

### **Reference:**

Rashed, Rushdi (2002), "Arabic sciences between theory of knowledge and history" in philosophy and current epoch, no.2, Cairo, Pp. 27-39.

### **Arabic sciences between theory of knowledge and history,**

**By: Rushdi Rashed**

### **Review**

History of Arabic science, which extended from the eighth century till the end of the seventeenth century is, generally speaking, not fully known until today. However, full knowledge of Arabic science is not only important for the Arab/Islamic culture, as a way for self-knowledge, but also important for correct and scientific knowledge of history of science itself as a field. Moreover, it leads to correcting the distorted knowledge that prevailed about the evolution of the European seventeenth century scientific practice.

This is the main theses of this work. The author makes use of a deep and intensive knowledge of the details of the scientific enterprise in the ancient, middle, as well as the modern ages. Through this knowledge, he was able to grasp and formulate a picture of 'continuity' between these three phases of human, as well as scientific, history. In this continuous form of advancement of science, the Arabic science played a pivotal role whether in preserving, translating, or contributing innovatively, in advancement of human science.

The author inaugurates his work by stating that history of science, as a distinct discipline, has been established within the philosophy of enlightenment. He notices that there have been many writings about the history of science in the previous ages but he sees that,

These referential important writings aimed at noting and recording and didn't follow this science or that to uncover how it became the way it is in a specific era and what are the obstacles that it had overcome. ... This endeavor requires a new methodology in study and analysis, the historian has to describe the theoretical structures and the conditions under which it has been formed. This methodology didn't appear, to my knowledge before the eighteenth century, and with the enlightenment philosophy. P. 28

This new discipline, history of science, served two functions for the philosophers of the enlightenment,

History of science undertakes two related functions, despite their differences, for enlightenment philosophers: it is the necessary tool to define modernism... The second function ... is establishment of the concept of continuous advancement and continuous elimination of the errors acquired by the nature of humanity. P. 29

The author, after establishing the emergence of the field of history of science within enlightenment philosophy discusses the position of the Arabic science in this new discipline as follows,

The picture of Arabic science during this century [the nineteenth century] has become distorted... In the beginning, history of Arabic science has gained a strong push from the German romantic philosophy as well as the linguistic school that sprung from it, before becoming afterwards one of its victims. For, study of history of science turned out to be a study of history through languages; I mean discrimination between races and mentalities according to languages. There are Arian languages and there are Semitic languages, the first is useful for a scientific philosophical mentality, and the second is for

**a 'religious/poetic' mentality... [hence] according to this school, which relates mentality to language, Semitics didn't have the right to produce science and philosophy. Consequently, Arabic science didn't have the legal right of existence. P. 30**

**As a result of this position, historians of science acquired the following distorted picture of the Arabic as well as history of science,**

**At this time, whatever the ideological view of the historian, it was not possible for him to ignore the Arabic science [due to historical facts] when he deals with the scientific material he wanted to historicize. This or that historian didn't see science except as a pure European phenomenon, and hence, it was not possible for him to look to Arabic science with a correct positive view. At best, he didn't see it except as a carrier of Greek translations, and it was considered as a 'new Greek science'... Many historians have been extravagant in this view which lead to a distortion of the results of the Greek science and misunderstanding of what happened in advancement of science during the seventeenth century. Many has read in Greek science what was not in it, others believed that the seventeenth century science was a complete revolution from the beginning to the end. P. 31**

**The author then points out to the new studies in Arabic science and the findings of such studies about the nature of the Arabic science and its status in the history of science. He countenances these findings as follows,**

**This ideological view to the Arabic science continued to prevail during the nineteenth and the twentieth centuries. However, this was not the only existing view, there have been another view that was advocated by a handful of historians who didn't accept the romantic school's view, such as A. Von Humboldt. This current has been concerned with what Arabic science bears of authentic traits. Which lead since the fifth decade of the twentieth century to unprecedented acceleration of this current of historical studies... If one wants to describe the Arabic science as whole, it will be clear that what was a potential in the Greek science has been realized in the Arabic science.**

I mean that, this tendency to overflow a specific area and to break the limits of a specific culture to reach the whole world has become a complete reality in a science that has been formulated around the basin of the Mediterranean Sea. Not only as a geographic space, but also as a focal point for exchange and communication for all the cultures that flourished around this basin. The word 'Global' is the most suitable and correct word to describe this new Arabic science. This science was global by its sources, global by its evolutions and extensions. For, despite that most of its sources were Hellenistic, it also included Syrian, Sanskrit, and Persian sources. P. 31

At this point, the author stresses on this basic trait of Arabic science, i.e. becoming a global phenomenon, and expresses in detail its origins and nature as well as its relation to the socio-political system of the Arabic societies and the Arabic cities. This elaboration prepares for his central theses, which is the 'continuous' advancement and interference between cultures with respect to history of science. He writes,

What should take our attention is that this phenomenon was not a result of mere chance. The scientific tradition that has been pursued by the scientists of the Islamic civilization with support from the political authority had prepared the stage and encouraged the scientists to continue this way. There has been contending schools, sometimes, and cooperating ones, some other times, that have been driven by scientific research itself to fetch for the ancient works and translate it to the Arabic language. Their aim was not to draw attention to such works, but to continue an active scientific inquiry... This phenomenon, to which I don't know before an equivalent, has produced for the first time in history a scientific library that encountered the dimensions of its era. This library included the scientific and philosophical production of multi-languages and sources' traditions. These scientific traditions along with its production became part of one civilization and its language, which was Arabic. Therefore, these traditions [the Arabic scientific traditions] acquired the resources for intercultural reciprocal effect,

which enabled it to introduce new methodologies, and reach new scientific fields that was unknown to the ancients, such as Algebra, and geometric projections and others... It became possible for the first time in history, then, to read translations for the scientific production of different ancient civilizations, as well as new novel research works in one language, the Arabic. This was not a privilege only for the Arabs, but overreached countries that speak other languages... In fact, we would not be exaggerating if we say that since the beginning of the ninth century, science had a language, and this language was Arabic. Moreover, this language has gained a global dimension, ... it became not a language for a specific culture, but the language of all of the rational knowledge. P. 32

Now that the author has established the location of the Arabic science in the history of human science, it becomes possible to analyze, in more detail, what went wrong in describing the position and picture of the Arabic science in the eighteenth and nineteenth centuries. He cites two basic reasons, ignoring the relations of Arabic science with other civilizations, and lack of knowledge of the details of Arabic science due to lack of knowledge of Arabic language.

There are two other reasons [for failing to appreciate the global dimension of Arabic science], the first one relates to history of science, and the other to what was written about this history. In reality, history of science uncovers for us the relations that bounded the Arabic science with its Latin extensions. In a more general view, with science that have developed in Europe till the seventeenth century approximately. Effectively, it is not possible, in any way, to understand what has been accomplished in science in Latin language since the twelfth century without knowing the Latin translation from Arabic and without knowing the scientific research that has been accomplished in Latin in context of Arabic science and within its style... The most advanced research works in Latin [at that time] can't be appreciated, with just, without referring to Al-Khwarizmi, Abu Kamel, Al-kindi, and Alhazen, etc... These serious relations between the Arabic science and Latin science diverted the views of the

historians from giving attention to other relations between the Arabic science such as its relation with the Indian and may be the Chinese sciences. P. 34

The other reason [for ignoring the global dimension of Arabic science] refers to the writings of the history of science. In most of the writings, the sixteenth and seventeenth century, science has appeared in a strange picture. The majority of these historians didn't know Arabic language and hence the Arabic science. Therefore, such a science [the European science] has appeared revolutionary from the beginning to the end, in all its fields as much. This situation has not been possible except in case of absence of correct knowledge of major works of Arabic science. Such as the works of the 'Maragha' school and what was before it in the 'science of Alhayaa' [Arabic Astronomy]; the writings of Al-Khayam, and Sharaf Al-deen Al-Tussi in Algebra; the writings of Bany Mousa, Thabet Ibn Qurra, Ibn Senan, Alquhy, Ibn Suhail, and Alhazen in mathematical analysis, as well as the writings of Ibn Sahl and Ahazen in the Perspectives, etc. Therefore, it was natural that such an ignorance of the effects of the Arabic science would create a gap that distorted both of them and hid their basic traits. P. 35

The aforementioned analysis makes the central thesis of the topic a natural corollary. Hence, the author states it as follows,

These are the reasons behind ignoring the basic traits of the Arabic science, especially the one that we have stressed on, which is its universality. The reestablishment of the status of Arabic science does not entail reducing the status of Kepler and the novelties he brought in astronomy, nor the status of Descartes and his contribution to algebraic geometry, nor that of Galileo and his revolution in the dynamics. On the contrary, correcting the picture and gaining complete knowledge of the material helps us to relocate the position of the new contribution with added accuracy... Correction and acquiring knowledge of real history would urge us to reconsider some of the ideologies and the prevailing concepts of historians of science,

and some of the methodologies that have been taken for granted while dealing with history of science. What should be put under critical scrutiny is our concept of 'scientific renaissance', in addition, we should redefine our concept of 'scientific revolution', i.e, those prevailing concepts in the references of history of science. This would not be possible except when research in the history of Arabic science becomes active, and only if this last one regains its picture as a global phenomenon. This compels us to follow the Arabic science and its extensions in Latin and Italian languages, as well as its extensions in Hebrew, Sanskrit, and Chinese... It is clear, then, that re-writing the history of Arabic science leads us to renovation of the history of science itself. This is the price, we have to pay, if we wish to contribute in advancement of history of science as a whole. In such a way, history of Arabic science would realize three tasks at least. Opening the way for a true understanding of the history of the classical science between the ninth and twelfth centuries; renovation of the history of science, in general, through reformulating the picture that has been distorted by the ideological views; and real knowledge of the Islamic culture in a correct way through restoring the rational/scientific dimension of its heritage. P. 35-36

In the final section of the paper, the author gives one practical example to prove his thesis. In this example he shows how one chapter of mathematics have appeared and flourished by several ancient and medieval mathematicians, and have not been surpassed till the beginning of the eighteenth century. This example is the calculation of the maximum areas and volumes, i.e., one of the chapters of mathematical analysis, and specifically proving that the circle is the widest plane shapes with equal surrounding elements, and that the sphere is the greatest volumes of equal surrounding elements. The author describes the efforts made to solve this problem since the Greek mathematicians, passing by the works of the Arabic scientists and mathematicians till the works of Ibn Alhaytham (Alhazen in English). He concludes his example by stating that the mathematical research has not exceeded this last work of Ibn Alhaytham till the discovery of the differential mathematics around the end of the seventeenth

century and the beginnings of the eighteenth. Consequently, he states that it is clear that the picture of such a chapter of the history of mathematics does not coincide with what classical historians narrate, for still the majority of those historians aren't aware about such picture of Arabic science. If we encounter this chapter, both pictures [of the Arabic and the modernist] will change. And the most important result is that we will be able to put the right question that follows: Ibn Alhaytham reached what the Bernoulli brothers has started with, then why he was not able to go far more than what he has reached, and what is that really new in the works of the Bernoulli brothers? To such a question, we can now answer, and this was not possible before knowing what was introduced by the Arabic science with respect to this topic. This is an example on what can be introduced by the Arabic science for the history of science, for these results about the works of Ibn Alhaytham was unknown till a few years ago. P. 36 – 39