



Mini Review

From iology to toxicology: A new specialization in ancient Alexandrian school

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ABSTRACT

"From iology to Toxicology: a new specialization in Ancient Alexandrian School", (published in Elsevier, Toxicology Reports 8, 2021, pp. 1310-1323) written by Ana María Rosso, develops the context and circumstances that led to the emergence of the Alexandria school of toxicology in the 3rd century BC, an intense period in the Ptolemaic kingdom with several prominent figures and scientists from different countries. The first Ptolemies, especially Soter with a poor health, became interested in medical science, regardless of his practical applications. Surrounded by court physicians, who finished involved in high politics, they promoted clinical and scientific investigations and specialties among the medical staff, studying new subjects and new diseases. Alexandrian medicine achieved fame thanks to an increasingly competent and dynamic team who advanced in related disciplines as anatomy, physiology, pharmacology and especially toxicology, because many people were afraid of being poisoned with lethal drugs or by snakebites envenoming. Later this science that deals with toxics was named iology. However the School did not exhibit the same splendor in all the Ptolemaic period. After the 3rd century BC the weakening of the royal power produced the Greek scientific emigration and a decline in the research. The Egyptian upper classes of society took the place and were seeking the protection and influences on the royal court. In contrast, the last 50 years of Ptolemaic reign, saw a great revival of medical schools, despite the monarch's adverse politics. In the 1st century BC with the last rulers of the Ptolemaic dynasty, Auletes and his child Cleopatra VII, Heraclides of Tarantum and Apollonius Mys stand out as the most remarkable Herophilean pupils of the Alexandrian school. "Heraclides, specialized in iology, was responsible for putting a brilliant end to the golden age of Ptolemaic medicine which had been opened by another great Alexandrian doctor, Herophilus".

Keywords: Iology, Toxicology, Specialities, Poison research, Prestigious physicians.

INTRODUCTION

The manuscript of Ana María Rosso entitled "From iology to Toxicology: a new specialization in Ancient Alexandrian School", (published in Elsevier, Toxicology Reports 8, 2021, pp. 1310-1323), aims to provide an original insight into the famous medical school of toxicology in Alexandria, that was both an important city and a place of inspiration in the history of medicine since the 3rd century BC until 7th century AD. Its fertile intellectual and scientific environment required new ways of thinking and understanding of the disease process. King Ptolemy I Soter (323-285 BC) established the Museion with the 'Faculty' of Medicine that would be an important part of this edifice of knowledge and the renowned Library of Alexandria, fabled in Antiquity for its treasures of wisdom formed a part of the museum (Flower, 2002; Fraser,

1972). This complex interaction between Greeks and Egyptians before and under the Ptolemies gave scholars on the staff a comfortable life supported by royal patronage and the opportunity to pursue scholarship in the company of other eminent scientists with excellent repercussions. Intellectuals took part in scientific research, especially in medicine and mathematics, developing different known areas and programs (Jonckheere, 1952). Furthermore specialized studies were codified and systematized in Alexandria and the activities promoted professional learning to grasp the new concepts and information. The 'School of toxicology' started in the 3rd century BC with Apollodorus of Tarentum (Allbutt, 1921) onwards, the father of iology and his book *Peri thêriôn* and later a long list of specialists transmitted the interest on the subject in several subsequent reviews until the Cleopatra reign.

LITERATURE REVIEW

The manuscript, interesting and very well written, provide a rich list of references, as well as an in-depth commentary of the covered notions, always supported by the appropriate citations. However many texts and treatises of the first specialists have been disappeared and their loss is a challenge to obtain sufficient information and complete a coherent history of medicine. Two types of sources allow make up the essential repository of information about the existence of all the Alexandrian court practitioners: 1) Galen, Celsus, Soranus, Pliny's accounts who were technical writing authors not much interested in the carrier and social position of Hellenistic doctors, but only in their works, intellectual trends and training, 2) another historical sources of unequal value, Polybius, Diogenes Aetius, a Theocritus'scholium, inscriptions, papyri, which requires critical examination. They draw us into the curtly circles but do not speak about scientific aspects (Gorteman, 1957).

Nevertheless, the article shows the close relationship in the Museion (Hajar, 2000) during the late 4th century between the most prestigious and progressive academic Coan doctors and the Alexandrian group, while Cnidus' elements largely disappeared from the field. It also underlines that several centuries before, when the Greek mercenaries came to fight and settled in Egypt under the Saite Pharaohs, took place the renewal of these principles and theories due to political and economic contacts between the two civilizations. Subsequently, the 26th dynasty (664-525 BC) was devoted to study, review and copying ancient papyri and brought to light different Egyptian ideas in many fields that had an impact on Greek scientific development on the Ionian coast (Rosso, 2007). These relationships allowed give birth to the Greek philosophy of nature and, in medicine, the Hippocratic documents were notably influenced by the Egyptian Papyri.

As the medical science of ancient Greece plunged late into political decadence and setbacks - scientific work was renewed in this city with the arriving of the greatest minds of the day. In the 3rd century BC, the Ptolemaic capital caught the different trends and became the seat of divergent and independent schools. Although Egyptians seem not to have been active as scholars in the Museum and the Library, the debt of the Alexandrian physicians to the native Egyptian doctors, highly specialized, was very considerable, an issue which has certainly been much discussed. But probably the intercultural contacts took place in the temples (Von Staden, 1989) and their 'Houses of Life' because Coan schools in this time had general professionals who recommended therapeutic and nutritional strategies and diets while Alexandria science provided academic specialization.

Furthermore, the new diseases, to which they faced and considered, did promote the specialties, distant from the Hippocratic Corpus. Doctors are therefore engaged in the study of certain subjects, previously excluded or ignored and the Alexandrian medicine has gained fame thanks to the environment in which they worked. This medical school offered and ensured a broad knowledge in anatomy, physiology and pharmacology, while still including the toxicology, providing a significant access to a neglected chapter in the history of medicine.

On the other hand, Herophilus and Erasistratus (Fraser, 1969) made important contributions in the study and teaching of human anatomy. Herophilus (335-280 BC), considered a master of ancient medicine and the father of anatomy, occasionally performed dissections in public and recorded these observations in *On Dissections*. His predecessor, Aristotle, had almost certainly vivisected animals, but Herophilus was possibly the first scientist to study the human body. In contrast to the physical observations and disease description of the Hippocratic School, the Herophilus' anatomical researches led to outstanding contributions in medical terminology. Through his fervent interest in the subject of the nervous system, he emphasized that the brain, not the heart, was the seat of intelligence, a scientific revolution over the prevailing Aristotelian doctrine at the time based in the historical belief that the heart controls sensation, thought, emotion and body movement. The medical school of Alexandria was on the front lines of 'scientific' medicine (Wellmann, 1900).

DISCUSSION

In this context the document tries to delve into the rise of the medical branch of toxicology in Egypt, later called lology. Animal and plants toxins received plentiful attention from academic research, a new and fascinating field very fashionable in the country after Alexander's conquests. The article clarifies and corroborates the important role of lology, venoms and medicine in the erudite circles of the city, the capital of Ptolemaic dynasty. The new discipline aroused a strong interest in this Ancient School, a world renowned institution of higher learning thriving in a fertile intellectual and scientific context. The palatine group of high-profile doctors, involved in legal tasks associated with the government, became great specialists supported by the sovereigns while the teachers of advanced medicine will leave their previous practices behind in order to devote themselves wholeheartedly to their investigations. Rulers were afraid that these scientists became suspects or guilty of impiety or would commit violent crimes with poisonous drugs for disloyalty to the Crown, given their considerable knowledge of the types of poisons and their effects on the body. For this reason it emerged as a very popular topic throughout the Hellenistic period and kings, with scientific concerns and very active in protecting themselves against all aggression, favored the study of plant toxins, animal

venoms, lethal properties and treatments, and Egypt developed some reputation (Serageldin, 2013).

Medical talents from different parts of the world, especially Greeks, became specialists in this science. They dedicated their efforts to understand the toxicity and risks of poisons and searched specific antidotes to combat side effects. A list of prestigious scholars in the field proves the importance and depth of these studies that became a special and developed branch in medical literature. Apollodorus of Tarentum, whose major work, *On Poisonous Animals*, was a source for pharmacologists and toxicologists in later antiquity, was the father of iology in the 3rd century BC and medical interests of some experts increasingly concerned the same subject of specialization still in the end of the dynasty (Aggrawal, 2005). Sources of information are cited to give credit to the different physicians development process, among them: Herophilus of Chalcedon, Erasistratus of Ceos, Straton of Lampsacus, Apollonius of Memphis, Philinus of Cos, Bolos of Mendes (Sigerist, 1971), Andreas from Carystos, Heraclides of Tarentum, Apollonius Mys, Zopyrus, Dioscorides Phacas, Sostratus and Philomenus of Alexandria (Philumenus, 1908).

CONCLUSION

The set of analyzed topics, all eloquently written, includes:

- The intellectual and scientific context in Alexandria
- The Coan School and the debates among the sects
- Court physicians and specializations in Alexandria
- Alexandrian School and the emergence of toxicology
- The most remarkable figures in the 3rd century BC and
- Preeminent personages at the end of the Ptolemaic Dynasty

The aim of the present review is to briefly describe the most important points in the development of toxicology and introduce a long list of iologues or eminent physicians in Alexandria whose works on botany, pharmacology and toxicology were renowned. This city was the bridge to establish this science, very important in the History of Medicine.

In view of all this, this pioneer study becomes the ideal complement to better understand a fascinating period of Egyptian history and the intellectual incepted ferment in the Ptolemaic era. Even though the Alexandrian school had also a systematic development of the toxicological education until the Byzantine era given that it still retained its prestige in this medical field.

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