Original Article

THE CONCEPT OF "MEDIEVAL EUROPEAN TRANSLATION CENTERS" AND THE REGISTER OF LATIN MANUSCRIPT-TRANSLATIONS OF THE WORKS OF MUSLIM EAST SCHOLARS, CARRIED OUT IN THESE CENTERS

Otabek V. Makhmudov
PhD., Associate Professor, Head of the Department of World History of Fergana State University, Fergana city, Uzbekistan
Email: o.maxmudov@pf.fdu.uz
DOI: 10.47750/pnr.2022.13.S09.622

Abstract

The article theoretically substantiates the concept of naming the cities of Europe of the XII–XV centuries, in which translation activities were established, as a unified system of «The translation centers of medieval Europe». Based on the analysis of Latin sources on the history of translation, the author concluded that the activities of medieval European translation centers should be divided into 3 stages, from which the first period, covering the XII–XIII centuries, should be evaluated as an early stage of the formation of Arabic studies in Europe. Up to the present many researches is conducted on due to the history of medieval European translation centers (XII–XIII centuries). However, the complete list of the translations created at the medieval European translation centers, such as Toledo, Saragossa, Segovia, Navarra, Barcelona, Palermo, Salerno, Padua, Marseille, Montpellier is not published. We have made the list of the translations created at these translation centers on the basis of results of a research on the subject "Studying the scientific heritage of East scholars in the translation centers of medieval Europe". This article provides a complete list of translations performed in Spanish translation centers. Works are classified by on sciences and given in a chronological order in the list. It is necessary to emphasize, the listed works below strongly influenced to development of science of medieval Europe.

Keywords: Middle Ages, Europe, Spain, Italy, Southern France, translation, translators, translation centers, Arabic, Latin, Hebrew, Latin sources, analysis, concept, stages, scientific legacy, astronomy, mathematics, geometry, physics, mechanics, medicine, biology, meteorology, chemistry, philosophy, logic, literature.

1. INTRODUCTION

It is well known from the history of science that the development of Sciences in Europe in the Middle Ages was greatly influenced by the scientific heritage of the scholars of the Muslim East, who lived and worked in the IX–XII centuries. For this reason, this issue is now considered one of the most interesting topics not only by historians of science and Orientalists, but also by specialists who conduct research in other areas of historical science, and even avid historians.

It should be noted that the history of European translation in the XII–XIII centuries was studied by scientists of the region to a certain extent, most of which are at the level of fundamental research. However, at the same time, the work of translating works in Arabic into Latin, Hebrew or other local languages was established in the Iberian Peninsula, Italy and the cities of southern France, while the work of translation remains unexplored in a common context. Perhaps that is why not a single theory was put forward by historians of science on how to name this stage in the history of translation. We, based on the results of our research on the coverage of issues related to the translation in Europe of the works of scholars of the Muslim East, who created them in the IX–XII centuries, came to the conclusion that the cities of Europe in the XII–XIII centuries, whose translation activities were established, should be called by a common name and in this article, we will try to theoretically substantiate our views on this issue.

It should be noted that a lot of investigations have been carried out till these days on the life's and heritage of scientists Medieval Muslim East. Although a number of them were fundamental researches, information about their translations and investigations

in Europe is general. If we have a look at these works, when the translation of a scholar's work was investigated in Europe in XII-XIII centuries, only the century is given. The translator, translation method, date and place of translation and the role of it in the development of the region's science are not covered. It is obvious that the cause of it is the lack of a well-structured complete scientific book that combines all information in this sphere. Terms above require carrying out a deep research in this sphere.

If we have a look at the activity of medieval European translation centers of XII–XIII centuries, a number of works of scientists of Muslim East were translated into Castilian, Jewish and Latin languages. Scientific theories of scholars of Medieval East crossed the threshold of western countries and it was the basis of new science formation and its further development.

2. Materials and methods

The research uses such methods as the principle of historicism, comparative analysis, systematization, classification, problem-chronological approach.

3. Results and discussion

3.1. About the concept of "Translation centers of Medieval Europe" and its scholarly use.

In the sources (Alfonso X 2009; Benjamin of Tudela 1907; Petrus Venerabilis 1964, 2016; de Rada 1974, 1989; Salimbene 1942; Villani 1906) on the history of medieval translation, as well as in scientific research, translation activities carried out in the XII–XIII centuries in different cities of Europe are not called by a common name and no specific proposals or opinions are put forward on this matter. In our opinion, this circumstance was caused by the fact that the history of translation activities in the Iberian Peninsula, Italy and the southern territories of France, where the direct and indirect process of joint translation took place, was not investigated in a complex, in other words, they were not analyzed in a general context and from the same angle. (for example: Alonso 1943, 1953, 1952; Alverny 1982; Astruc 1767; Burnett 1977, 1992, 2001; Borsari 2020; Dulieu 1975; Lawn 1963: Mazza 1681; Toubert & Bagliani 1994).

As a result of the study on the topic, it was found that in the XII–XIII centuries, translation work in Europe was carried out mainly in 13 cities – Barcelona, Murcia, Pamplona, Zaragoza, Seville, Segovia, Toledo and Naples, Padua, Palermo, Salerno, as well as Marseille and Montpellier. It will be correct to divide these cities into three groups geographically and call them the cities of the Pyrenean Peninsula, Sicily and Italy, Provence. From the point of view of the modern era, they should be classified as cities of Spain, Italy and southern France.

In the listed cities, about 200 works in Arabic related to various fields were translated into Latin, which was considered the scientific language of that time. In the period under review, the main center of translation activity in Spain was considered the Toledo School, while in Sicily this task was performed by Palermo, in Italy by the Salerno medical school, and in South France by the Montpellier school.

Based on the conclusions of our previous research in this area and the results of our research at the current stage, we came to the conclusion that every aspect is correct to call the cities of Europe where translation work was carried out in the XII–XIII centuries by a common name "medieval European translation centers". With the introduction of this concept into scientific consumption, it will be possible to express as a single system the translation work established in the cities of Spain, Italy and southern France.

At the same time, it is worth noting that the chronology of the activities of medieval European translation centers is not limited to the XII–XIII centuries.

Based on the research in the field and their results, we conclude that the activities of medieval European translation centers should be chronologically divided into the following 3 stages:

stage I – covering the XII–XIII centuries, translation processes were established mainly in 3 areas listed above. At the same time, works, including books by the authors of antiquity, are often translated from Arabic into Latin. One of the special aspects of this stage is the widespread use of free and intermediary language translation methods along with the literal method in the work activities of translators;

stage II – at this stage, defined by the XIV century, the geography of translation centers is expanding, and the translation business begins to take shape on the territory of Northern France, Germany and Britain. At this stage, the works were translated into Latin not from Arabic, but often on the basis of Jewish copies created during the same period;

stage III – at this stage, which includes the 15th century, translation activities were carried out in conjunction with publishing work. From this period, an academic style is formed in the translation methodology and special attention is paid to the basis of the original works. In addition, at this stage, corrections are made to the translations created in the previous stages, which are processed. Translation activities by this time begin to take shape as a separate sphere not only in western and southern Europe, but also in its central part.

The first stage, which included the XII–XIII centuries in the above stages, is also significant in that it has been translated many times with great interest the works of scientists of the Muslim East, who created it in the IX–XII centuries. This aspect led to the fact that the history of translation centers operating at the same stage was chosen as the object of our research. In fact, the main object of study of translation centers, which were formed on the territory of Europe in the XII–XIII centuries, was a large number of works in Arabic, which relate to various sciences and fields. As noted earlier, they consisted of Arabic copies of books by scientists of antiquity, as well as works belonging to the pen of Eastern thinkers who created in the Middle Ages in Arabic. While the history of science is dominated by the idea that the field of Arabic studies was actually formed in Europe at the turn of the XVI century, the analysis of the activities of translators who created it in the XII–XIII centuries testifies to the fact that they not only turned Arabic works into Latin, but also For this reason, it will be correct to evaluate the XII–XIII centuries as the first stage in the emergence of the field of Arab Studies in Europe.

Medieval Europe divided the cities that entered the system of translation centers in the XII–XIII centuries into 3 groups based on their geographical location, the translation centers of medieval Spain – Barcelona, Murcia, Pamplona, Zaragoza, Seville, Segovia, Toledo; the translation centers of medieval Italy – Naples, Padua, Palermo, Salerno; the translation centers of medieval southern France – should be classified as Marseille and Montpellier.

Cities that belong to the first stage of the system of translation centers of medieval Europe, that is, translation centers should be divided into 2 categories according to their structure, scope of activity and essence:

the first category included such cities as Toledo, Seville and Murcia in Spain, Salerno and Naples in Italy, Montpellier in France, where translation processes were carried out in scientific or educational institutions. In other words, literal translation institutions operated in these cities;

the second category includes the Spanish cities of Barcelona, Pamplona, Zaragoza and Segovia, the Italian cities of Padua and Palermo, the French cities of Marseille. In them, translation processes took the form of independent activities of translators, and translators worked mainly in a palace or in the Central Church of cities under the leadership of a head of state or religious figure.

The result of a comparative analysis of the translation work in the three regions is that in the Spanish translation centers the works were mainly translated from Arabic into Latin, and also the translation of works in the area into the local language began as early as the XIII century. In Italy and France, however, this process occurs between the XIV and XV centuries. Italian translators, when translating the works of ancient Greek scientists into Latin, were based directly on the original Greek manuscripts, and not on their Arabic translations, as was the case with the Spanish and southern French translation centers. In the translation centers of southern France, however, the works were mostly translated into Hebrew.

It should be noted that translators operating at the first stage of the system of medieval European translation centers formed representatives of different faiths and ethnicities from different regions of the region. Within the framework of our research in the field, as a result of the analysis of sources on the history of translation and manuscripts of translations created during the period under review, we managed to identify 69 translators operating in the XII–XIII centuries.

3.2. The register of Latin manuscript-translations of the works of Muslim East scholars, carried out in translation centers of medieval Europe.

Basing on the careful analysis of the Latin-language sources and scientific literature (Alfonso X 2009; Alonso 1943, 1953, 1952; Alverny 1982; Burnett 1977, 1992, 2001; Petrus Venerabilis 1964, 2016; de Rada 1974, 1989) devoted to history of the translations in Spain in XII–XIII centuries, compiled list of the translations created at Spanish translation centers, such as Toledo, Saragossa, Segovia, Navarra and Barcelona. Works are classified by on sciences and given in a chronological order in the list.

Total of works: 122, number of authors: 47 (including, 10 scientists of Antiquity, 37 scientists of Medieval). 57 works in the field of the exact sciences (including, 8 of them works of ancient scientists, the 49 works of scientists of Medieval); 33 works on natural sciences (including, 11 of them works of ancient scientists, the 22 works of scientists of Medieval); 32 works on the humanities (including, 11 of them works of ancient scientists, the 16 works of scientists of Medieval, 5 of them on religion and national fairy tales).

Total of translations: 158, number of translators: 35 (including, 26 translators are representatives of the Toledo school, 3 translators worked in Saragossa, 2 translators worked in Barcelona, 2 translators worked in Segovia and Navarra). From them, Gerard of Cremona translated 37 works, John of Seville translated 16 works, Yehuda ben Moshe translated 11 works, Michael Scot translated 10 works, Domingo Gundisalvo translated 9 works, Mark of Toledo translated 8 works, Herman of German translated 7 works, Herman Dalmatin translated 6 works. Adelard of Bath, Alfred of Sareshel, Plato of Tivoli and Isaac ibn Sid translated 4 works each. Petrus Alphonsi and Robert of Chester translated 3 works each. Rudolph of Bruges, Hugh of Santalla and Edigio de Tebladis translated 2 works each. Robert of Ketton, Abraham de Toledo, Bonaventura of Siena, Alvaro de Oviedo and Ferrando de Toledo translated 1 works each. Domingo Gundisalvo in cooperation with Abraham ibn Daud translated 5 works, and with John of Spain was translated 5 works. Plato of Tivoli in a cooperation with Abraham bar-Hiyya translated 2 works. Yehuda ben Moshe in cooperation with Juan D'Aspa translated 2 works, and with Guillen Arremon translated 2 works. Robert of Ketton, Herman Dalmatin, Peter of Toledo and Mohammed in cooperation translated 1 works. Yehuda ben Moshe and Garci Perez in cooperation translated 1 works, Edigio de Tebladis and Pietro de Reggio in cooperation translated 1 works, Abraham de Toledo and Bernardo el Arabigo translated in cooperation 1 works. Samuel ha-Levi, Joan de Mesina, Joan de Cremona and Yehuda ben Moshe in cooperation translated 1 works.

Table 1. The list of translations carried out in the Spanish translation centers

№	Name of the work and Author	Name of the translation	Translator	Target language	Year and translation center
WORKS ON THE ASTRONOMY, MATHEMATICS, GEOMETRY, PHYSICS, MECHANICS					
WORKS OF SCIENTISTS OF ANTIQUITY					
1.	**«On the Heavens and the World»** Aristotle (384 BC – 322 BC)	«De caelo et mundo»	Gerard of Cremona	Arabic →Latin	1165 Toledo
2.	**Same work**	«De caelo et mundo»	Domingo Gundisalvo	Arabic →Latin	1180 Toledo
3.	**Same work**	«De caelo et mundo»	Michael Scot	Arabic →Latin	1230 Toledo
4.	**«Physics»** Aristotle	«Physica»	Gerard of Cremona	Arabic →Latin	1175 Toledo
5.	**Same work**	«Libre Phisicorum»	Michael Scot	Arabic →Latin	1230 Toledo
6.	**«Elements of Geometry»** Euclid (325 BC –265 BC)	«Elementorum»	Adelard of Bath	Arabic →Latin	1120 unknown
7.	**Same work**	«Elementorum»	Herman Dalmatin	Arabic →Latin	1140 Saragossa
8.	**Same work**	«Elementorum»	Gerard of Cremona	Arabic →Latin	between 1160–1187
9.	**«On the Measurement of the**	«De mensura circuli»			

	Circle» Archimedes (287 BC – 212 BC)				Toledo
10.	**«Sphaerica»** Theodosius of Bithynia (c. 160 BC – c. 100 BC**)**	«Sphaerics»	Abraham bar-Hiyya and Plato of Tivoli	Arabic→ Yiddish →Latin	between 1134—1145 Barcelona
11.	**«Almagest»** Ptolemy (90 – 168)	«Almagest»	Gerard of Cremona	Arabic →Latin	1167 Toledo
12.	**«Planisphere»** Ptolemy	«Planisphaerium»	Herman Dalmatin	Arabic →Latin	1143 Saragossa
13.	**Same work**	«Planisphaerium»	Rudolph of Bruges	Arabic →Latin	1144 Toledo
14.	**«Tetrabiblos»** Ptolemy	«Quadripartitum»	Abraham bar-Hiyya and Plato of Tivoli	Arabic→ Yiddish →Latin	1138 Barcelona
15.	**Same work**	«Tetrabiblon» or «Quatriparito»	Yehuda ben Moshe	Arabic→ Castilian → Latin	1271 – 1275 Toledo
16.	**Same work**	«Quatriparito»	Edigio de Tebladis	Arabic→ Latin	between 1252 – 1272 Toledo
WORKS OF SCIENTISTS OF MEDIEVAL EAST					
17.	**«On the mysteries of obstruction»** Mashallah ibn Athari (740–815)	«De rebus eclipsium»	John of Seville	Arabic →Latin	till 1133 Toledo
18.	**Same work** Mashallah	«Epistola Messahallah in rebus eclipsis Lune»			
19.	**«The book about two lots»** Mashallah	«De receptione planetarum siue de interrogationibus»			
20.	**«About values of planets in a horoscope»** Mashallah	«De significationibus planetarum in nativitate»			
21.	**«The Book Known as the Twenty-Seventh»** Mashallah	«De interpretatione cogitationis»			between 1133–1142 Toledo
22.	**«On the knowledge of the movement of the world»** Mashallah	«De elementis et orbibus»	Gerard of Cremona	Arabic →Latin	between 1160–1178 Toledo
23.	**«Book of Nativities»** Umar Ibn al-Farrukhan al-Tabari (w.b. 762)	«De nativitatibus secundum Omar»	John of Seville	Arabic →Latin	between 1133–1142 Toledo
24.	**«Big book of horoscopes»** al-Tabari	the name of the translation isn't known	Hugh of Santalla	Arabic →Latin	XII c. Saragossa
25.	**«The Introduction to the Science of the Judgments of the Stars»** Sahl ibn Bishr al-Israili (c. 786–845)	«Introductorium ad astrologiam seu de iudiciis [de principiis iudiciorum] seu de interrogationibus»	Herman Dalmatin	Arabic →Latin	between 1140–1160 Saragossa
26.	**«The treatise on mundanny astrology»** Sahl ibn Bishr	«Prognostica de reuolutionibus»			1138 Saragossa
27.	**«Book of Elections According to the Twelve Houses»** Sahl ibn Bishr	De electionibus	Gerard of Cremona	Arabic →Latin	between 1160–1178 Toledo

28.	**«The book on similar subject»** Sahl ibn Bishr	«Liber temporum»			
29.	**«The treatise about judgments»** Sahl ibn Bishr	«De iudiciis»			
30.	**«Book of Birth»** Abu Ali al-Khayyat (770–835)	«De nativitatibus»	Plato of Tivoli	Arabic →Latin	1136 Barcelona
31.	**Same work**	«De judiciis nativitatum»	John of Seville	Arabic →Latin	1153 Toledo
32.	**«Zīj»** Mukhammad ibn Musa al-Khwarizmi (783–850)	«Tavole astronomiche»	Adelard of Bath	Arabic →Latin	1126 unknown
33.	**Same work**	the name of the translation isn't known	Herman Dalmatin	Arabic →Latin	between 1140–1160 Saragossa
34.	**Same work**	«Tavole astronomiche»	Robert of Chester	Arabic →Latin	Unknown Segovia
35.	**«The Book of Addition and Subtraction According to the Hindu Calculation»** al-Khwarizmi	«Liber Ysagogarum Alchorismi»	Adelard of Bath	Arabic →Latin	between 1120–1130 unknown
36.	**Same work**	«Algoritimi de numero indorum»	John of Spain and Domingo Gundisalvo	Arabic→ Castilian → Latin	between 1180–1190 Toledo
37.	**«The Compendious Book on Calculation by Completion and Balancing»** al-Khwarizmi	«Liber algebrae et almucabala»	Robert of Chester	Arabic →Latin	1145 Segovia
38.	**Same work**	«Liber Alchoarismi de et almucabila tractaus»	Gerard of Cremona	Arabic →Latin	between 1160–1178 Toledo
39.	**«The big book of introduction to science about stars»** Abu Maʿshar al-Balkhi (787–886)	«Introductorium in Astronomiam»	John of Seville	Arabic →Latin	1133 Toledo
40.	**Same work**	«Liber introductorius in astronomiam Albumasaris»	Herman Dalmatin	Arabic →Latin	1140 Saragossa
41.	**«The small book of introduction to science about stars»** Abu Maʿshar al-Balkhi	«Minus Liber introductorius in astronomiam»	Adelard of Bath	Arabic →Latin	XII c. unknown
42.	**«Elements of astronomy on the celestial motions»** Ahmad al-Farghani (798–865)	«Rudimentis astronomiae»	John of Seville	Arabic →Latin	1135 Toledo
43.	**Same work**	«De rudimentis astronomiae»	Gerard of Cremona	Arabic →Latin	1175 Toledo
44.	**«On the Revolutions of the Years»**	«Introductorium maius» or «De magnis	John of Seville	Arabic	between 1133–1142

	Al-Kindi (800–873)	coniunctionibus»		→Latin	Toledo
45.	**«The Book of the Judgments of the Stars»** Al-Kindi	the name of the translation isn't known			
46.	**«On Optics»** Al-Kindi	«Optica»	Gerard of Cremona	Arabic →Latin	between 1160–1178 Toledo
47.	**«A treatise on the celestial spheres»** Qusta ibn Luqa (820–912)	«Libro de la faiçon dell espera»	Yehuda ben Moshe and Juan D'Aspa	Arabic→ Castilian	1259 Toledo
48.	**Same book**	«Libro de la faiçon dell espera» (corrected version)			1277 Toledo
49.	**«On the Sector-Figure»** Thābit ibn Qurra (836–901)	the name of the translation isn't known	Gerard of Cremona	Arabic →Latin	between 1160–1178 Toledo
50.	**«The book about horoscopes»** Abu Bakr al-Khasan (IX c.)	«De Nativitatibus»	John of Seville	Arabic →Latin	between 1133–1142 Toledo
51.	**«Revolution birth»** al-Khasan	«De revolutionibus nativitatum»	Plato of Tivoli	Arabic →Latin	XII c. Barcelona
52.	**«Book of Algebra»** Abū Kāmil (850–930)	«Liber mathematicis»	John of Seville	Arabic →Latin	between 1133–1142 Toledo
53.	**«Book of Zīj»** al-Battānī (858–929)	«De motu stellarum»	Plato of Tivoli	Arabic →Latin	1116 Barcelona
54.	**«Introduction to the Art of Judgments of the Stars»** Abu al-Saqr al-Qabisi (died 967)	«Liber introductorius ad magisterium judiciorum astrorum»	John of Seville	Arabic →Latin	1144 Toledo
55.	**«Book of Fixed Stars»** Abd al-Rahman al-Sufi (903 – 986)	«Los IIII libros de las estrellas de la ochaua espera»	Yehuda ben Moshe and Guillen Arremon	Arabic→ Castilian	1256 Toledo
56.	**Same book**	«Los IIII libros de las estrellas de la ochaua espera»	Samuel ha-Levi, Joan de Mesina, Joan de Cremona and Yehuda ben Moshe	Arabic→ Castilian	1276 Toledo
57.	**«Canon of al-Mansor»** Author unknown	«Iudicia Almansoris»	Plato of Tivoli	Arabic →Latin	1136 Barcelona
58.	**«The book about the Astrolabe»** Maslamah Ibn Ahmad al-Majriti (died 1008)	«Liber de compositione astrolabii»	Rudolph of Bruges	Arabic →Latin	XII c. Toledo
59.	**«Cosmography»** (Part of «Epistles of the Brethren of Purity») The Brethren of Purity (X c.)	«Cosmographia»	Domingo Gundisalvo	Arabic →Latin	1180 Toledo
60.	**«Book of Optics»** Ibn al-Haytham (965–1040)	«Liber de opticus»	Gerard of Cremona	Arabic →Latin	between 1160–1178 Toledo

61.	**«Book of on the Configuration of the World»** Ibn al-Haytham	«Libro de la Construction del Universo»	Isaac Ibn Sid	Arabic→ Castilian	between 1263 – 1277 Toledo
62.	**«On the Heavens and the World»** Avicenna (980–1037)	«De cello et mundo»	Domingo Gundisalvo	Arabic →Latin	between 1140 – 1160 Toledo
63.	**«Physics»** (Part of «The book of healing») Avicenna	«Physica»			1180 Toledo
64.	**«Commentary on Ptolemy's Tetrabiblos»** Abu'l Hasan Ali ibn Ridwan Al-Misri (988–1061)	«Quatriparito»	Edigio de Tebladis	Arabic →Latin	between 1252 – 1272 Toledo
65.	**«Tables of Toledo»** Abū Ishāq Ibrāhīm al-Zarqālī (1029–1087)	«Canonis Arzachel»	Gerard of Cremona	Arabic →Latin	between 1160–1178 Toledo
66.	**«Treatise of the açafeha»** al-Zarqālī	«Tratado de la açafeha»	Yehuda ben Moshe and Guillen Arremon	Arabic→ Castilian	1231 Toledo
67.	**Same book**	«Libro de la Açafeha»	Ferrando de Toledo	Arabic→ Castilian	1256 Toledo
68.	**Same book**	«Libro de las armellas o de la açafeha»	Isaac Ibn Sid	Arabic→ Castilian	between 1263 – 1277 Toledo
69.	**Same book**	«Libro de la Açafeha»	Abraham de Toledo and Bernardo el Arabigo	Arabic→ Castilian	1277 Toledo
70.	**«The book of theoretical astronomy»** Nur ad-Din al-Bitruji (died ca. 1204)	«De motibus celorum circularibus»	Michael Scot	Arabic →Latin	1217 Toledo
71.	**«Correction of the Almagest»** Jabir ibn Aflah (1100–1150)	«Rectus Almagestus»	Gerard of Cremona	Arabic →Latin	between 1170–1178 Toledo
72.	**«Book on the Judgment of the Stars»** Abu l-Hasan Ali ibn Abi al-Rijal (X – XI)	«De judiciis astrologiae»	Alvaro de Oviedo	Arabic →Latin	Until 1254 Toledo
73.	**Same book**	«El Libro conplido en los iudizios de las estrellas»	Yehuda ben Moshe	Latin → Castilian	1254 Toledo
74.	**Same book**	«Liber de Judiciis Astrologiae»	Edigio de Tebladis and Pietro de Reggio	Castilian→ Latin	between 1252 – 1272 Toledo
75.	**«Universal Table»** Ibn Jalaf of Cordoba (XI)	«Lamina Universal»	Isaac Ibn Sid	Arabic→ Castilian	between 1263 – 1277 Toledo
76.	**«The Aim of the Sage»** Author unknown	«Picatrix»	Yehuda ben Moshe	Arabic→ Castilian	1256 Toledo
77.	**Same work**	«Picatrix»		Castilian → Latin	1258 Toledo
78.	**«Books of knowledge of**	«Libros del saber de		Arabic→	1259

	Astronomy»	Astronomía»		Castilian	Toledo
79.	**«The book about crossing»** Abu Said Ubaid-Allah (?)	Libro de las cruces		Arabic→ Castilian	
80.	**«Alfonsine tables»** a group of authors led by Yehuda ben Moshe and Isaac ibn Sid (XII)	«Tabulae alphonsinae»		Castilian → Latin	1277 Toledo
81.	**«Book a round astrolabe»** Author unknown	«Libro del astrolabio redondo»	Isaac Ibn Sid	Arabic→ Castilian	between 1263 – 1277 Toledo
MEDICAL WORKS					
WORKS OF SCIENTISTS OF ANTIQUITY					
82.	**«On Airs, Waters and Places»** Hippocrates (460 BC –370 BC)	«De aere aquis locis»	Mark of Toledo	Arabic →Latin	between 1210 – 1231 Toledo
83.	**«Pulsation»** Galen (129 – 200)	«De utilitate pulsus»			
84.	**«Need to pulsation»** Galen	«De tactu pulsus»			
85.	**«Structure of drugs»** Galen	«De motibus liquidis»			
86.	**«Movement muscle»** Galen	«Se motu membrorum»			
WORKS OF SCIENTISTS OF MEDIEVAL EAST					
87.	**«Practice»** Yahya ibn Sarafyun (IX c.)	«Breviarium medicine»	Gerard of Cremona	Arabic →Latin	between 1160–1178 Toledo
88.	**«Phases»** Al-Kindi	«De Gradibus»			
89.	**«Book of the Ten Treatises of the Eye»** Hunayn ibn Ishaq (809–877)	«Liber de oculorum»			
90.	**«Introduction to Galen's works»** Hunayn ibn Ishaq	«Isagoge ad Tegni Galieni»	Mark of Toledo	Arabic →Latin	1210–1234 Toledo
91.	**Same work**	«Liber isagogarum»			
92.	**«Book of definitions and descriptions»** Isaac Israeli ben Solomon (832–932)	«De definitionibus»	Gerard of Cremona	Arabic →Latin	between 1160–1178 Toledo
93.	**Same work**	«De definitionibus»	Domingo Gundisalvo	Arabic →Latin	1180 Toledo
94.	**«The book about primary elements»** ben Solomon	«De elementis»			
95.	**«The medical book devoted to Mansour»** Muhammad ibn Zakariya ar-Razi (865–925)	«Liber almansoris»			
96.	**«The book about division»** ar-Razi	«Liber divisionum»			

97.	**«Introduction to medicine»** ar-Razi	«Introductio in medicinam»	Gerard of Cremona	Arabic →Latin	between 1160–1178 Toledo
98.	**«Diseases of joints»** ar-Razi	«De egritudinibus iuncturarum»			
99.	**«The comprehensive book on medicine»** ar-Razi	«Locorum quorundam tractatuum medecina»			
100.	**«Kitab al-Tasrif»** Abu al-Qasim al-Zahrawi (936–1013)	«Concessio ei data qui componere haud valet»			
101.	**«The Canon of Medicine»** Avicenna	«Liber Canonis»			
102.	**«Book of Urjuza»** («The poem about medicine») Avicenna	«Cantica de Medicina»			
103.	**«Commentary on Galen's Ars Parva»** Abu'l Hasan Ali ibn Ridwan Al-Misri	«Expositio ad Tegni Galeni»			
104.	**«The book about ordinary drugs»** Ali Ibn al-Husain Ibn al-Wafid (997–1074)	«De medicamentis simplicibus»			
105.	**Same book**	«El Libro conplido en los iudizios de las estrellas»	Yehuda ben Moshe	Latin → Castilian	1254 Toledo
106.	**«Lapidary»** Author unknown Ar. trans by Abu-l Ayis of Chaldean	«Lapidario»	Yehuda ben Moshe and Garci Perez	Arabic→ Castilian	1279 Toledo
WORKS ON THE BIOLOGY, METEOROLOGY AND CHEMISTRY					
WORKS OF SCIENTISTS OF ANTIQUITY					
107.	**«History of animals»** Aristotle	«Historia animalium»	Michael Scot	Arabic →Latin	1271 – 1220 Toledo
108.	**«Appearance of animals»** Aristotle	«De generatione animalium»			
109.	**«Bodies of animals»** Aristotle	«De partibus animalium»			
110.	**«Meteorology»** Aristotle	«Meteorologica»	Gerard of Cremona	Arabic →Latin	1160–1187 Toledo
111.	**«About plants»** Nicolaus of Damascus (64 BC – 4 AD)	«De plantis»	Alfred of Sareshel	Arabic →Latin	XII c. Toledo
112.	**«The book about nature secrets»** Apollonius of Tyana (1–98)	«Liber de secretis naturae»	Hugh of Santalla	Arabic →Latin	XII c. Saragossa
WORKS OF SCIENTISTS OF MEDIEVAL EAST					
113.	**«Book of the Composition of Alchemy»** Jabir ibn Hayyan (721–815)	«Liber de compositione alchimiae»	Robert of Chester	Arabic →Latin	1144 Segovia

114.	**«Book of secrets»** ar-Razi	«Secretum secretorum»	Gerard of Cremona	Arabic →Latin	between 1160–1187 Toledo
115.	**«Mineralogy»** (Part of «The book of healing») Avicenna	«Avicennae Mineralia»	Alfred of Sareshel	Arabic →Latin	XII c. Toledo
116.	**«About animals»** (Part of «The book of healing») Avicenna	«De animalibus seu Abbreviatio Avicenna de animalibus» or «De animalium»	Michael Scot	Arabic →Latin	1232 Toledo
WORKS ON THE PHILOSOPHY, LOGICIANS, THEOLOGY AND LITERATURE					
WORKS OF SCIENTISTS OF ANTIQUITY					
117.	**«The book about emergence and destruction»** Aristotle	«De Generatione et Corruptione»	Gerard of Cremona	Arabic →Latin	between 1160–1187 Toledo
118.	**«Posterior Analytics»** Aristotle	«Analytica Posteriora»			
119.	**«Metaphysics»** Aristotle	«Metaphysica»	Domingo Gundisalvo	Arabic →Latin	1180 Toledo
120.	**Same work**	«Metaphysica»	Michael Scot	Arabic →Latin	1220 – 1230 Toledo
121.	**«On the Soul»** Aristotle	«De Amina»			1230 Toledo
122.	**«Nicomachean Ethics»** Aristotle	«Ethica Nicomachea»			1220 – 1230 Toledo
123.	**Same work**	«De Moribus ad Nicomachum»	Herman of German	Arabic →Latin	1240–1256 Toledo
124.	**«Rhetoric»** Aristotle	«Ars rhetorica»			
125.	**«Ethics»** Aristotle	«Summa Alexandrinorum»			1243 – 1244 Toledo
126.	**«Poetics»** Aristotle	«Ars poetica»			1256 Toledo
127.	**«Canon of Kings»** Ptolemy	«Canon»			1240–1256 Toledo
128.	**«On Sense»** Alexander of Aphrodisias (fl. 200 AD)	«De intellectu»	Domingo Gundisalvo	Arabic →Latin	1180 Toledo
129.	**Same work**	«De intellectu»	Gerard of Cremona	Arabic →Latin	1187 Toledo
130.	**«The Theology of Aristotle»** Plotinus (205–270)	«Theologia Aristotelis»	Alfred of Sareshel	Arabic →Latin	XII c. Toledo
WORKS OF SCIENTISTS OF MEDIEVAL EAST					
131.	**«On the Difference between the Spirit and the Soul»** Qusta ibn Luqa	«De diffrentia spiritus et anima»	John of Seville	Arabic →Latin	between 1133–1142 Toledo
132.	**«The book about definition and classification of sciences»** Abu Nasr al-Farabi (873–950)	«De ortu scientiarum»	Abraham ibn Daud and Domingo Gundisalvo	Arabic→ Yiddish →Latin	between 1150–1180 Toledo
133.	**«Classification of sciences»** al-Farabi	«De scientiis»	Gerard of Cremona	Arabic →Latin	between 1160–1187 Toledo
134.	**«Indication of ways of happiness»**	«Liber excitativus ad viam felicitatis»	John of Spain and Domingo	Arabic→	1176–1178 Toledo

	al-Farabi		Gundisalvo	Castilian → Latin	
135.	**«Being of questions»** al-Farabi	«Fontes quastionum»			
136.	**«The book about sense of reason»** al-Farabi	«De intellectu»			
137.	**«The book about rhetoric»** al-Farabi	«Ars rhetorica»	Herman of German	Arabic →Latin	between 1240–1256 Toledo
138.	**«The book about a verse»** al-Farabi	«Ars poetica»			
139.	**«Epistles of the Brethren of Purity»** The Brethren of Purity (X c.)	«In artem logicae demonstrationis»	Domingo Gundisalvo	Arabic →Latin	1179 Toledo
140.	**«The book of healing»** Avicenna	«Sufficientia»	John of Seville	Arabic →Latin	between 1133–1142 Toledo
141.	**«The book about soul»** (Part of «The book of healing») Avicenna	«Liber de Anima»	Abraham ibn Daud and Domingo Gundisalvo	Arabic→ Yiddish →Latin	between 1152–1166 Toledo
142.	**«Metaphysics»** (Part of «The book of healing») Avicenna	«Metaphysica»	Domingo Gundisalvo	Arabic →Latin	1180 Toledo
143.	**«The comments to the Posterior Analytics»** (Part of «The book of healing») Avicenna	«Commentario Analytica Posteriora»	John of Spain and Domingo Gundisalvo	Arabic→ Castilian → Latin	between 1176–1190 Toledo
144.	**«Source of Life»** Solomon ibn Gabirol (1021 – 1058)	«Fons vitae»	Abraham ibn Daud and Domingo Gundisalvo	Yiddish →Latin	1150 Toledo
145.	**«Aims of Philosophers»** Al-Ghazali (1058–1111)	«Liber Algazel»		Arabic→ Yiddish →Latin	between 1152–1166 Toledo
146.	**«The book about the reasons»** The author is unknown	«Liber de causis»	Gerard of Cremona	Arabic →Latin	1187 Toledo
147.	**Same book**	«Liber de causis»	Alfred of Sareshel	Arabic →Latin	XII c. Toledo
BOOKS ON RELIGION AND NATIONAL FAIRY TALES					
148.	**«Quran»**	«Alchoran»	Robert of Ketton, Herman Dalmatin, Peter of Toledo and Mohammed	Arabic →Latin	1141 Toledo or Navarra
149.	**Same book**	«Alchoran»	Robert of Ketton	Arabic →Latin	1143 Navarra
150.	**Same book**	«Alchoran»	Mark of Toledo	Arabic →Latin	1211 – 1212 Toledo
151.	**«The 17th surah of the Qur'an»**	«La Escala de Mahoma»	Abraham de Toledo	Arabic→ Castilian	1264 Toledo
152.	**Same book**	«Muhammad échelle»	Bonaventura of Siena	Castilian→ French	1264 Seville
153.	**«Panchatantra»**	the name of the translation	Petrus Alphonsi	Arabic	between

		isn't known		→Latin	1106 – 1140 Saragossa
154.	**Same book**	«Calila e Dimna»	Yehuda ben Moshe	Arabic→ Castilian → Latin	between 1252–1284 Toledo
155.	**«One Thousand and One Nights»**	«Unus mille et noctes»	Petrus Alphonsi	Arabic →Latin	between 1106 – 1140 Saragossa
156.	**Same book**	the name of the translation isn't known	Yehuda ben Moshe	Arabic→ Castilian → Latin	between 1252–1284 Toledo
157.	**«Sinbad the Sailor»**	the name of the translation isn't known	Petrus Alphonsi	Arabic →Latin	between 1106 – 1140 Saragossa
158.	**Same book**	the name of the translation isn't known	Yehuda ben Moshe	Arabic→ Castilian → Latin	between 1252–1284 Toledo

4. Conclusions

Scientific theories of Eastern thinkers came into all Western worlds through translations from this list. They were basis and impact to further development of science in the continent. These works had been reliable and the most referable source for many centuries for European scientists and the fact that it was the main course book in the continent proves the given idea.

If we consider that the manuscripts of some books of listed scientists have not been preserved so far and their texts have been extended only through Latin translations, the significance of translation woks, which were made in medieval European translation centers, rises.

Therefore, incomparable works of East thinkers were the reasonable main source for the development of Europe folk scientific and spiritual potential. It is determined that among these translated works their total number was rather bigger and they were translated for many times. Further age of West scientists used translations particularly of Toledo schools and it shows us the significance of this certain scientific center in expansion of the works of East thinkers throughout the continent.

Consequently, the data is given in our research paper is another result of our investigation. Accordingly, it is natural that the number of the works of Eastern scientists, which were translated in medieval European translation centers, will rise and the list of their translators will be expanded during our further research.

REFERENCES

1. Alfonso X el Sabio. General estoria. Cuarta parte. Tomo I y II. Edición de I.F.Ordóñez y R.Orellana. Madrid: Fundación José Antonio de Castro, 2009. – 1294 p.
2. Alonso M. Notas sobre los traductores toledanos Domingo Gundisalvo y Juan Hispano. Al-Andalus. Revista de las Escuelas de Estudios árabes de Madrid y Granada. 1943; 7: 155–188.
3. Alonso M. Traducciones del arabe al latin por Juan Hispano. Al-Andalus. Revista de las Escuelas de Estudios árabes de Madrid y Granada. 1952; 17: 129–151.
4. Alonso M. Juan Sevillano, sus obras propias y sus traducciones. Al-Andalus. Revista de las Escuelas de Estudios árabes de Madrid y Granada. 1953; 18: 17–49.
5. Alverny M-T d'. Translations and translators. Renaissance and Renewal in the Twelfth Century. Oxford: Clarendon Press, 1982. – P. 421–462.
6. Astruc J. Mémoires pour servir à l'histoire de la Faculté de médecine de Montpellier. Paris: P.G.Cavelier, 1767. – 432 p.
7. Benjamin of Tudela. The Itinerary. Critical text, translation and commentary by M.N.Adler. London: Oxford University Press, 1907. – 209 p.
8. Burnett C. A group of Arabic-Latin Translators Working in Northern Spain in the Mid-12th Century. Royal Asiatic Society of Great Britain and Ireland. 1977; 1: 62–108.
9. Burnett C. The Coherence of the Arabic-Latin Translation Program in Toledo in the Twelfth Century. Science in Context. 2001; 14: 249–288.
10. Burnett C. The Translating Activity in Medieval Spain. The Legacy of Muslim Spain. / Ed. S.K.Jayyusi. Leiden, 1992. – P. 1036–1058.
11. Borsari E. (ed.) Translation in Europe during the Middle Ages. Berlin: Peter Lang Verlag, 2020. – 316 p.
12. Dulieu L. La médecine à Montpellier. Tome 1: Le Moyen âge. Avignon: Presses universelles, 1975. – 416 p.

13. Lawn B. The Salernitan Questions: An Introduction to the History of Medieval and Renaissance Problem Literature. Oxford: Clarendon Press, 1963. – 240 p.
14. Makhmudov O.V. The Toledo School – myth or reality: A refutations to J.S.Santoyo and A.Kalashnikov. Look to the Past. 2021; 4 (11): 38–48. http://dx.doi.org/10.26739/2181-9599-2021-11-5
15. Makhmudov O.V. Studies of scientific works of Muslim East scholars in the translations centers of medieval Europe. International Journal of Early Childhood Special Education. 2022; 14 (06): 1142–1151. DOI:10.9756/INTJECSE/V14I6.137
16. Makhmudov O.V. The Toledo School – Early Center of Translation in Medieval Europe. European Researcher. Series A. 2020; 11 (3): P. 150–158. DOI:10.13187/er.2020.3.150.
17. Mahmudov O. The beginning of the European renaissance. ERPA International Journal of Research and Development. 2020; 5 (7): 104–108. DOI: https://doi.org/10.36713/epra4787.
18. Makhmudov O. The role of the Toledo as a center for the transfer of scientific knowledge of medieval Eastern scientists to Europe. Eurasian Union Scientists. 2020; 6-8 (75):13-16. DOI:10.31618/ESU.2413-9335.2020.8.75.890
19. Mazza A. Historiarum epitome de rebus Salernitanis. Neapoli: Francifci Paci, 1681. – 192 p.
20. Petrus Venerabilis. Summa totius haeresis Saracenorum. In Peter the Venerable and Islam / Ed by J.A.Kritzeck. Princeton: Princeton University Press, 1964. – P. 115–293. – 301 p.
21. Peter the Venerable. Writings against the Saracens. Trans. by I.M.Resnick. – Washington: – The Catholic University of America Press, 2016. – 189 p.
22. Rada de J.R. Historia de los hechos de España. / Introd., traduc., notas de J.F.Valverde. Madrid: Alianza editorial, 1989. – 457 p.
23. Rada de J.R. Historia arabum. Publicaciones de la Universidad de Sevilla: Serie Filosofía y letras. Sevilla: Salesiana, 1974. – 92 p.
24. Salimbene da Parma. Cronica. A cura di F.Bernini. – 2 vol. – Bari: Laterza e Figli, 1942. – 1005 p.
25. Toubert P., Bagliani A.P. Federico II e le scienze. Palermo: Sellerio, 1994. – 189 p.
26. Villani G. Chronicle. / Trans. by R.E.Selfe., Ed. by P.H.Wicksteed. London: Archibald constable & Co. Ltd., 1906. – 461 p.