geographical data. This fact has prompted many geographers to reiterate that geography is nothing but maps. Moreover, they even transcended this notion and pointed out that unless potential spatial information that is represented on a map, it remains outside the scope of geography (Al-Gohary 1979, p. 10). There are different types of maps representing natural and human phenomena from geographical perspectives. The importance of maps has increased at the present time and geographical information became an urgent necessity for geographers and non-geographers alike. Hence, ancient maps spread among primitive peoples whose lives were based mainly on hunting. Their need to know directions and measure distances gave maps unprecedented importance. Examples of maps used by primitive communities are the maps of the inhabitants of the Marshall Islands, the maps of the Eskimos, the maps of the Aztec peoples in Mexico and the Inca peoples of Peru (Al-Gohary 1979, p. 38).

Maps in Ancient Civilizations and the Middle Ages:

These maps include the following:

1- **Babylonian Maps:** The oldest Babylonian map according to documented research, which represents Al-Futuh area was drawn by Sargon, King of Akkad in the year 2300 BC. The map was painted on a clay tablet (Muhammedin 1983, p. 52). The oldest city was drawn for Nefer/ Nippur, which was the cultural center of Sumer⁴, and it dates back to the first half of 2000 BC. The Jassur painting, which dates back to 3500 BC one of the oldest topographic maps (Al-Gohary 1979, p. 57).

2-**Ancient Egyptian Maps:** They are the first maps in the world to be drawn on the basis of conducting survey operations required for tax collection. The ancient Egyptians were interested in building cities, and they had ancient maps showing cities such as Tell el-Amarma, which dates back to about 2000 BC. (Alsayed Ghallab 1968 p. 566). Most of the Egyptian maps were subjected to annihilation because they were drawn on papyrus.

3-**Chinese Maps:** China's isolated location led to the emergence of Chinese maps at an early period. Chinese maps were created in order to estimate taxes on their agricultural lands. Technically and independent from any external impact, the Chinese maps reached a HIGH degree of progress and perfection (Al-Gohary 1979, p. 44). The oldest Chinese map dates back to 1137 BC. It is engraved on a stone slab showing the great wall of China and its extension across the Yellow River (Mohammedin 1981 p. 211). When the missionaries came

⁴ The Sumerian civilization is one of the well-known ancient civilizations in southern Mesopotamia, and its history is known from the clay tablets recorded in the cuneiform script. The name Sumer appeared at the beginning of the third millennium BC. In the period of the emergence of the Hittites, but the beginning of the Sumerians was in the sixth millennium BC.

to China in the sixteenth century AD, they found many maps, including the atlas of the Chinese Empire (Abdul Hakim and Al-Laithi 1979, p. 4).

4-Phoenician Maps: The Phoenicians were a marine nation. It was known that the Phoenicians produced few maps. They were afraid that their maps may fall into the hands of their enemies. It was mentioned in one of the Brazilian history documents that a map was found representing the mines that the Phoenicians invested in Brazil (Muhammedin 1983, p. 60).

5-Greek Maps: The Greeks are considered the first people who established the foundations of cartography. Their maps reached a great level of accuracy because the Greeks took advantage of the map-making information they received from Egypt and Babylon. Many Greek scholars were well-versed in the field of map-making including Homer (Alawi 1980, p. 22), Anaxmandar, Hecateus, Herodotus and Eratosthenes (Mohammedin 1983 p. 74-90). It can be said that Eratosthenes' map of the world was the most accurate map of his time.

6-Roman Maps: The Romans drew on the origins of Greek knowledge and reverted to the ancient idea of the Earth as a flat, round disk. The Romans drew a map of the world in the form of a circle with their empire in the middle, which included the coasts of the Mediterranean (Abdul Hakim and Al-Laithi 1979, p. 18). Despite the deterioration of map-making among the Romans, two prominent Roman scholars achieved great reputation: Strabo (Al-Gohary 1979, p. 53) and Ptolemy, who was considered the founder of cartography.

7-European Maps in the Middle Ages: These maps appeared between 200-1400 AD, a period of geographical darkness in

which the Church was the source of thought. In this period, the spherical TinO maps appeared, which excelled in showing holy places and the rectangular Cosmos map as well as the oval map of San Petos. The production of European maps increased between the eighth century and the middle of the fifteenth century AD, but these maps have no value from a cartographic point of view (Al-Sharnoubi, p. 29). It is worth noting that in the late fourteenth century AD, the second atlas following Ptolemy's Atlas including ⁵Portolan marine maps/ charts. The origin of these maps is shrouded in mystery and they were considered suitable for navigation in the Mediterranean. These maps depend on the compass system and lines of magnetic direction to help navigators determine their destinations (Aziz and Aswad 1972, p. 20).

8-Islamic Maps: The interest of the Arabs in geography in the pre- Islamic era was self-evident, as their lives depended on travel and roaming. They were obliged to learn how to travel in different paths and paths, therefore they drew maps of these roads and paths (Alawi 1980, p. 114). Whereas maps deteriorated in Europe during the Middle Ages, Muslims continued to make use of the ancient Greek cartographic heritage. In the period between the seventh and twelfth centuries AD, the Muslims excelled in map-making due to the following:

⁵ These maps were drawn in the 13th century and later expanded to include other regions, of the Mediterranean basin, noted for their high cartographic accuracy. The word portolan comes from the Italian word portulano, meaning "relating to ports or harbors", and defining at least a "set of sailing directions" since the 17th century.

- 1- The Islamic conquests that led to the expansion of the Muslim empire and thus the growing need to study the conditions of the newly conquered territories.
- 2- The necessity of locating the directions of Al-Qiblah⁶ during Muslim prayers in various parts of the Islamic world, therefore they became interested in astronomical and geographical studies.
- 3- The Hajj season, which gives Muslim pilgrims worldwide an opportunity to meet other Muslims and learn about the conditions of other countries.
- 4- The invention of some surveying devices such as the astrolabe to determine the degree of width of places.
- 5- The flourishing of trade and commercial exchange with other nations, which enabled Muslims to visit various destinations and write down their observations about foreign countries.
- 6- The growing interest in the translation of foreign texts, such as the translation of Ptolemy's Geography book.

Islamic maps passed through seven stages of developments as follows:

First: The Pre- Mamounia map stage:

There were references to cartography in the times of Al-Hajjaj ibn Yusuf Al Thaqafi (661-714 AD) and the Abbasid caliph Abu-Jaafar Al-Mansur (714-775 AD) but no maps were found. Ibn al-Faqih Al Hamathani, a Persian geographer who died in

⁶ According to the Islamic religious rituals, all Muslims from different destination during daily prayers (five times daily) must turn their faces in the direction of the holy Mosque in Mecca (Al-Qibla)

(951 AD) mentioned that Al-Hajjaj asked that the Shahrستان area, located in Iran, be depicted for him. When the Shahrستان delegation saw the drawing, they acknowledged that the picture delineated their region. This incident indicated that the Shahrستان or (Al-Daylam) map was at a good level of accuracy. In Mohamed ibn Jareer Al-Tabari's book, *History of Nations and Kings*, it was reported that Qutaybah ibn Muslim invaded Bukhara, a city in modern Uzbekistan, in the year 89 AH but he did not achieve victory. Therefore, he returned to Merv, a city in modern Turkmenistan, and Al-Hajjaj asked him to photograph it. Al-Tabari also mentioned the photographing of Al-Bataeh area in the Basra region (Al Tabari. University of Baghdad 1980 pp. 209-211).

Second: The Mamounia map stage:

The map constitutes the first picture of the Earth in the time of the Abbasid caliph, Al-Ma'moun, and it was made by a group of astronomers and mathematicians. On the map, the world was divided into seven regions according to latitude and longitude. The designers of this map depended on Greek maps, especially the map of Ptolemy.

However, the Mamounia map included new additions and corrections regarding the locations of the Arabian Peninsula and the Arabian Gulf (Mohammedin 1981 p. 191). Ignatyi Krachkovsky stated that this map represents an important geographical trace of the early Arab prosperity era, and that the information available from the map is correct (Krachkovsky 1957 pg. 86/87). The Mamounia map is characterized by the following:

1. The division of the world into seven regions with illustrations about each region and the cities it includes in addition to the distances between the seven regions in terms of longitude and latitude.
2. The map is superior to Greek maps in terms of the correctness of the information contained therein, and thus highlights the beginning of the independence of Arab and Islamic thought in drawing maps.
3. The map uses colors to clarify the information contained therein. Abu Al Hassan Al-Masudi (896-956 AD) mentioned that he saw this COLORED map, which depicts the world with its spheres, stars, land, sea, inhabited areas and nations, cities and other things. Al-Masudi argues that the Mamounia map is better than other maps presented by Ptolemy's geography (Al-Masudi 1938, p. 30/31) (Fig. 1).

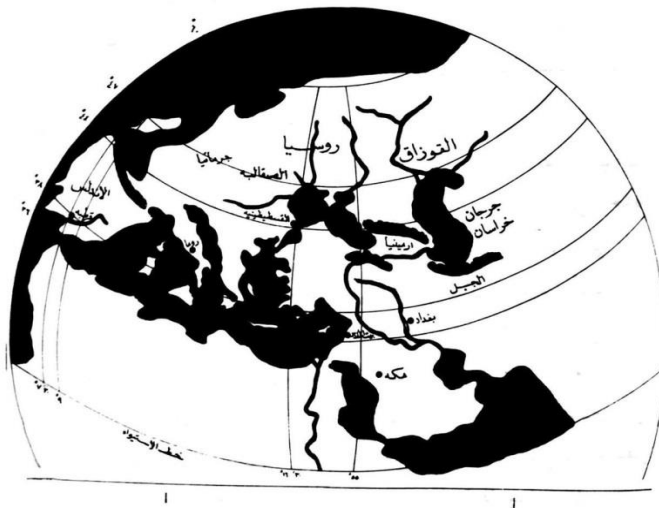


Figure 1: The Mamounia map

The Turkish historian Fuat Sezgin (1924-2018 AD) argues that during the reign of caliph Al-Ma'moun at the beginning of the

ninth century AD, more than 70 Muslim geographers made a journey that lasted several years, during which they toured in ships, on the backs of horses and elephants, in various parts of Africa, Europe and Asia. This scientific trip resulted in the development of a map of the world that is considered - for that time - of high accuracy, and is currently displayed by the German Frankfurt Institute after being transformed into an ingenious architectural diorama in the form of a globe (Fig. 2).



Figure 2: The gorgeous 9th century Mamounia map, developed and re-created by the German Frankfurt Institute. This is the map of the ancient world - amazing in its time due to its magnificent form. The map dates back to the reign of caliph Al-Ma'moun in the ninth century AD

Third: The stage of astronomical maps:

This stage constitutes the maps of Al-Khwarizmi (780-850 AD) and Al-Battani (858-929 AD), two Muslim astronomers. In the period between 836 and 847 AD, Al-Khwarizmi wrote a book titled (The Image of the Earth), supported with maps. The book consists of astronomical tables in the form of two columns

showing the geographical locations of 537 major places and destinations. The book also includes tables of 290 mountains in addition to the seas, islands and rivers in each region.

There are six differences between Ptolemy's geography and Al-Khwarizmi's image of the earth:

1. Al-Khwarizmi's latitude and longitude were based on letters, while Ptolemy's latitude and longitude were created on the basis of numbers.
2. Ptolemy divided the world into Europe, Asia and Africa, while Al-Khwarizmi followed the division of the earth into seven regions paralleling the equator.
3. Most of the cities, rivers, mountains, and lakes are still known by their names as mentioned by Al-Khwarizmi, while they are rarely identified in light of Ptolemy's map.
4. Ptolemy used conical projection, while Al-Khwarizmi advocated the cylindrical projection.
5. The information provided by Al-Khwarizmi is more accurate in terms of scientific accuracy. The current shapes of the Arabian (Persian) Gulf and the Nile River, for example, are closer to Al-Khwarizmi's accurate vision (Fig. 3).
6. Some historians claimed that Al-Khwarizmi's map was based on Ptolemy's geography, while others demonstrated that Al-Khwarizmi's approach independent and his map was drawn prior to the era of translation of Ptolemy's geography



Photo 1: A postage stamp issued in the Soviet Union on September 6, 1993, commemorating the approximately 1200th birthday of Al-Khwarizmi

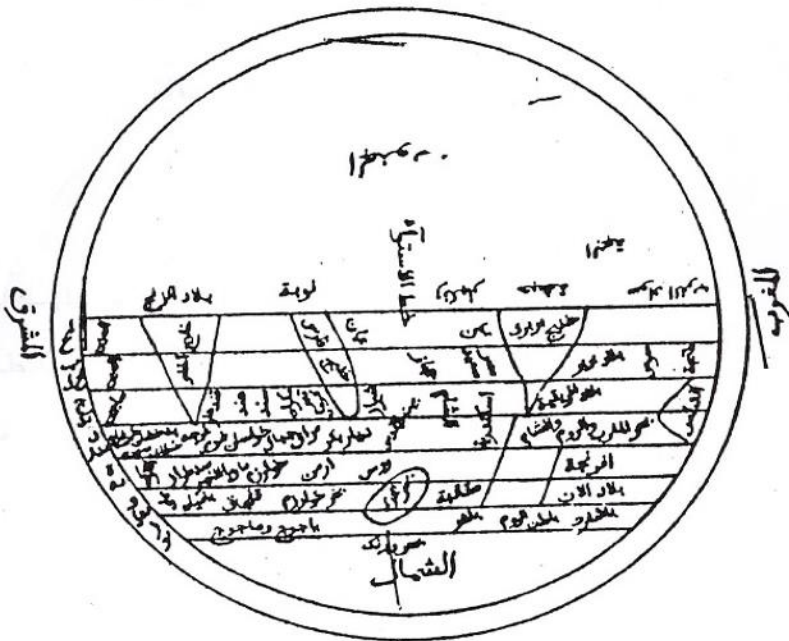


Figure 3: Al-Khwarizmi's map of the seven regions (Source: Al-Gohary, Geographical Thought...1979)

A map of Al-Khwarizmi drawing the River Nile is illustrated in figure 4 below (Fig. 4).

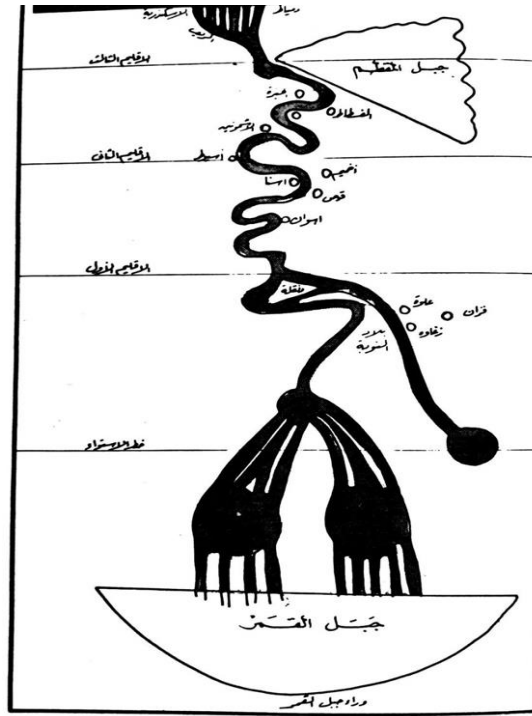


Figure 4: Al-Khwarizmi's map of the part of the Nile River (Source: Al-Shami. The Efforts of Muslims..... 1981)

As for Al-Battani, he drew a map of the world, which appeared after Ptolemy's map. In his map, Al-Battani depicted the world in a manner consistent with the latest astronomical studies in that period. Al-Battani's map was not a copy of Ptolemy's map due to some differences between them. Al-Battani's map was subjected to a revision process and some information in the map came under scrutiny during the period 877-918 AD (Al-Shami 1978, p. 160). Al-Battani map was characterized by the following:

- 1-The north direction was located at the bottom of the map following the practice of Muslim geographers.
- 2-Drwaing the Aral Lake and the Oxus and Amu Darya rivers that were neglected by Ptolemy.

- 3- Using the simple cylindrical projection in drawing.
4. Drawing the Indian Sea as an open landscape, while Ptolemy painted it as a closed lake.
5. Dividing the globe into three main continents.
6. Drawing the Caspian Sea and making it connected to the ocean (Fig. 5)

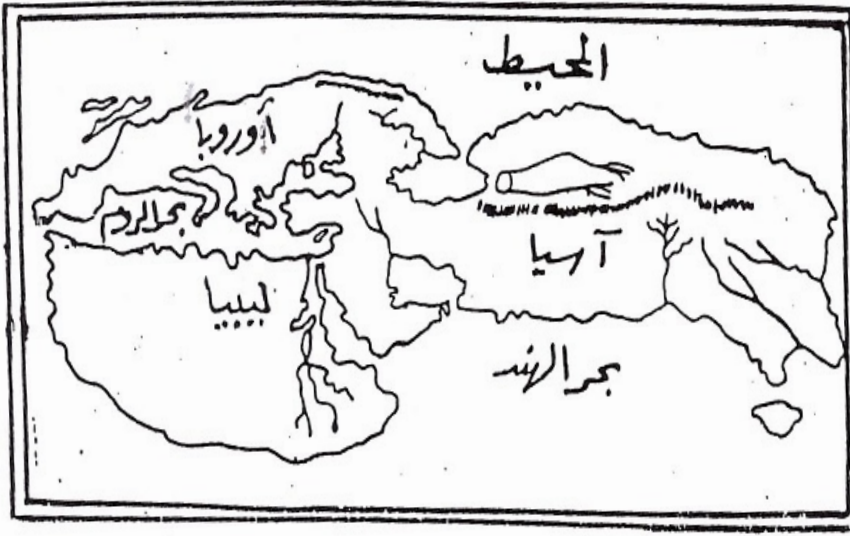


Figure 5: Al-Battani's world map (Source: Salah Al-Din Al-Shami. Islam and Arab Geographical Thought, 1978)

Fourth: The stage of regional maps:

These are the maps that appeared in the era of Islamic creativity in the tenth century AD. This stage is represented by the authors of books about different kingdoms that include the branches of descriptive and regional geography and related creative approaches in mapping. The most important scholars representing this stage are Al-Jihani, Al-Balkhi, Al-Istakhri, Ibn Hawqal, Al-Maqdisi, and Al-Masudi. The following is a

description of the most important achievements of these scholars in geography in general and in maps in particular.

(1) Al-Jihani- died in 1000 AD:

He authored a book titled (Paths in Knowing Kingdoms), where he drew a map of the world, which differed from the Greek and Persian maps. He placed the map in a circle surrounded by the part of the Pacific Ocean covering Oceania, and the map was devoid of longitude and latitude (Fig. 6). Al-Jihani divided the world into seven regions. He also drew individual maps of other Islamic regions such as the Arabian Peninsula and Iraq (Fig. 7, 8) in addition to a map of the Indian Ocean (Fig. 9) (Mohammedin 1981 p. 215). In his maps, Al-Jihani did not place the south at the top of the map, as done by other Muslim geographers.

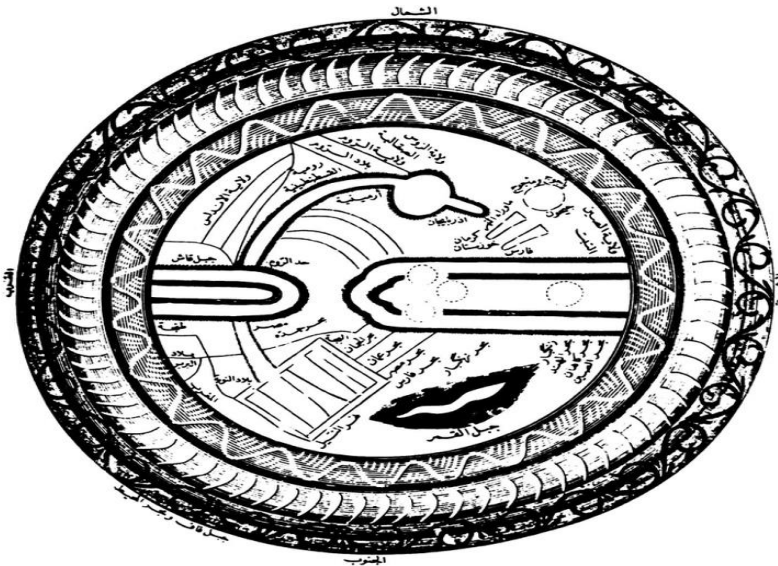


Figure 6: Al-Jihani's globe map (Source: Muhammadin. Islamic Geographical Heritage 1981)

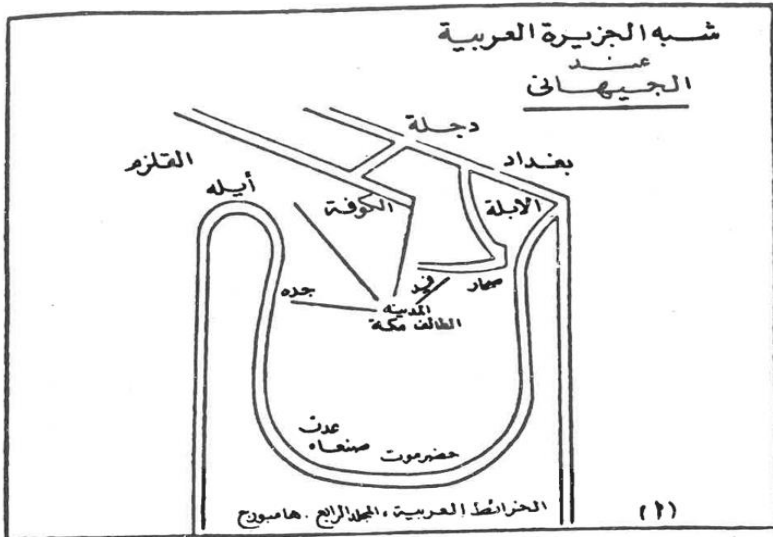


Figure 7 on the right: Map of the Arabian Peninsula by Al-Jihani

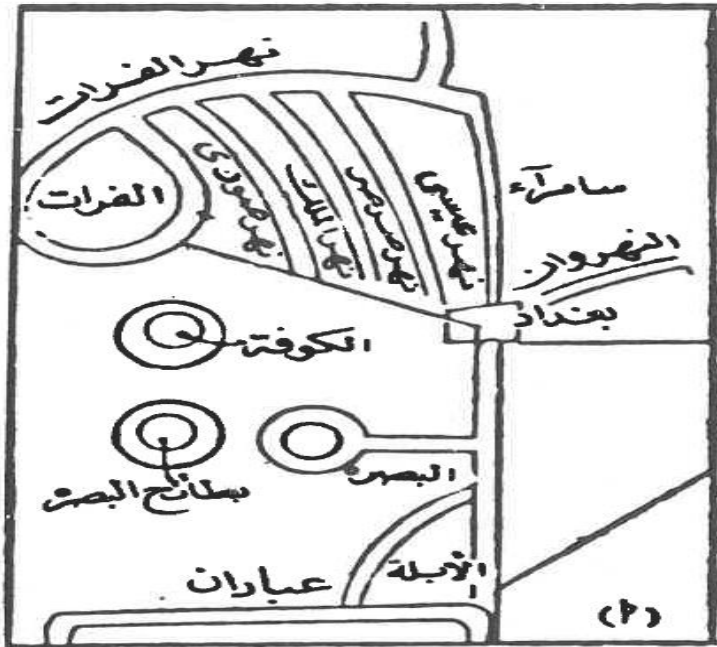


Figure 8 on the left: Map of Iraq by Al-Jihani

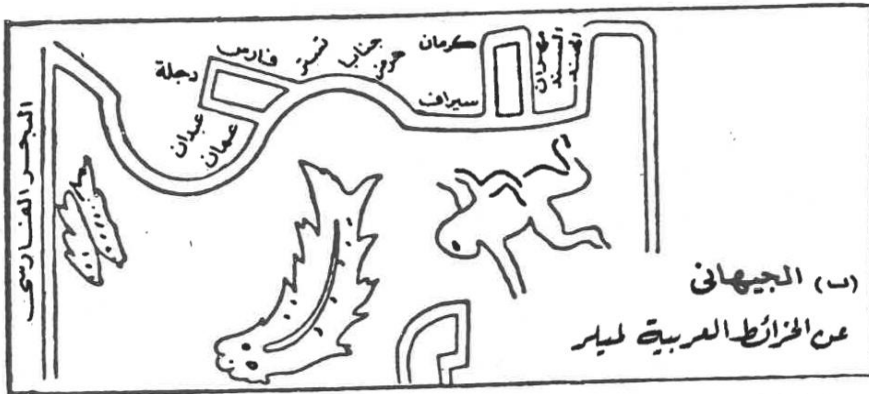


Figure 9: Map of the Indian Ocean by Al-Jihani (Source: Alawi. Arab Geography 1980)

(2) Al-Balkhi -died in 934/AD:

He wrote a book titled (The Image of Provinces). In fact, the maps attributed to Al-Balkhi are very similar to Al-Jihani's map of the world (Fig. 10).

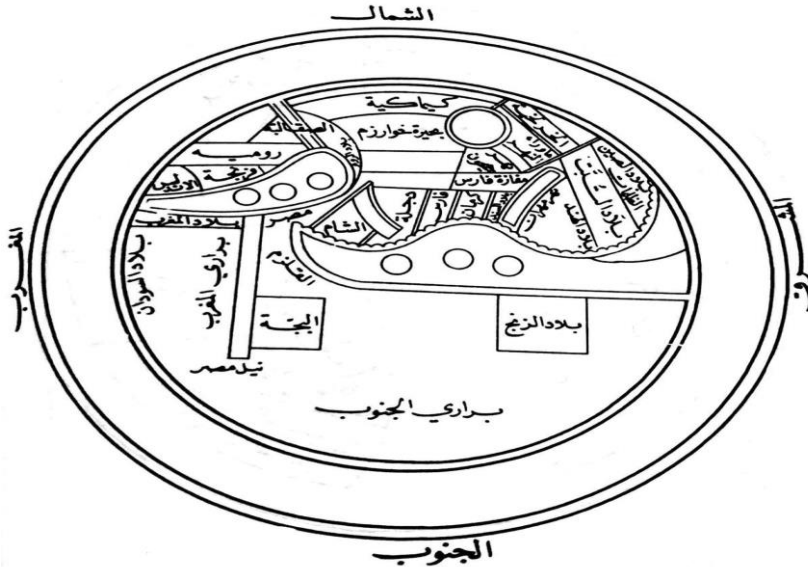


Figure 10: Balkhi's World Map (Source: Muhammadin. Islamic Geographical Heritage 1981)

Al-Balkhi drew another set of maps of the Islamic world, as well as his geography text, which describes the various countries and divides them according to climatic zones (Fig. 11) (Alawi 1980, p. 87).

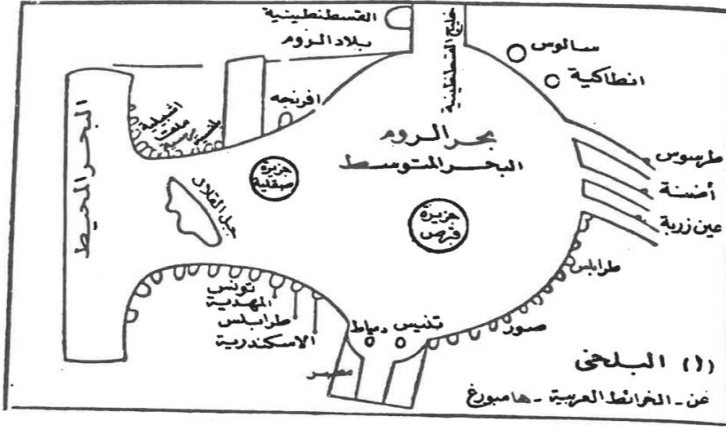


Figure 11: Al-Balkhi's Map of the Mediterranean Sea (Source: Alawi, Arab Geography 1980)

(3) Al-Istakhri-died in 957/AD:

He wrote a book titled (The Paths of kingdoms/ Masalek Al-Mamalek). He drew 21 maps, the first of which was a map of the world showing all the regions in miniature (Fig. 12).

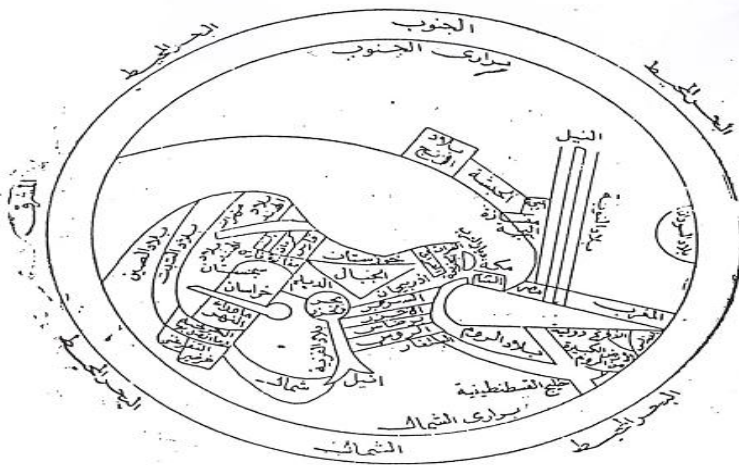


Figure 12: Map of the world by Al-Istikhri (Source: Muhammadin. Islamic Geographical Heritage, 1981)

Then Al-Istikhri drew the rest of the maps for each of the Islamic regions. For example, he drew Iraq from Tikrit in the north to the Arabian Gulf, and he drew Egypt from the Roman Sea (The Mediterranean) in the north to Nubia in the south (Fig. 13, 14).

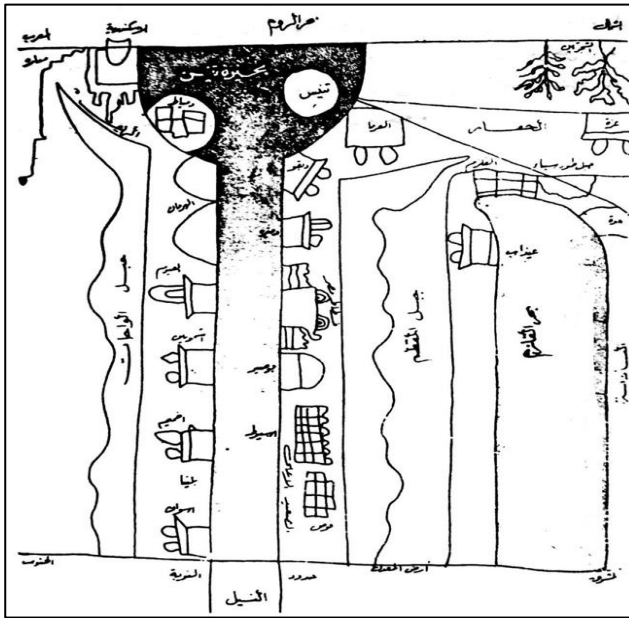


Figure 13 on the right: Map of Iraq by Al-Istikhri. (Source: Muhammedin. Geographical Heritage.....1981).

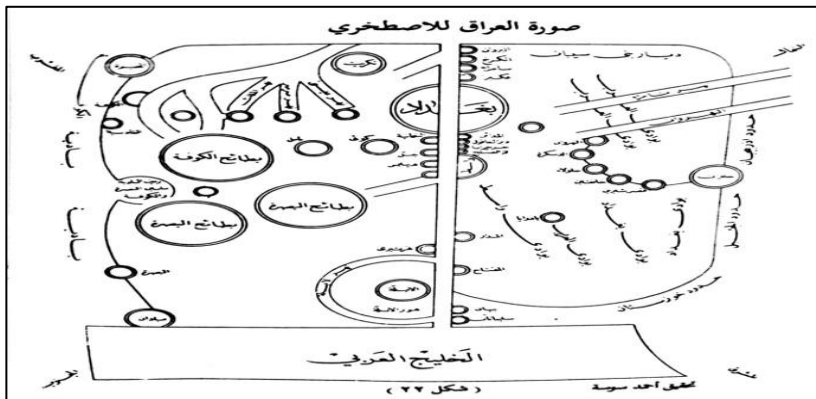


Figure 14 on the left: Map of Egypt by Al-Istikhri. (Source: Kamal. The Kemalist Group.....)

Al-Istakhri mentioned in his book (The Paths of kingdoms/ Masalek Al-Mamalek) the following: “Then I singled out for each region of the Islamic countries a picture in which I showed the shape of that region and the cities located in it. I mentioned twenty provinces as follows”: Diyar Al-Arab, 2- Sea of Persia, 3- Morocco, 4- Egypt, 5- The Levant, 6- Bahr Al-Rum, (**The Mediterranean**) 7- Euphrates Island between the Tigris and Euphrates rivers (that is, the northern half of Iraq), 8- Iraq, 9- Khuzestan (Arabistan), 10- Persia, 11- Kerman, 12- the countries of Sindh and India, 13- Armenia and Azerbaijan, 14- the mountains, 15- Shahrstan /Al-Daylam, 16- the Caspian Sea, 17- the border between Persia and Khorasan, 18- Sajistan, 19- Khorasan 20 - Beyond the River (Oxus). (Khasbak 1984 p. 168).

The maps of Al-Istakhri were characterized by the following:

1. He did not use a drawing scale, yet his maps maintained correct directions and appropriate proportions and dimensions between cities.
2. As for the world map, he kept the tradition of placing the south at the top of the map advocated by other Muslim geographers.
3. He used colors in his maps. Rivers, for example, were painted in dark brown.
4. Cities are drawn in different shapes in the forms of circles or rectangles.

5. These maps differ in terms of their quality and degree of comprehensiveness from one region to another (University of Baghdad 1980, p. 218).

Ibn Hawqal-died in 977/ AD:

He authored a book titled (The Image of the Earth) (Ibn Hawqal - sine anno, p. 15). He also drew 22 maps, including the map of the world, and the rest of the maps covered Islamic regions (fig. 15, 16, 17).

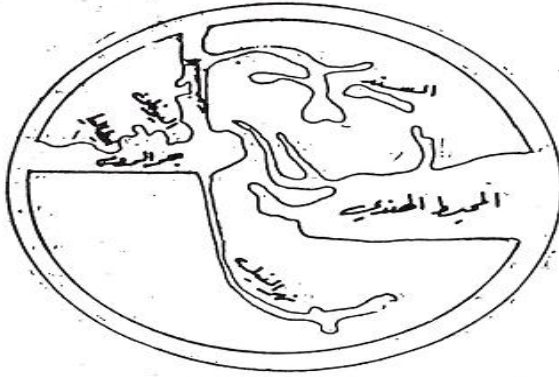


Figure 15: Ibn Hawqal's world map (Source: Al-Gohary. Arab Geography 1979)

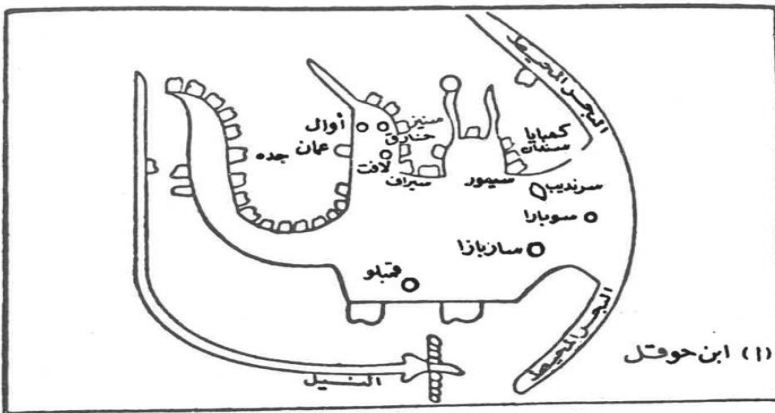


Figure 16 on the right: Map of the Indian Ocean by Ibn Hawqal

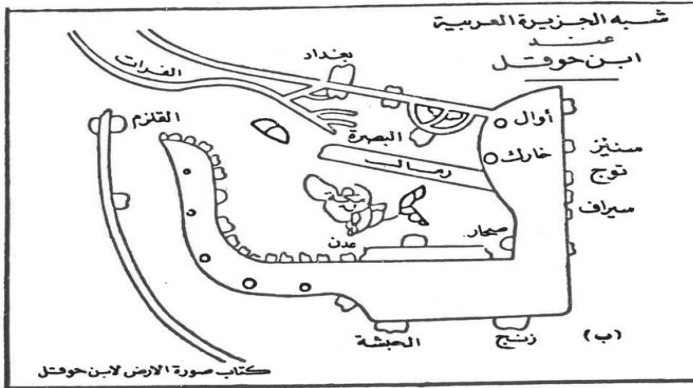


Figure 17 on the left: Map of the Arabian Peninsula by Ibn Hawqal

The maps of Ibn Hawqal and Al-Istakhri's maps were similar because they met with each other and Ibn Hawqal learned about Al-Istakhri's maps and modified them, which made the maps of the former (Ibn Hawqal) surpass the maps of the latter (Al-Istakhri) in quality, details and accuracy particularly the map of Egypt (Fig. 18).

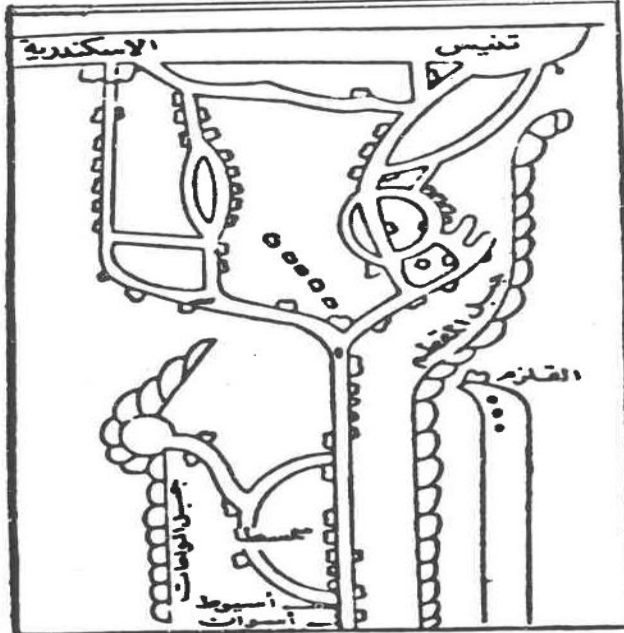


Figure 18: Map of Egypt by Ibn Hawqal. (Source: Alawi. Arab Geography 1980)

Abu Al-Fida stated that he had read Ibn Hawqal's book (The Image of the Earth) and found it reflective of the characteristics of the country. However, Ibn Hawqal did not specify the names of places and did not mention the lengths and widths of regions, therefore, many destinations were mentioned without known names or locations. The reason for this error was that he did not, like Ptolemy, use longitude and latitude in dividing the world into regions. Rather, he relied on describing the different types of climate and the regions on the surface of the earth that fall within the domain of Muslim countries and each region was provided with a special map (Al-Gohary 1979, p. 73).

(4) Al-Maqdisi-died in 1000 AD:

He wrote a book titled (The best divisions in the knowledge of regions). He drew 18 maps, 14 of them for Islamic provinces, two maps of the seas (the Indian Ocean and the Mediterranean Sea) and two maps of the desert (Fig. 19, 20).

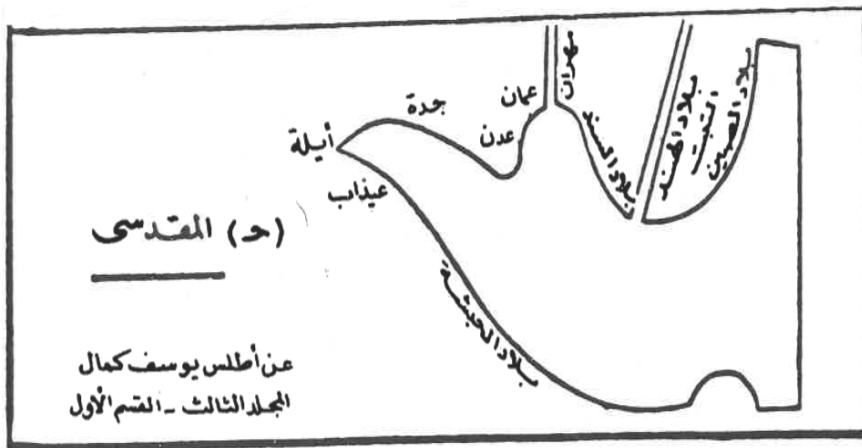


Figure 19: Map of the Mediterranean Sea by Al-Maqdisi

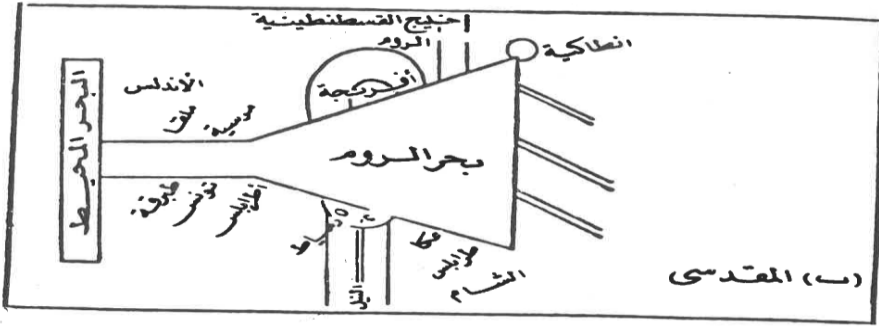


Figure 20: Map of the Indian Ocean by Al-Maqqisi

Al-Maqqisi maps out the regions of the Arab world, such as Iraq, the Levant, and Egypt, in separation from the regions of the Persians, such as Persia and Sindh (fig. 21, 22). Colors were used in the maps to illustrate natural features. He did not mention that he painted a complete picture of the Earth. The following lines were mentioned in his book, (The Best Divisions in Knowledge of Regions): “We have made clear the paths because the need for them was greater, and we have illustrated the regions because knowledge of them was more expansive” (Khasbak 1404 AH / 1984 p. 168).

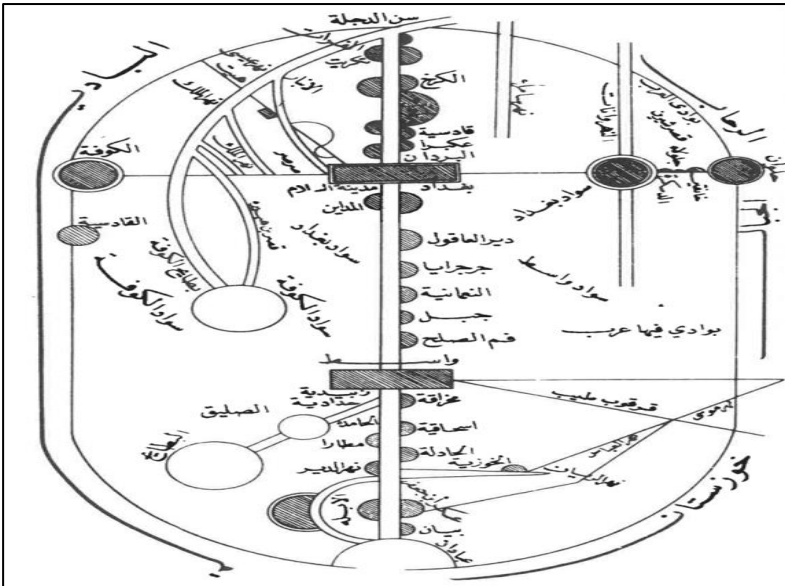


Figure 21 on the right: Map of Iraq by Al-Maqqisi

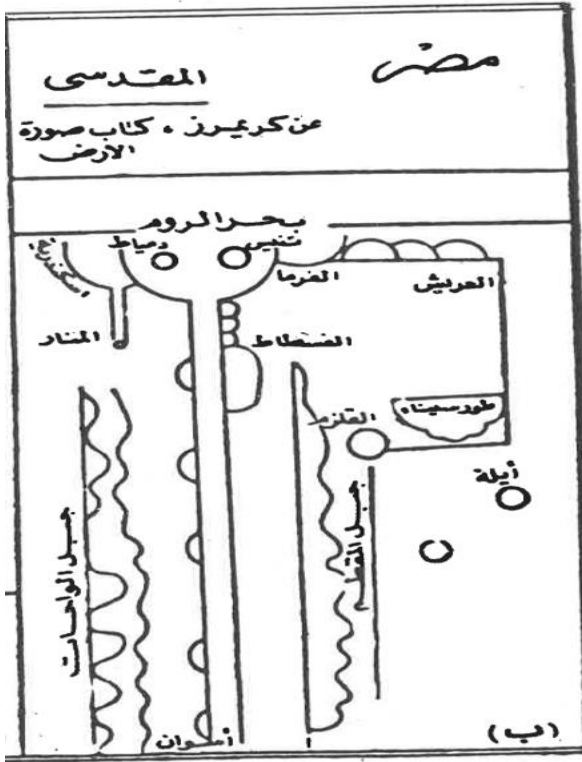


Figure 22 on the left: Map of Egypt by Al-Maqdisi
(Source: Alawi. Arab Geography 1980)

(5) Al-Masudi-died in 957 /AD:

He authored a book titled (Meadows of Gold and Minerals of the Essence) and drew a map of the world, which was considered one of his most important works at that time. This map was one of the most accurate Arab maps that appeared in Al-Masudi's era. He placed the southern direction at the top of this map. Al-Masudi's work gained significance because he described Islamic and non-Islamic countries in his map. Two main lines appeared on his map: The first line was the equator and he drew the equator as passing through the island of Ceylon (known as the island of Sri Lanka today) and the second was the Aryans line associated with a city on the island of Zanzibar,

where it was believed that the zero longitude line passed through it (Fig. 23) (Al-Gohary 1979 p. 112).

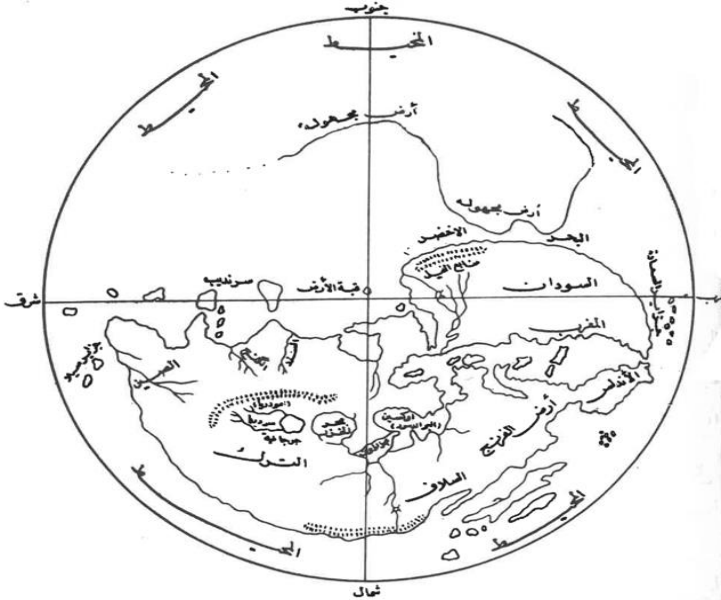


Figure 23: Al-Masudi's map of the world. (Source: Al-Gohary. Geographical Thought and Geographical Discoveries 1979)

It can be argued that the most important characteristics of the maps of this period are as follows:

1. These pictures and drawings have nothing to do with astronomical maps, because they study each region separately, and it is not possible to combine them together to form a single map because they were created as guides and manuals for travelers.
2. These maps depicted the world as a round disk surrounded by water, with several water bodies penetrating it from the east: the Arabian Gulf, the Arabian Sea, and the Red Sea, and from the west the Mediterranean Sea.
3. The eastern part of the Islamic world was presented in more details than the western part (Table 1). This can be explained by the fact that two of the geographical pioneers at that time,

Al-Balkhi and Al-Istakhri, were from Persia, where extensive information was available to them and they impacted who came after them (Muhammadin 1981 p. 198).

4. These maps, which were called the "Atlas of Islam", are devoid of longitudes and latitudes, and the seas, islands, and cities were drawn geometrically in the form of circles, while the transportation routes are drawn in the form of straight lines.
5. The maps of this stage were concerned with representing geographical facts with pictures at the expense of accuracy. Therefore, they came closer to schematic drawings than to real maps (University of Baghdad 1980, p. 222).

number	Name of the map
١١	Earth image
١٢	Arab land
١٥	The Persian Sea and the Arabian Desert
١٢	Morocco
١٣	Egypt
١٠	Syria
١٣	Mediterranean Sea (Bahr al-Rum)
١٣	The Peninsula
١٤	Iraq
٤	Khuzestan
١٣	Persia
١٤	Kerman
١٤	Sindh
١٣	Azerbaijan
١٥	The mountains
١٣	Tabaristan
١٤	Caspian Sea (Khazars)
١٣	The desert
١٢	Sjistan
١٤	Khorasan
١٣	Beyond the Oxus river
٢٧٥	Total

Table 1: Maps of Regional Phase

Fifthly: Al-Idrisi's map stage:

Al-Idrisi was one of the Arab geographers who lived in the 12th century AD, and he was one of the most famous Muslim map makers. Al-Idrisi represented a new stage in the development of

maps. He drew maps on models. For example, he made a model of the globe on which he showed the seven regions according to the climatic division determined by latitudes. Al-Idrisi also made a map on a silver tablet and prepared seventy maps of the sub- regions included in the division of the provinces. This task was accomplished at the court of Roger II, King of Sicily around the year 1154 AD, and Al-Idrisi included it in his book *Nuzhat al-Mushtaq fi Ekhteraq al-Afaq / The Picnic of the homesick in breaking through the horizons*” (Al-Gohary 1979, p. 57).

Al-Idrisi also wrote a detailed book about the world (*Jenan Al-Ensam wa Aja'eb AlNafs/ The Human Paradise and the Wonders of the Self*). In the year 1161 /AD, he presented the book in addition to an atlas of 73 maps to William II, son of Roger. It is worth noting that the map of the world, drawn by Al-Idrisi, on a silver sheet called the demarcation tablet placed the southern direction at the top, and the continents were not shown by their names. Al-Idrisi divided the world into seven transverse regions, and then divided each region into ten divisions. The equator appeared at the top of the map, defining the known world at that time (Fig. 24, 25).



Figure 24: Al-Idrisi's world map, showing the south at the top
(Source: Al-Gohary. Practical Geography 1979)



Figure 25: Al-Idrisi's world map showing the north at the top.
(Source: Al-Bashir. Geography among the Arabs ... 1984)

In the world map of Al-Masudi, we find that the polar region is not inhabited because of the freezing climate. In the same map, the south of the equator is not inhabited as well because of the severity of the heat. In addition, Al-Masudi mentioned the most important natural manifestations in each region, then presented the customs, habits and conduct of the population, and the myths, which were proliferated in the regions (Muhammedin 1981, p. 199).

The most important features of Al-Idrisi's map are the following:

- 1-If all parts of the map joined together, they will form a global rectangular map in contrast to the atlas of Islam.
2. The set of maps representing North Africa, Spain, Sicily, and some parts of Italy are more accurate than the rest of the maps, due to the fact that their data was based on personal observation.
3. Al Idrisi's maps adhered to the drawing scale and determine the positions of longitudes and latitudes, and reflected the true form of each region. Therefore, Al Idrisi's maps were considered the top of Islamic cartography.
4. The lines of longitude and latitude were drawn on the seas and oceans only, and not on the land.
5. Al-Idrisi used colors in his maps, therefore, the seas appeared in blue and the rivers in green, while cities were painted in circles.
6. The geographical works of Al-Idrisi were considered the greatest Arab cartography in the Middle Ages, as they served as a point of contact between the Islamic and Christian civilizations.

Sixth: Marine maps:

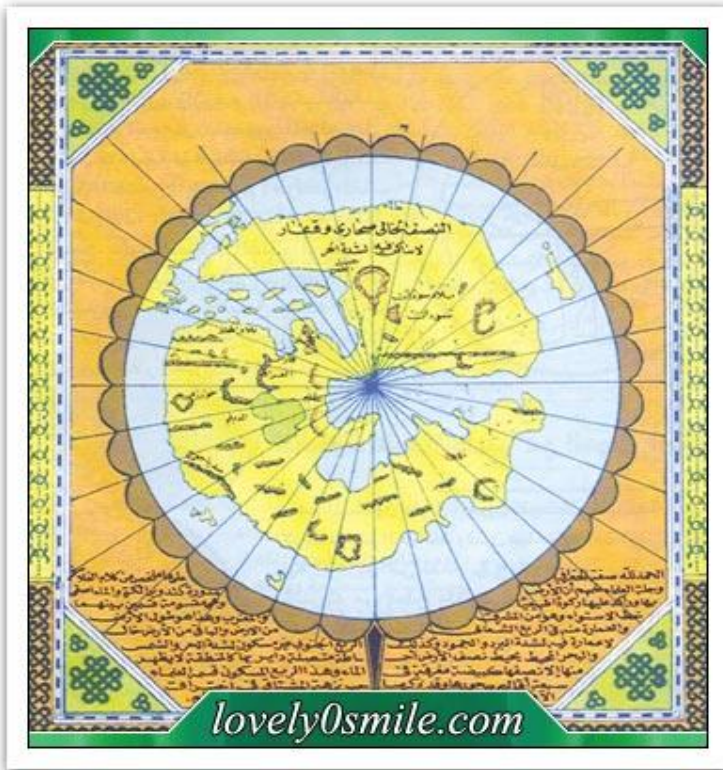
Muslims knew this type of maps by virtue of their trade activity between the Arabian Peninsula and the coasts of India or with the eastern coast of Africa. For example, when Vasco da Gama sought the help of the Arab navigator Ahmed bin Majid, he found with him a marine map -punctuated with lines of longitude and latitude - showing the coasts of India (Fig. 26). Al-Idrisi used the Arab maritime maps that focused on the coasts and neglected the internal details, as was the case with the maps that showed the areas surrounding the Black Sea and the Mediterranean.



Figure 26: Map of the Indian Sea by Ahmed bin Majid. (Source: Al-Sammak. Islamic Marine..... 2013)

The oldest known Islamic marine charts consisted of three sheets of maps drawing the Mediterranean. According to

Moroccan sources, these maps were painted in the western part of North Africa. It is possible that these maps dated back to the fourteenth century AD and that the maps were of Italian origin in terms of drawing and coastal planning. Because it retained Arabic names, it must have been based on an Arabic map (Muhammedin 1981, p. 203). Examples of Muslim marine maps included in the atlas drawn up by Ali bin Ahmed Al-Safaqsi in 1551 AD were maps of the coasts of the Mediterranean, the Black Sea, and the Sea of Azov, which served navigation in these seas and other water bodies, as well as a map titled (Description of the Land) drawn by Al-Safaqsi who died in 958 AH (Fig. 27).



(Fig. 27): The map- (Description of the Land) - drawn by Al-Safaqsi. (Source: Al-Maghlouth. Map's industry through History. Lovely Smile 1427 A.H.)

Seventh: Religious Maps:

They are detailed maps portraying limited areas of religious nature. For example, some religious maps are maps that show the direction of Al-Qibla (The direction Muslims take during prayers) with regard of the countries of the world. Other religious maps delineated Al-Kaaba⁷ and its vicinity, or Al-Aqsa Mosque in Jerusalem. Among the most prominent people who addressed the topic of religious maps were:

(1) Abu-Obaid Al-Bakri (1040-1094 AD:

Al-Bakri lived in the fourth century AH, and he drew an illustrative map of Al-Aqsa Mosque showing its mihrabs/arches, domes, minarets and doors (Fig. 28).

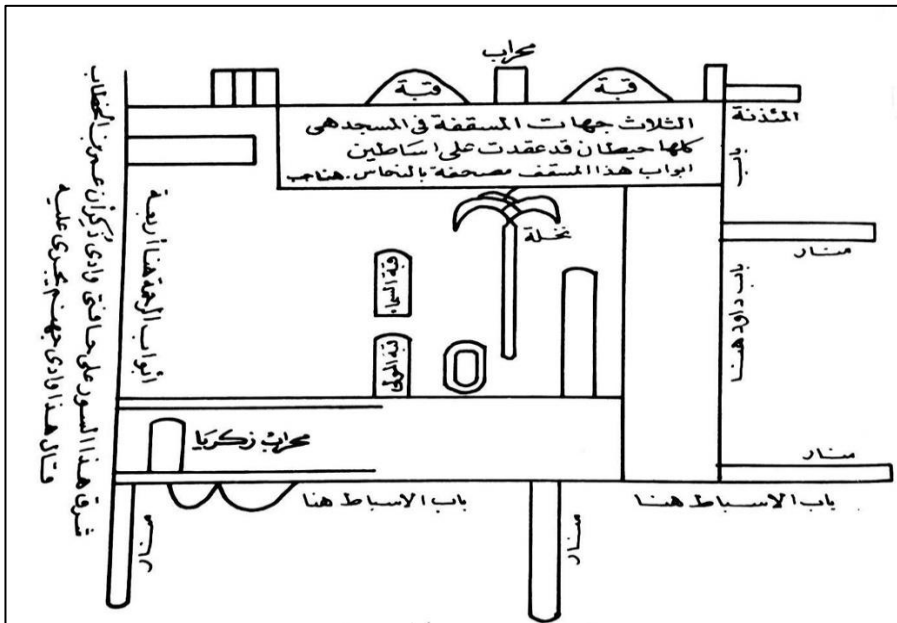


Figure 28: Al-Aqsa Mosque as drawn by Al-Bakri. (Source: (Al-Shami. The Efforts of Muslims Geographers1981)

⁷ It is a building at the center of Islam's most important mosque, the Masjid al-Haram in Mecca, Saudi Arabia.

(2) Ibn Almojawer Al-Demeshqi (601-690 AH):

He wrote a book entitled "Descriptions of Yemen, Mecca and Some of the Hijaz Lands", where he spoke about Mecca and identified the locations of Al-Kaaba and Al-Haram /the Grand Mosque of Mecca. He also identified some of the doors and the destinations he reached, and identified some of the famous paths and mountains around Al-Haram/ the Grand Mosque of Mecca. (Fig. 29) (Al-Shami 1981 pp. 27-53).

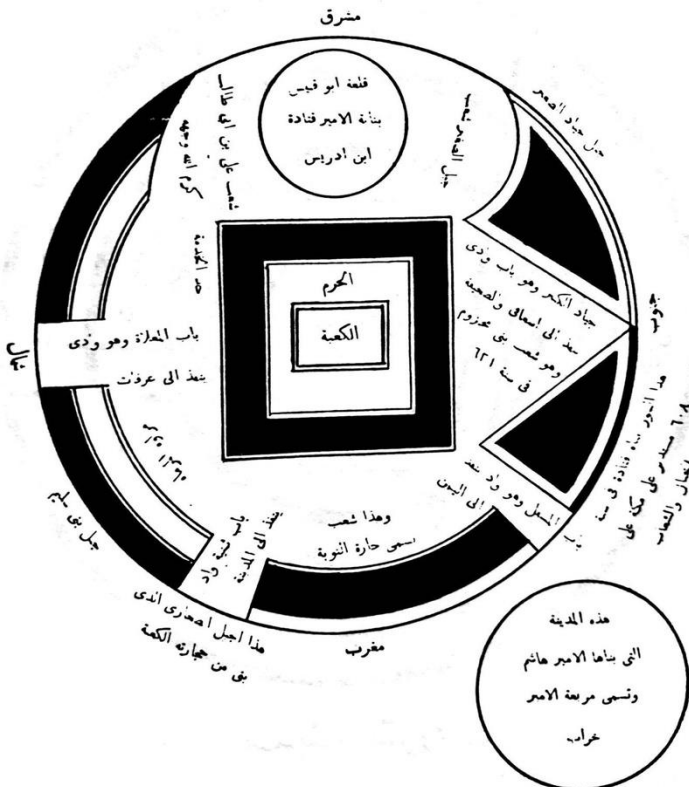


Figure 29: Map of Mecca by Ibn Almojawer Al-Demeshqi. (Source: Al-Shami. The Efforts of Muslim Geographers..... 1981)

(3) Ibn Al-Wardi- died in 861 /AH:

He wrote a book titled "Khuridat Al-Ajaa'ib and Faridat Al-Ghara'eb/ The Treasure of Wonders and the Uniqueness of Oddities". In this book, Ibn Al-Wardi included a map showing the direction of Al-Qiblah for all the countries worldwide and placed the Grand Mosque of Mecca and the Kaaba at the center of the circle. Then he identified the different regions of the Muslim world. In the map, Ibn Al-Wardi placed the Levant in the northeast corner and Morocco in the northwest corner. He placed Iraq in the southeast corner and Yemen in the southwest corner (Fig. 30) (Muhammedin 1981 p. 205).

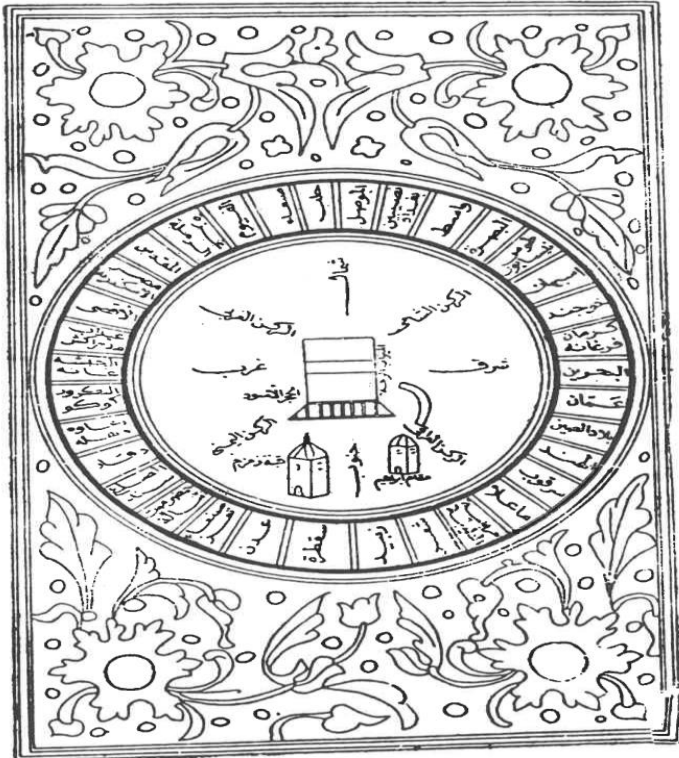


Figure 30: Map of the direction of A-Qibla with regard to the countries of the world by Ibn Al-Wardi. (Source: Muhammedin, Islamic Geographical Heritage 1981)

Conclusion

In light of the above-mentioned discussions on Islamic maps in the Middle Ages, the following results are reached:

- 1) On these maps, the direction of the south was placed at the top of each map. Positioning the south at the top of the map had religious significance because Islamic capital cities at that time were located to north of Mecca, and the Muslim caliph during prayers turned his face toward the south, therefore, the southern direction was placed at the top of the map.
- 2) Many Islamic maps used colors to illustrate and draw phenomena.
- 3) Makers of Islamic maps did not use a fixed drawing scale, but maps were drawn according to available geographical data.
- 4) Islamic maps were characterized by geometric lines: Rivers were represented by two parallel lines, cities were represented by circles, and roads were represented by straight lines. The use of geometric lines was an evidence of the extent of accuracy that Muslims sought in drawing their maps.
- 5) Some Islamic maps were lost due to the invasions and wars that took place at different times.
- 6) Unlike European maps in the Middle Ages, Islamic maps did not contain images of animals or angels.
- 7) Muslims benefited in their map-making and cartography from the information gained from the translation of Greek and Roman geography books.
- 8) Islamic expansions increased the number of regions and provinces under the Islamic Empire. Accordingly, Islamic

- maps included a growing number of descriptions of the new parts of the world annexed by Muslims.
- 9) The development and expansion of trade among Islamic provinces contributed to the diversity of maps.
 - 10) During the Hajj /pilgrimage season, Muslims from all parts of the Empire met together in Mecca and described their own cities and regions. These descriptions contributed to the representations of these places on maps.
 - 11) Islamic maps are considered the nucleus of modern maps in terms of longitude and latitude and the use of colors and drawing scale.
 - 12) The persistence and dominance of the idea of a spherical Earth among Muslim geographers contributed to the correct display of the maps.
 - 13) The invention of geographical devices by Muslims contributed to the accuracy of Islamic maps.

Finally, the emergence of maps in general coincided with scientific developments in different civilizations. Nevertheless, map-making was subjected to some drawbacks during eras of deterioration. Regardless of periods of civilizational decline, Islamic maps re-emerged in better shapes at the hands of Islamic pioneers mentioned in this paper.

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