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AHMAD NAZMI

"Al-Ḫāriṭa al-Ma'mūniyya". The Islamic World Map of Al-Ma'mūn and the Islamic Cartography

Recent scholars maintain that, the Arabs in early time of the Umayyad reign had prepared some of local maps for their political, military and administrative requirements. According to S. Maqbul Ahmad, the first mention of a map in Arabic geographical literature appeared in the second century of Islam[1]. A map of Daylam region in Persia south of the Caspian Sea, and a map for the city of Buḫāra were prepared for Al-Ḥaǧǧāǧ the Umayyad governor of the eastern part of the Caliphate[2]. Ibn al-Faqīh used the word *ṣūra* (picture or drawing) when he was talking about the map of the Daylam.

Intuitively, the Muslim geographers perceived the importance of the map as a means for the illustration of geographical data gathered in their book. In this respect, one of the earliest works in geography wrote by Al-Ḫūwārizmī bears the title *Ṣurat al-arḍ* (The picture of the world). The book also contains a few maps, which are considered as the first maps in Islamic geography. The author pays attention to this aspect by adding this collection of such maps to his work. According to a recent scholar, there is a little doubt that a single world map must have originally accompanied this work[3]. But as we mentioned above there are other regional maps such as that of the river Nile, Indian Ocean, and Azov Sea and a last map of Ǧazirat al-Ǧawhar (the isle of Jewels) have survived. However, there is an assumption that those four maps seem to be later interpolated as a recension to the work[4]. Another scholar maintains that although there is no world map in the work of Al-Ḫūwārizmī, the indications of longitudes and latitudes furnish all the material for designing one[5].

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[1] S. Maqbul Aḥmad, article: *Kharīṭa*, E.I., new edition, vol. II.

[2] Ibn al-Faqīh, *Kitāb al-buldān*, edited by M.J. de Goeje, Bril, Leyden 1885, p. 283. Aṭ-Ṭabarī, *Tārīḫ ar-rusul wa-al-mulūk*, ed. by Muḥammad Abū al-Faḍl Ibrāhīm, Dār al-Ma'ārif, Cairo 1979, vol. IV, p. 236.

[3] S. Maqbul Ahmad, op. cit.

[4] Al-Ḫūwārizmī, *Kitāb ṣurat al-arḍ*, ed. by Hans von Mžik, Tab. No 1–4.

[5] J.H. Kramers, article: *Djughrāfyā*, *Enzyklopaedie des Islām*, Leipzig 1913–1938.

According to Gerald R. Tebbetts, Islamic cartography had two existing cartographic systems on which they could base their work. The first was of Greek origin, derived from Marinus; the second system was that of the Al-Balḫī School, which originated in the tenth century. It seems that Al-Balḫī drew the first Islamic Atlas, which attached to his book, the original manuscript of which was never available. The origins of this second system are obscure. Tebbetts simply maintains that one get impression that this whole system produced independently as reaction against work depends on Greek and other foreign agencies[6].

Another category of particular importance in this Atlas could be finding in some detail that deals with the political division of the world. In these world maps, such as the map of of Al-Iṣṭaḫrī and Ibn Ḥawqal, where arbitrary boundaries of the provinces of the Islamic world, as well those of the non-Islamic regions, are drawn so as to convey an overall picture of the political and the ethnographic divisions of the world[7].

Undoubtedly, the idea of the circle model of the world map is of Greek origin[8]. To the first system Al-Mas'ūdī states that he has seen the World Map of Marinus in his work *Ğugrāfyā* depicted in many colours. In this map the inhabited and uninhabited quarters of the earth, in addition to the seas, rivers and the seven climes are depicted[9]. It is quite clear that Muslim geography since the third century reflects knowledge mainly derived from Marinus and Ptolemy. Obviously, Arabic cartography is more or less linked with the name of Ptolemy and it preserved the works of this geographer up to the end of the middle Ages.

Other activities came into existence during the eighth century and affected the work of Islamic geography and cartography was the independent Islamic scientific research achieved by the working team of Bayt al-Ḥikma. This activities could be rather considered as third system or could be called Al-Ma'mūn School of geography and cartography.

The Epoch of Al-Ma'mūn

The epoch of Al-Ma'mūn (813–833) constitutes the most glorious age of Muslim Caliphate. The twenty years of his reign had left enduring monuments of the intellectual development of the Muslims in all directions of thought. The translation movement grew in scope under this Caliph, the great bulk of the translations were of Greek origin, particularly in philosophy, medicine, mathematics, astronomy and geography. Muslim sources speak

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[6] Gerald R. Tebbetts, *Later Cartographic Developments* in: *The History of Cartography*, ed. by J.P. Harley and D. Woodward, The University of Chicago Press 1984, p. 137.

[7] See the world maps of Al-Iṣṭaḫrī, *Al-Masālik wa-al-mamālik*, ed. by M. Al-Ḥīnī, Dār al-Qalam, Cairo 1961 and Ibn Ḥawqal, *Ṣūrat al-arḍ*, edited by J.H. Kramers, E.J. Brill, Leyden 1938, vol. I.

[8] Al-Mas'ūdī, *At-Tanbīh wa-al-išrāf*, edited by Baron Rosen, reprint, Maktabat al-Ḥayāt, Bayrūt 1965, p. 30.

[9] Op. cit., pp. 33, 127.

about the delegations sent by the Caliph al-Ma'mūn to the Byzantine Empire to acquire books in various kind of sciences[10]. The achievements of Muslim scholars during that time were not restricted to any particular branch of science, but ranged over the whole course of the domain of intellect. Mathematics, astronomy and geography were among the sciences, which abundantly reached the Caliphate during this time[11].

Under the rule of Al-Ma'mūn, the liberality towards non-Muslims and other groups of thinkers was large-hearted and exemplary[12]. During his reign there appeared a group of eminent learned men and theologians who dealt with the origins of religion and doctrines, adopted liberal views in research by the study of Greek philosophy. Al-Ma'mūn himself was inclined to adopt the Mu'tazilite doctrine due to its more liberal and rationalistic views. Therefore, he attracted the followers of this group, who stood high in his favour and exercised great authority in his court at Bagdād, where he keenly was interested in holding meetings and allowed debates in various subjects[13].

According to R. Levy, Al-Ma'mūn applied himself vigorously, during the last four years of his reign, to the task of secularizing the state, and of emancipating the human intellect from the shackles which doctors and jurists were beginning to place upon it, by adopting the *Mu'tazilite* doctrines and tried to introduce this in his dominions[14]. His knowledge of tradition and jurisprudence from one hand, philosophy and science from the other yielded him the freethinking and liberated mind.

Generally, the Mu'tazilite's ideology rejected all kind of notion that seemed not rational and not yielding to logical demonstration. Under their influence not only the religious texts but also all the science branches should agree with the judgments of reason. The idea of Mu'tazilites reached its apogee during Al-Ma'mūn's reign. The rationalistic tendencies of this Caliph and his successors' espousal of the Mu'tazilites provided to one of the greatest scientific revolution in the history of culture in the Muslim Caliphate. The study and cultivation of humanitarian science from everywhere is the best index to the Caliphate's development[15]. Generally it could be said that the 'Abbāsids from the first half of the 9th century, established an empire within which a rich flowering of science, astronomy, geography medicine, mathematics, chemistry and philosophy resulted.

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[10] According to Ibn an-Nadim the chiefs of this delegation were certain Al-Ḥaǧǧāǧ Ibn Maṭar and Ibn al-Baṭrīq, other sources speak also about Ḥunayn Ibn Isḥāq as one of those messengers sent by Al-Ma'mūn for the same purpose. Ibn an-Nadīm, *Kitāb al-fihrist*, Dār al-Ma'ārif, Bayrūt 1978, pp. 15, 154, 174. Ibn Abī Uṣaybi'a, 'Uyūn al-anbā', Dār aṭ-Ṭaqāfa, Bayrūt 1981. vol. I, p. 260. Ar-Rūmī, *Kašf aẓ-ẓunūn 'an asāmī al-kutub wa-al-funūn*, Dār al-Kutub al-'Ilmiyya, Bayrūt 1992, vol. I, p. 681. Al-Qannūǧī, *Abǧad al-'ulūm wa-al-wašī al-marqūm fī bayān aḥwāl al-'ulūm*, Bayrūt 1978, vol. II, pp. 252–253.

[11] Ph. Hitti, *History of the Arabs*, 3rd edition, Macmillan and Co. London 1943, p. 310. Ameer Ali, *A Short History of the Saracens*. Macmillan and Co., London 1955. pp. 274–276. R. Levy, *The Social Structure of Islam*, second edition, Cambridge 1962, pp. 466–467.

[12] A. Ali, op. cit., p. 275; J. Bielawski, Islam, Warszawa 1980, KAW, pp. 136–137.

[13] R. Levy, op. cit., pp. 464–465.

[14] Ibid.

[15] J. Bielawski, ibid.

This theological school of the Muslim rationalists and free thinkers very soon spread, gained numerous disciples and was by degrees more fully worked out especially when later on the works of the Greek philosophers and thinkers in all fields. According to F.A. Klein, their system construed as to be in harmony with the demands of sound reason and the principles of philosophy[16].

Libraries, academies, translation bureaus, observatories, educational institutions and many books brought from abroad, from Persia, India and particularly the Greek sources in major of the knowledge branches found their way to the Muslim brain. The Abbāsid era of translation lasted about a century, many of Greek works were done whether in Aramaic (Syriac) or in Arabic. Greek philosophy of Aristotle, and Platon, the great astronomical and geographical works translated during this period[17]. In astronomy an early translation of Ptolemy's *Almagest* fulfilled as early as 212/827-8, his second work *Geography* translated into Arabic either directly or through Syriac several times[18]. These translations served as a basis for later works, and stimulated geographical studies and even became a model followed by Muslim authors[19]. It could be said that scientific work in the realms of astronomy, mathematics, as well as cartography conducted alongside the philosophical and theological discussion during the time of Al-Ma'mūn.

Astronomical observatories attached to the institution of Bayt al-Ḥikma. The first was established during the reign of Al-Ma'mūn at *Aš-Šammāsiyya* on the plains of Tadmur (Palmyra). Afterwards several other were built at *Wāsiṭ*, *Afāmyā* (Apamea), etc. The main purpose for Muslim scholars directed into setting particularly new tables, determining astronomical calendar, correcting the ancient table of Ptolemy and enhancing astrological knowledge.

Bayt al-Ḥikma and its role in producing the world map

Bayt al-Ḥikma, literary means the House of Wisdom or the Abode of Wisdom as many other scholars called. It is a scientific institution established in 830 in Bagdād by the caliph Al-Ma'mūn, undoubtedly in imitation of the ancient academy of Ğundīsābūr. It included library, academy and translation bureau with important staff of scientists and technicians as well as copyists and binders. It meant that this academy had an observatory connected with it[20]. The principal activity of Bayt al-Ḥikma was the translation of philosophical and scientific works from Greek originals. According to many Muslim sources,

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[16] F.A. Klein, op. cit., pp. 46–47.

[17] Ibn an-Nadīm, *Kitāb al-fihrist*, ibid.

[18] Ibn an-Nadīm, ibid.; Ibn Ḫurradāḏbeh, *Al-Masālik wa-al mamālik*, p. 2.

[19] With this model, Al-Ḫuwārizmī composed his work *Ṣurat al-arḍ* (Image of the earth) while Suhrāb composed his work: *'Aǧā'ib al-aqālīm as-sab'a* (the wonders of the seven climes) on the model of Ptolemy's work *Geography*.

[20] Ph. Hitti, op. cit., pp. 310, 410.

the Caliph dispatched Al-Ḥaǧǧāǧ Ibn Maṭar, Ibn al-Baṭrīq and Ḥunayn Ibn Isḥāq in emissaries as far as Conistantinople to bring the Greek manuscripts of various kinds of sciences[21]. It appears in fact that the library so constituted, and often called Ḫizānat al-Ḥikma (Library of Wisdom), had already existed in the time of Hārūn ar-Rašīd. To the same institution were attached astronomical observatories (*marṣad*), one installed at Bagdād, the other at Damascus, where Muslim scholars devised in particular new tables (*Zīǧ*), correcting the ancient ones furnished by Ptolemy[22].

Al-Ma'mūn not only gave a new impetus to the scientific activities in Bayt al-Ḥikma but also participated in disputation of this academy. Undoubtedly, he had a considerable influence on the development of Islamic thought and culture in this period. Many of the works achieved in this academy and many persons enrolled among of its team had got the epithet of Al-Ma'mūn. For instance Ǧabrā'īl al-Ma'mūnī and Sanad Ibn 'Alī al-Munaǧǧim al-Ma'mūnī. Many books also attributed to Al-Ma'mūn such as *Al-Kitab al-Ma'mūnī fi šarḥ riyāḍiyyāt Iqlīdis*, (The Ma'mūnian book in explaining the Mathematic of Iqlīdis), and *Kitāb az-Zīǧ al-Ma'mūnī* (The astronomical tables of Al-Ma'mūn). In addition to many other terms become current and connected with the name of Al-Ma'mūn such like *Ar-Raṣd al-Ma'mūnī*, *Az-Zīǧ al-Ma'mūnī* and *Al-Ḫarīṭa* or *Aṣ-Ṣūra al-Ma'mūniyya*. The first two names applied to identify the ephemeris made for Al-Ma'mūn, where the last name applied to identify the world map made for Al-Ma'mūn[23].

The technical information of Al-Ma'mūn's map

The Arab gives various names to the map of the world, Al-Iṣṭaḫrī, simply adopts the word *ṣūra* as generic name to identify all the kind of maps, among them also *ṣurat al-arḍ* as equivalent name to the science of geography and to the world as well[24]. Ibn Ḥawqal gives the name *ṣurat ǧamī' al-arḍ* (the picture of the whole world) to the world map[25]. Ibn Faḍl Allah al-'Umarī uses the term *lawḥ ad-dā'ira* (The plate of the circle)[26]. Most of our sources refer to the map of Al-Ma'mūn by the name *Aṣ-Ṣūra* or *Al-Ḫarīṭa al-Ma'mūniyya*, (The Ma'mūnian Picture). Al-Ma'mūns corps work i.e the map and the geographical researches created by his scholars in Bayt al-Ḥikma[27] was seen by many other geographers.

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21 Ibn an-Nadīm, pp. 339–340, Ibn Abī Uṣaybi'a, op. cit. vol. III, pp. 142–143; Al-Qifṭī, *Ta'rīḫ al-ḥukamā'*, ed. by J. Lippert, Leipzig 1903, pp. 29–30; *Kašf az-ẓunūn*, vol. I, p. 681.

22 Janine and Dominique Sourdel, *Cywilizacja islamu*, PIW, Warszawa 1980, pp. 196, 440.

23 Al-Qifṭī, op. cit., pp. 64, 154, 170, 206, 242.

24 Al-Iṣṭaḫrī, *Al-Masālik wa-al-mamālik*, op. cit., p. 15.

25 Ibn Ḥawqal, *Ṣūrat al-arḍ*, p. 8.

26 Ibn Faḍl Allah al-'Umarī, *Masālik al-abṣār*, ed. by Aḥmad Zakī Bāšā, Dār al-Kutub al-Miṣryya, Al-Qāhira 1924, vol. I, p. 29.

27 It seems that most of contemporary famous Muslim scientists such as Al-Fazārī, Al-Marwazī, Al-Kindī and Al-Ḫuwārizmī were assigned in the Abode of Wisdom. One of the major achievements

We know little about the method concepts, and the technique associated with these maps. Except this example, we are not sure if the Arabs represented other military maps in a systematic way[28]. Al-Mas'ūdī tells us nothing about the shape and the nature of the map which he saw, or even where and when he saw it. One can only conjecture that the author saw a map but not a global figure or spherical body. He also was able to comprise between the map of Al-Ma'mūn and other maps of Greek origin. However, the question is what was the kind of the material used in making this map and what about its shape and size.

The importance of Al-Ma'mūn's group team not only was restricted in translating the Greek works but also as Ibn Ḫallikān refers that Al-Ma'mūn had a strong prediction for the sciences of the ancients and a great desire of putting their exactness to the test[29]. Ibn an-Nadīm, the author of *Kitāb al-fihrist* informs that the technical instruments using in astronomy and geography had developed, and since the time of Al-Ma'mūn many of technicians in this fields were appeared. Among them were the artisans manufacturing planispheric *asturlābs* and map makers such as Ibn Ḫalaf al-Marwazī who made the best kind of *asturlābs*, Ğābir Ibn Sinān, Ğābir Ibn Qurra, 'Alī Ibn Ya'qūb ar-Raṣṣāṣ and others. Most of them were members of the Abode of Wisdom established by Al-Ma'mūn[30]. Due to this information, there are abundant technicians who were able to make such a map, glob or planisphere with a depicted map of the world.

Due to the vague information and the contradictory references, there are no sufficient evidences if this map was represented in picture or illustrated shape. No explicable references from Muslim records mention the climes were represented in this map in Iranian *kišwārs* system or in Greek seven climes system[31].

On other hand, we are informed that this map comprises not only the earth but also the heavens with its planets. This means that it was a very complex shape of its kind. The question how the scientific team of Al-Ma'mūn from the technical point of view could established this map or this plansphere.

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of the group of scholars working at this scientific convention was a large map of the World. Ibn an-Nadīm, op. cit., p. 396; Ar-Rūmī op. cit., vol. I, p. 905; Qānnūğī, op. cit., vol. II, p. 300. As-Suyūṭī, *Ta'rīḫ al-ḫulafā'*, ed. by M.A. Ibrāhīm, Dār Nahḍat Miṣr, Al-Qāhira 1976, p. 488. See also: A. Miquel, *La géographie humaine du monde musulman*, transl. into Arabic by I. Ḥūrī, Wizarat aṭ-Ṭaqāfa, Dimašq 1985, vol. I, part I, pp. 169–170; R. Arnaldez, L. Massignon et A.P. Youschkevitch, *La science arabe dans la science antique et médiévale. (Des origines à 1450)*, tome I, Presses Universitaires de France, Paris 1966, pp. 490, 491. Comparable center of a similar science activities was established later in Cairo during the reign of the Fatimide Caliph Al-Ḥākim in the end of the tenth the beginning of the eleventh centuries under the name of Dār al-Ḥikma, J. Bielawski, op. cit., pp. 181–182.

[28] Gerald R. Tibbetts, *The Beginnings of a Cartographic Tradition*, in: *The History of Cartography*, op. cit., p. 90.

[29] Ibn Ḫallikān, *Wafayāt al-a'yān*, transl. from Arabic by MacGuckin de Slane 1842. First reprinting, Johnson Reprint Corporation, New York and London 1961, vol. III., p. 315. See also Ibn aṭ-Ṭuqṭuqī, *Al-Faḫrī fī al-adāb as-sulṭāniyya*, Maktabat M.A. Ṣubayḥ, Al-Qāhira 1962, p. 175.

[30] Ibn an-Nadīm, op. cit., pp. 396–397.

[31] Gerald R. Tibbetts, op. cit., p. 95.

Ibn an-Nadīm states that he had seen the world map depicted in many colours on silk fabric of *dubayqī* kind, the dyestuff of this map was hardened by wax. The author gives the name to this map as *Ṣifat ad-dunyā* (the description of the world). This map was made by a certain Qurra Ibn Qamīṭā al-Ḥarrānī. Ibn an-Nadīm maintains that Ṭābit Ibn Qurra al-Ḥarrānī plagiarized this map off as his own[32]. We are not sure if the map seen by Ibn an-Nadīm is either the map called *Al-Ma'mūniyya* or a copy of it or something else.

An attractive description also preserved in the work of Az-Zuhrī[33]. According to his testimony, the author has seen in this map two coloured rings depicted around the world. The greater is in blue colour and this is the surrounding outer sea known as the darkness sea, the second depicted in green colour and known as the sea which is directly compassing the mainland of the earth, and from this later all the seas over the world are ramified from it[34].

Information about Al-Ma'mūn's World Map is very scanty and not sufficient to enable us to imagine its shape or form. This is of course because this map is not extant. Secondly, the scattered information mentioned in Muslim geographical sources about this map is so contradictory. Only thing we know according to the testimonies of some authorities who had seen this map, it was the most exquisite of all the maps they had seen.

Al-Mas'ūdī's statement considered as one of the earliest and the most detailed information says about Al-Ma'mūn's map which was made for the Caliph in various colours and represented the seven climes. The author mentions that: „I have seen the map of Al-Ma'mūn which was made for him by many of the best scientists of that time. The map was depicted to show all the world with its spheres and planets, its lands and seas, its inhabited and uninhabited regions, the dwellings of the different nations, the cities, the stars, and the climes which traced in various colors and all of this climes are drawn in straight lines"[35]. The author comments that this map is perfect and better than the predecessor maps depicted in the *Geography* of Ptolemy and Marinos[36]. Our author maintains that all the Climes if drawn in straight lines as it was seen in the Al-Ma'mūn's Map[37]. Moreover, it Al-Mas'ūdī had seen many other world maps which belong to the Greek scientist. According to his testimony, he had seen a map attached to Ptolemy's *Geography* but the work was in Greek. He had also seen the world map of Marinos of Tyre[38]. As a geographer he also could gave his self-testimonial as an eyewitness, and he could compare it with other maps. Accordingly he could decide if Al-Ma'mūn's map was more accurate than that of the Greek or not.

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[32] Ibn an-Nadīm, op. cit., p. 397.

[33] According to Kračkovskij, Az-Zuhrī belonged to the school which joined geography with cosmography like his contemporary native Al-Idrīsī, I. Kračkovskij, *Istorija arabskoj geografičeskoj literatury*, vol. IV, Moscow-Leningrad 1957, pp. 280–281.

[34] Az-Zuhrī, *Kitāb al-ǧuġrāfyā*, op. cit., pp. 304–305.

[35] Al-Mas'ūdī, *Tanbīh*, pp. 33, 44.

[36] Ibid., p. 33.

[37] Ibid., p. 44.

[38] Ibid.

In connection with Bayt al-Ḥikma[39], Al-Ma'mūn erected an astronomical observatory in Bağdād where the Caliph's astronomers not only made systematic observations of the celestial movements, but also verified with remarkably precision fundamental elements in the works of Ptolemy[40]. Many sources refer that the apogee of Greek influence was reached under the reign of Al-Ma'mūn due to his rationalistic tendencies[41]. According to E. Ullendorff the recent scholar, Al-Ḫuwārizmī wrote his hand-book *Ṣurat al-arḍ* to accompany the map compiled by order of Al-Ma'mūn[42].

Unfortunately, we have not a full and direct knowledge about the Al-Ma'mūn's corps work which apparently includes a large geographical material and a great world map, another regional maps, and perhaps a plansphere. From data found in other sources he know that this work perhaps is similar if not larger than the later work made by the Andalusian Arab geographer Al-Idrīsi for the king Roger of Sicily. He produced a famous map of the world and accompanied it with a detailed description in a major book.

However, many specimens of *portolan* world maps produced by many geographers have survived. Az-Zuhrī alleges that he had copied his work on the model of Al-Ma'mūn's depiction and his book of geography, although there are no maps included, the author gives many important details about this work. He says in the first page of his work, "I have copied my work in geography from the work of Al-Fazārī[43] who eventually directly copied from the geographical work executed for Al-Ma'mūn the son of the Caliph Hārūn ar-Rašīd"[44]. According to S. Maqbul Ahmad, concerning Al-Ma'mūn's map, Az-Zuhrī states that a copy of it was made by Al-Fazārī and that Az-Zuhrī's own work, *Ǧuğrāfyā*, was based on Al-Fazārī's copy[45]. The author hardly criticized this map because it was just a flatted and not spherical map in a shape of globe. He adds that there was seventy scientific men assigned for this duty; they made it flat as the same that they have been made with the astrolabe. Accordingly, one can imagine that the first Muslim world map was not on the shape of the glob, rather it flatted and circled[46]. Generally, it

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[39] Ph. Hitti refers that Bayt al-Ḥikma was a combination of a library, academy and translation bureau which in many respects proved the most important educational institution since the foundation of the Alexandrian Museum in the first half of the third century B.C. Ph. Hitti, op. cit., p. 31.

[40] Hitti, op. cit., pp. 374–375.

[41] F. Oṭmān maintained that the Arabs campaigns during the reign of the Caliph Hārūn ar-Rašīd against the Byzantine, particularly the raids against Ankara and Amorium brought numerous Greek manuscripts to Bağdād, F. Oṭmān, *Islamic Byzantine Frontiers*, pp. 260.

[42] E. Ullendorff, article: *Ḥabasha*, E.I.

[43] One can assume that he was one of the two known astronomers, Abū Isḥāq Ibrahīm Ibn Ḥabīb or his son Abū 'Abd Allāh Muḥammad Ibn Ibrāhīm whose works in astronomy, mathematics and geography were considered as lost. Most probably our intended Al-Fazārī is the second one because he was contemporary to the last years of the reign of the Caliph Al-Ma'mūn. See the introduction of the editor of the work of Az-Zuhrī. Az-Zuhrī, *Kitāb al-ǧuğrāfyā*, p. 308. Ibn Ṣā'id al-Andalusī, *Ṭabaqāt al-umam*, pp. 130–131, Ibn an-Nadīm, op. cit., p. 396.

[44] Az-Zuhrī, op. cit., p. 306.

[45] S. Maqbul Ahmad, *Cartography of al-Sharīf al-Idrīsī*, in: *The History of Cartography*, p. 157.

[46] Ibid.

is somewhat difficult to determine if the climes shown on this map are in a shape of Persian *kišwārs* or in Ptolemaic strips. Ad-Dimašqī in confuseed texts claims that many of great kings, wisemen and scientist, among them Solomon, Alexander the Great, the Persian king Ardašīr, Ptolemy, and Al-Ma'mūn divided the world to climes. The picture of the world comes as a carpet divided in a climes starting from west to east in length and its width from the Equator towards the north. All these climes are different in length and width[47]. This persuades us that Al-Ma'mūn's world map was in a form putting together the Ptolemaic seven climes plus the seven *kišwārs* which considered by many Muslim geographers as regions or at least as the great kingdoms of the world of that time.

According to the sources, one can conclude that Al-Ḥūwārizmī had played an important role in the scientific activities of the Bayt al-Hikma. He also participated in compiling the geographical research and making the map of Al-Ma'mūn. Ph. Hitti maintains that the map was executed by Al-Ḥūwārizmī and sixty nine other scholars at the instigation of Al-Ma'mūn-the first map of the heavens and the world in Islam[48]. According to V.V. Barthold, Al-Ḥūwūrizmī took part in the scientific activity which flourished in the reign of the Caliph Al-Ma'mūn; his geographical work is surly connected with the map drawn up for this Caliph, which was regarded as a joint production. Barthold depending himself on Aṭ-Ṭabarī, mentions that seventy scholars took part in this work[49].

S. Maqbūl Ahmad comments upon Al-Ḥuwārizmī's world map, that this early map was drawn in the tradition of Ptolemy in 232/847. Although the map has not survived, it has been reconstructed by S. Razia Ja'fari based on the coordinates given in Al-Ḥūwarizmī's extant text in his work *Ṣurat al-arḍ*. Comparing this map with that of Ptolemy shows a close affinity between the two, thought there are some differences: for example, the Indian Ocean in Al-Ḥūwārizmī is not landlocked as in Ptolemy but is connected with the Pacific in the East[50].

According to Al-Mas'ūdī, this map contains the divisions of the earth, and represent the world with all its continents[51]. From Az-Zuhrī's description, we conclude that this book and its map included all matters connected comprehensively with geographical science. The author counts among the items he mentioned the parts of the earth, its regions, borders, seas, rivers, mountains, inhabited land, uninhabited land, towns in the east and west, and the famous marvels and buildings all over the world in great dexterity. The map also contains all the countries of the world and its peoples according to their races, colours, characters and natures; and explains what they eat. It contains also the fruits and grains

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[47] Ad-Dimašqi, *Nuḫbat ad-dahr fi 'aǧā'ib al-barr wa-al-baḥr*, publié M.A.F. Mehren, Saint-Pétersbourg 1866, p. 18.

[48] Ph. Hitti, op. cit., p. 384.

[49] V.V. Barthold, Preface to the work. *Ḥudūd al-'Ālam*, edited by V. Minorsky, The University Press, Oxford 1937, p. 10.

[50] S. Maqbul Ahmad, *Cartography of al-Sharīf al-Idrīsī*, op. cit., p. 157.

[51] Al-Mas'ūdī, *Tanbīh*, p. 33.

of each regions; and explains what is the produce of its people; what they export and import; and their trade either in land or by seas; and what the animals living in those countries; and the itineraries and distances between these countries. Finally, what had been mentioned by earlier philosophers, scientists and geographers about the earth its length and width and how many *farsaḫs* reached its circumference[52]. Such many details must need for great area either it is flatted or not.

One can assume that Mecca as a sacred Muslim town or Bağdād as the Capital of the Caliphate was situated in the middle as a main purpose to highlight the Islamic World. It seems that such details could not be preserved in a small or middle size map attached a book. The author must have had in his mind not only the map but also the book of geography written for Al-Ma'mūn.

In addition to Az-Zuhrī's statement, we can understand from other sources that this map was presumably depicted or eventually brocaded, on a great carpet. In this concern, Ad-Dimašqī mentions that the picture of the world of Al-Ma'mūn looks like a carpet divided into climes, starts from west to east in length and with its width from the equator towards the north. All these climes are different in length and width[53]. Perhaps it was similar to the undermentioned world map of Al-Mu'izz which we are going to taken about. However, the question here is the following: did the map of Al-Ma'mūn follow the Ptolemaic technique of conical projection? Unfortunately, it is difficult to answer this question due to the lake of information. All we have are many indications that suggesting it was drawn with latitudes and longitudes as strait lines as though on a plan surface, without any regard to the spherical shape of the earth. Furthermore, Az-Zuhrī criticized the construction of the world map by mentioning that, while the earth is in fact spherical in shape, they draw the map of the earth on a plane; a method followed in the construction of the astrolabe[54].

Generally it is also said that Al-Ḫūwārizmī's geography or *Kitāb ṣūrat al-arḍ*, has been the object of a detailed study by many scholars. It consists of lists of co-ordinates of the main seas, countries, mountains, rivers, towns and geographical features, which are sometimes, but not always, in harmony with those of Ptolemy. His source of inspiration might possibly have been the *mappa mundi* constructed for Al-Ma'mūn by a team of geographers in which Al-Ḫūwārizmī himself would have been included. The Al-Ma'mūn's map depends, even if in an indirect manner, on the Geography of Ptolemy[55].

The contradictory between Al-Mas'ūdī and Az-Zuhrīs' description of this map is clear. It seems that the first speaks about a map, which made on the Greek model. The second gives impression that this map consists of the Iranian seven *kišwārs*[56]. Moreover, Az-Zuhrī states that a copy of Al-Ma'mūn's map was made by Al-Fazārī and that

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[52] Az-Zuhrī, op. cit., pp. 305–306.
[53] Ad-Dimašqī, *Nuḫbat ad-dahr*, p. 18.
[54] Az-Zuhrī, ibid.
[55] Maqbūl Ahmad, article *Kharīṭa*, E.I.
[56] Kračkovskij, op. cit., pp. 87–88.

Az-Zuhrī's own work was based on Al-Fazārī's copy. It is obvious clear that Az-Zuhrī in his work did not divide the world according to the Greek system of the seven climes but rather based on the seven *kišwārs*.

One can come to the conclusion that Al-Ma'mūn's map was made or built in mixed model and contains the main Iranian and Greek cartographical elements. This new tradition of cartography differed fundamentally both in approach and content from the pure Greek or pure Iranian tradition and could be described as reflecting the Islamic political point of view of that time.

F. Sezgin assumes that the Al-Ma'mūn's map is still preserved in the Book of *Masālik al-abṣār* written by Ibn Faḍl Allāh al-'Umarī (1301–1349). The scholar maintains that this is the world map of the *Al-Ma'munic geography* with the longitudes and latitudes found in this work, and that the author called it *Ṣurat lawḥ ar-rasm*[57]. G. Tibbetts comments that the information on this map may derive ultimately from sources such as Al-Idrīsī and Ibn Sa'īd. He also adds that the graticule, which is most uncharacteristic for manuscripts from the fourteenth or even fifteenth century, was modified by a copyist at the time the map was drafted, perhaps in the sixteenth century[58]. Although the aforementioned map belongs to the Al-Balḫī school, it seems to be more professional and accurate. Seas and rivers are depicted near to the reality. The seven climes depicted on the map, are in addition divided into sections along the clime[59].

According to the obtainable data, Al-Ma'mūn's map was presumably built up from longitude and latitude tables of Al-Ḫuwārizmī on a projection similar to that used by Ptolemy and Marinos. The maker of this map also adds all the climes which Al-Mas'ūdī or other eyewitnesses had seen. Most probably those climes were drawn in straight lines[60] Nevertheless, Al-Mas'ūdī after finishing his statement on Al-Ma'mūn's map directly starts to list the seven climes according to Iranian tradition. In general, it stands to reason that quite a number of geographical Greek elements took place in this map. Undoubtedly this lost map apply Ptolemaic construction, but nothing has survived to show the influence of any of this missing map.

Undoubtedly, many other researches were used to make this map achieved. The work of Al-Ma'mūn's academy seems to be the first Muslim scientific attempt to estimate the size of the Earth, its circumference, length of a terrestrial degree and other important experiments in this topic in Muslim Caliphate. Many of experiments were undertaken to correct the ancient information which appeared in the translated texts particularly from Greek. Consequently, a series of observations was undertaken first to determine the value of the degree of the meridian. Al-Ma'mūn astronomers and geographers group had made many measurements in many places in the land of the Caliphate. The best known of them

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[57] F. Sezgin, *The contribution of the Arabic-Islamic Geographers to the formation of the World Map*, pp.16–17.

[58] G. Tibbetts, *Latter Cartographic Developments*, op. cit., p. 153, Fig. 6.14.

[59] See Fig. 6.14, World Map of Ibn Faḍl Allāh al-'Umarī, in: G.R. Tibbetts, *The History of Cartography*, p. 153.

[60] Ibid., p. 44.

are the measurements that took place on the plains of *Sinğār*, and the measurement based on the calculation of the depression of the horizon from the top of a mountain on the shore of the Mediterranean. From these measurements, the scientist groupe could be able to deduce the value of the degree and consequently the size of the circumference of the earth. According to Juan Vernet the value of a degree of a meridian, was found to be equal to 111,814 meters (real value: 110,938 meters)[61].

In addition to the measuring of the length of a terrestrial degree and the determining of the size of the earth and its circumference on the assumption that the earth is round, the team also performed a comprehensive geographical work containing a great map for the world known at that time. To compare between the Muslim and the Greek measurements, F. Sezgin, mentions that it was not easy for the Greeks to carry out astronomical measurements, especially those concerning the determination of longitudes. The research was that the only astronomical measurement known to them for obtaining the time difference between two localities was between Carthage and Arela, with an error of about 11 degrees[62].

Nevertheless, it could be said that the map of Al-Ma'mūn and the scientific geographical studies of this school influenced on the Muslim authors down to the 15th century. From the time of Al-Ma'mūn, the Muslim geographers began to produce maps of the completely known regions and world maps. This period found its apogee from the Al-Balḫī school in the 4th–10th century to the time of Al-Idrīsī in the 12th century. The Al-Balḫī school was gaining popularity with its cartographers particularly in the geographical works written during the 4th century such as the works of Al-Iṣṭaḫrī and Ibn Ḥawqal, and generally in the Eastern Caliphate. As we know, neither the geographical treatise nor the maps of Al-Balḫī have survived independently. However, his maps were copied and probably improved by Al-Iṣṭaḫrī and his treatise incorporated in the latter's work. The author drew 21 provincial maps (including one for the whole world), which are found attached to his *Kitāb al-masālik wa-al-mamālik*[63]. Ibn Ḥawqal in his work *Ṣurat al-arḍ*, followed Al-Iṣṭaḫrī in drawing his maps. Gerald R. Tibbetts maintains that the two world maps in both works built up by what might be called academic conjecture-an armchair-attempt to see all the provinces set down relative to each other. The whole has to fit into a stereotyped idea of what the whole world should look like[64]. The world maps belonging to this school are projected onto a flat area and represented by a circle. In view of the fact that both world maps mentioned above are similar, the modifications made by the second are considerable[65]. The Cardinal points were demarcated in both maps and extended outside its frame, but as usually by putting the north of the map down and the south up

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[61] Juan Vernet, op. cit., p. 479; R. Arnaldez, L. Massignon et A.P. Youschkevitch, op. cit., pp. 490–491.

[62] Sezgin, op. cit., p. 15.

[63] Maqbul Ahmad, E.I. Article: *Kharīṭa*. See also the *World Maps of al-Iṣṭaḫrī*, p. 16.

[64] Gerald R. Tibbetts, op. cit., p. 120.

[65] See the *World Maps of Al-Iṣṭaḫrī*, p. 16, Ibn Ḥawqal, op. cit., p. 8.

of the page. Al-Iṣṭaḫrī's map contains little detail in connection with the kingdoms and the peoples, whereas Ibn Ḥawqal gives more additional data in demarcating the seas and the main land; he also gives more attention to the position of the main rivers in the world. There is no longitude or latitude depicted on these maps, except the prime meridian, which clearly seems to pass by Mecca as the center of the world[66]. In the world maps belonging to the Al-Balḫī school, Mecca occupied the central position. Another interesting feature of these round world maps is that the south is placed at the top and the north at the bottom, for which religious reasons were given. It seems that Muslim geographers of this school put the south at the top of their maps because of reverence for the cities of Mecca and Medina in Arabia, beyond which there was no land, and thus there became a stable tradition for the Muslim mapmakers[67]. There is no clime demarcated on these maps, the Equator also disappears.

There can be observed another religious point of view of Muslim geographers of this school. The Mediterranean and the Indian Ocean are depicted as two gulfs coming out of the Encircling Ocean and reaching nearest to each other at the Isthmus of Suez, thus conforming the Qur'ānic concept of the two seas meeting at *Al-Barzaḫ*, the barrier.

There is no either symmetry nor proportionality in both maps particularly between the seas.The main islands of the world except a few in the Mediterranean and the Indian Ocean disappear, and there is no mountain depicted on these maps. From the period of Al-Ma'mūn until the beginning of the 11th century, there is a considerable number of geographical works throughout the Muslim Caliphate which are basically taken from earlier authors such as Al-Gayhānī, Ibn Ḫurradāḏbih, and Al-Balḫī. Many of these works followed the Al-Balḫī school in producing their maps and in particular the circular world maps attached to these works. In general, the world maps come to be rough sketch maps and in particular the regional maps.

Although the Al-Balḫī school dominated in the field of mapping in this period which come after the making of Al-Ma'mūn's map, there is no any particular evidence connect between Al-Balḫī school and Al-Ma'mūn school of cartography. It could be only said that in both maps the encircling Ocean surrounds the land and practically the whole of the southern quarter of the earth is shown covered by land, following the Greek concept of *terra incognita* as an extension of the African continent. This view is more clearly shown in Al-Iṣṭaḫrī's map than in that of Ibn Ḥawqal.

Moreover, as a map derived ultimately from the Greek system, however, it is clearly corrupt. There seems to be no doubt that the Al-Balḫi School mixed together the Iranian tradition of the seven *kišwārs* with the Greek circle model of the world map and the inhabited quarter. Additionally, the land and the sea are usually geometrical in shape, and resemble some other figures. This supposition is clear in Al-Iṣṭaḫrī's world map rather than that of Ibn Ḥawqal. As a first circle, Persia comes in the middle, the

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[66] Ibn Ḥawqal, ibid.

[67] Maqbul Ahmad, ibid.

Khazar, Rūs, Burṭās in the north of it. India and China are in the east, where the land of Ğūğ and Māğūğ connects between the farther east and farther north. Rūm and Franks locate in the west, where the country of Slavs connects between the west and the north. In the south are the countries *Sūdān* and *Zanğ*. It comes similarly to the diagram of the seven *kišwārs* but depicted on a flat circle. To this supposition S. Maqbūl Aḥmad mentions that an analysis of the work of Az-Zuhrī which basically depends on the work of Al-Fazārī shows that the original map of Al-Ma'mūn there for must have represented a synthesis of the Iranian *kišwār* system and the Ptolemaic tradition of cartography[68].

We confronted also in this topic with a statement mentioned by Ibn Ḥawqal who refers to a picture of the world which he names the copy of Al-Qawāḍiyān. The author in the preface of his work, reports that: "I have made my recent book to describe the shapes of the earth; its length and breadth; the regions with its countries the inhabited and uninhabited land and the Muslim land". He adds that: "I am not intended in my work to mention the seven climes as a division of the earth because, however, the Indian picture which in Al-Qawāḍiyān is correct but it contains many of mingling; I have made a detailed map for each peace of land I have presented"[69]. The author mentions the same name of Al-Qawāḍiyān in a second place, where he refers that: "I have mentioned all the distances [between places]. I have made a picture for all the earth including the circumambient, unsailed ocean; this picture is from one hand equal to the picture of Al-Qawāḍiyān, and on other hand differs in some places [.....] this book is different rather from the book of Ibn Ḥurradāḍbih"[70].

According to Muslim geographical sources Al-Qawāḍiyān is a name of a small town in Transoxiana near to the town of Turmuḍ on the River Oxus[71]. Here it is necessary to return to the work of Al-Iṣṭaḫrī, where some of Ibn Ḥawqal's text seem to be quoted from the first. Al-Iṣṭaḫrī mentions a similar paragraph in his preface but without mentioning of the Indian seven climes. He mentions that: "I have mentioned the regions of the world according to its kingdoms in my book. I am not intended to mention the seven climes which divided the earth [....]; and I have made a picture for the world including the circumambient ocean; if any one looked at this picture he could find the place of each region mentioned in it"[72]. In another place the author reported that, a map of all regions (world map) cannot be able to contain all the detail of the regions; for that reasons I have singled out a picture (map) for each region[73].

As mentioned above, there is nothing about the Indian world map or the map attributed to the town of Al-Qawāḍiyān reported by Al-Iṣṭaḫrī. It seems that this version of the seven climes map is connected with the Persian seven *kišwārs*, or a modified

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[68] S. Maqbul Ahmad, *Cartography...*, p. 157.
[69] Ibn Ḥawqal, op. cit., vol. I, pp. 2–3.
[70] Ibid., p. 5.
[71] Ibid, vol. II. p. 454. Al-Iṣṭaḫrī, op. cit., pp. 166–167; Al-Idrīsī, vol. I, p. 482.
[72] Al-Iṣṭaḫrī, op. cit., p. 15.
[73] Ibid., p. 19.

version of climate diagram in Indian geographical concepts. We have also to draw attention to a particular sentence mentioned by both writers and to their effort to produce a map mixes together the seven *kišwärs* with the Greek concept of seven climates. In this text they give a simple description of the world to explain their world maps. They mention that the earth is divided into two by the two seas. The main kingdoms are listed together with the kingdom that adjoin them[74]. This description reflects in bad way the seven *kišwārs* distributed and projected onto a flat area and represented by a circle and perhaps as a trial to mix the Persian seven kišwārs with Greek climates. It was perhaps similar to the Al-Balḫī world map with climate boundaries[75]. This may explain why these maps had been drawn in such a geometric configuration. Generally it seems that because the region or kingdom is also known as climate (*iqlīm*), this idea clashes with the idea of Greek climate and creates a kind of obscurity either in texts or in maps alike. Al-Muqaddasi's map was based on the same principles as the maps of Al-Iṣṭaḫrī and Ibn Ḥawqal, and it covers in the same way the Islamic regions, but Al-Muqaddasi has no world map. Nevertheless, gives some information about technical methods in depicting maps. He states that "I depicted the map of regions by demarcating the routes in red colour, the deserts in golden colour, the seas in green colour, the rivers in blue colour, and the mountains in dust-colour, all of these to be clear to understand"[76].

Finally S. Maqbūl Ahmad's opinion sazing, that while much of the data of the Al-Ma'mūn's map derived from Ptolemy's geography, a substantial amount of it and its arrangement must have come from non-Greek sources is acceptable[77].

Al-Mu'izz's World Map

In Cairo, perhaps between 362–365/ A.H. a world map was produced for the Fatimid Caliph Al-Mu'izz. We know little about this map, the scanty information provided by Al-Maqrīzī cannot allow us to build up a particular imagination about it. Al-Maqrīzī presumably quotes from a prior source, which refers that in the time of the Caliph Al-Mustanṣir his Turkish soldiers revolted against him. They attacked the palaces of the Caliph and plundered everything. Among these things, there was a great piece of a blue delicate silk, silk map very height fashion made of golden textile decorated with rich ornament. According to Al-Maqrīzī, this map was made for the Caliph Al-Mu'izz. All towns, mountains, seas, rivers and fortress the regions of the world were depicted in this map in details. The towns of Mekka and Madīna were shown as the highlight of the

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[74] Al-Iṣṭaḫrī, op. cit., p. 15, 19; Ibn Ḥawqal, op. cit., p. 3.

[75] See Fig. 5.25. in *The History of Cartography*, p.128.

[76] Šams ad-Dīn al-Muqaddasī, *Aḥsan at-taqāsīm fi ma'rifat al-aqālīm*, ed. by M.J. de Goeje, E.J. Brill, Leyden 1919, p. 9.

[77] S. Maqbūl Ahmad, E.I., op. cit.

Islamic world. At the end of this map it was written, that this map was made by the order of the Caliph Al-Mu'izz in the year 353 A.H. The author adds that this map cost 22 thousand *dinars*[78].

One can imagine that this map was an imitation to the map of Al-Ma'mūn. From Al-Maqrīzī description, we know that the seven climes were depicted in addition to the details about the towns, seas, etc. Nevertheless, there is no more information that can refer to the method and the technique of making this map.

Unfortunately, we have not enough information about this map, its makers, and its technical classification except that it was made in silk. We also do not know if it was fabricated in Egypt or in some place else in the Muslim world. Actually in this map, the seven regions or climes, seas, the boundaries, cities and towns, rivers, mountains and roads are shown, but it seems that it will not be too bold to compare it with the Al-Ma'mūn's map.

Al-Idrīsī's World Map

The greatest step made by the Muslim cartography was probably the appearance of Ptolemaic maps again in the Muslim world owing to Andalusian geographer. It was in the year 548/1153 when Al-Idrīsī according to his testimony, produced an up-to-date world map for the King Roger of Sicily. He also produced a ball of silver of great size and 400 *raṭl* (rotls) in weight and drew on it the inhabited quarter and the seven *iqlims* (climes). Seas, lakes and rivers, cities and routes, mountains and plains, all of things in it correspondes to those depicted in the world map. Undoubtedly, his book *Nuzhāt al-muštāq fi iḫtrāq al-afāq* was written to accompany the silver globe as he reported himself[79].

This work, not only was considered as a major work which combines descriptive and mathematical geography, but also supplied with a silver plansphere on which a world map had been depicted. This world map consisting of 70 sections was formed by dividing the earth north of the equator into 7 climatic zones of equal width, each of which was subdivided into 10 equal parts by lines of longitude. But all of them (the regional and world maps) were not in conical form. The silver planisphere has been lost, but the maps and book have survived.

Al-Idrīsī's world map was criticized by the scholars mainly because he utilized the maps of Ptolemy, which were out of date in relation to the material at his disposal[80]. To this point, recent scholar maintains that although Al-Idrīsī made Ptolemaic cartography the basis of his sectional maps in the *Nuzhat al-muštāq*, as we are able to

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[78] Al-Maqrīzī, *Iṭ'āẓ al-ḥunafā' bi-aḫbār al-a'imma wa-al-ḫulafā'*, Al-Maǧlis al-A'lā li-aš-Šu'ūn al-Islāmiyya, Al-Qāhira 1967, vol. II., pp. 292–293.

[79] Al-Idrīsī, *Nuzhat al-muštäq*, pp. 6–7.

[80] S. Maqbul Ahmad, *Al-Šarīf al-Idrīsī*, India and the Neighbouring, op. cit., p. 9.

surmise, were an improvement on the maps drawn during the time of the Caliph Al-Ma'mūn[81]. His effort was not an unqualified success it apparently stems from the author's inadequate mastery of the physical and mathematical aspects of geography[82].

It is not exaggeration that one of modern scholars maintains that "It is interesting to note that like Al-Ma'mūn's Geography the Book of Roger was also based on a model of the earth's surface, in al-Idrīsī case a silver planisphere constructed with a greatest attention to scientific accuracy"[83]. In any case Al-Idrīsī's work is particularly valuable for its data on such regions as the Mediterranean basin and Europe.

Finally, it could be said that the reception of the Greek knowledge of astronomy and geography, and the scientific astronomical observations made by the Caliph Al-Ma'mūn's team produced two main results. The first was the astronomical tables which were called *Az-Zīğ al-Ma'mūnī al-mumtaḥan*, the second was the world map which was constantly called by Muslim geographers *aṣ-ṣura al-Ma'mūniyya*[84]. Unfortunately, it is difficult to arrive at a certain conclusion about this map because of the lack of information on it. Yet it would be a mistake to assert stable facts. Unless further evidence in this direction is forthcoming, the map of Al-Ma'mūn will still be a real puzzle and the one still needing more investigations.

One of the scholars maintains that the Arabs did not show much progress in the cartographical art, equivalent to that shown in their geographical books, and they were none the less reputed for the preservation of the ancient cartographical legacy[85]. Nevertheless, Muslim cartography left its impact on the European cartography of the medieval period. Muslim theories in this field are made manifest in the map of Marino Santo added to his opus *Terrae Sanctae*. According to I. Kračkovskij, this map was nothing more than a repetition of the entire prominent map of the world in the Islamic Atlas with a slight difference, namely, that the latter has its center in Mecca whereas the other has it at Jerusalem[86].

According to Kramers, the Muslim geographical view is accepted by European cartographers, the proof of that is the world map (*Mappae Mundi*) to be found in the opus *Terra sanctae* compiled by Marino Sanudo in 1321 and dedicated to the Pope. This map is round, Jerusalem being its center, and shows clearly the two big seas derived from the ocean and the prolongation of the African coast to the east[87]. It seems that this map was an imitated form in the model of Al-Idrīsī's world

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[81] S. Maqbul Ahmad, *Cartography of al-Sharīf al-Idrīsī*, ibid.

[82] G. Oṭman, article *al-Idrīsī*, E.I., new edition.

[83] D.M. Dunlop, *Arab Civilization to AD 1500*, London 1971, p. 171.

[84] J.H. Kramers, *Geography and Commerce*, in: *The Legacy of Islam*, edited by Sir Thomas Arnold and Alfred Guillaume, London 1931, p. 93.

[85] M.M. al Sayyad, Geography, in: *Islamic and Arab contribution to the European Renaissance*, General Egyptian Book Organization, Cairo 1977, p. 250.

[86] I. Kračkovskij, op. cit., p. 26.

[87] J.H. Kramers, op. cit., pp. 93–9; I. Kračkovskij, op. cit., p. 26; M. al Sayyad, ibid.

map. Nevertheless, this Islamic trend appears earlier and clearly in the maps of Psalter produced at about 1200[88].

Al-Mas'ūdī's report should be considered as a very important testimony because he saw the three world maps, i.e. the map attached to Ptolemy's Geography (the very work was in Greek), the world map of Marinos of Tyr, and the world map of Al-Ma'mūn besides he was able to compare them. According to Al-Mas'ūdī's testimony, the Map of Al-Ma'mūn was perfect and the best[89].

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[88] M. al Sayyad, ibid.

[89] Al-Mas'ūdī, *Tanbīh*, p. 33.