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GENERAL ASPECTS OF HISTORY AND PHILOSOPHY OF MEDICINE

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## Galen as Read and Perceived by Medieval Islamic Medicine

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The influence of Galen in Islamic countries is associated with the extensive contribution of Greek scientific knowledge in the pre-Islamic and Islamic periods. Islam as a religion and a political force, competing with Christianity and the Byzantine Empire, was instrumental in spreading the heritage of Greek medicine. It originated in a geographical and cultural sphere near Hellenistic civilization. For development and distribution, «non-Islamic» science and knowledge were needed. It appears that the dominance of Greek medical thought in Islamic culture was possible because integration of Greek intellectual heritage was part of the ideological process during the formation of Islam itself. However, Greek medicine, as it was perceived by Islam, was no longer a body of knowledge that could develop independently: it now needed to be interpreted in a special way – as Islam required it. While theoretical teaching in Hellenistic medicine was based on anatomical observations. After a period of neglect that began in the second half of the third century BC, it was again taken up by Galen in the second century AD. Theoretical innovation based on anatomy did not actually occur in Islamic medicine. A lack of any clear understanding of the practical relevance of anatomy to the development of medical knowledge led to it becoming exclusively descriptive in medieval Islam. However, this underestimation did not explain why dissection and surgery did not develop in Islamic medicine. Religious and theoretical factors were more important. The author attempts to show how Galen was perceived in the Islamic world and, based on an analysis of Islamic reading of his works, reveals the reasons for the gap between the Christian West and the Islamic East in their approaches to ancient Greek medicine.

**Keywords:** *Galen, Islam, Greek medicine, Islamic medicine, anatomy, history of medicine*

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In a letter of 20 February 1657, a contemporary of Descartes wrote: One of Descartes' friends went to visit him at Egmond, Netherlands. This gentleman asked him about physics books: which ones did he most value and which of them did he most frequently consult? "I shall show you", replied Descartes, "if you wish to follow me". He led him into a lower courtyard at the back of his house, and showed a calf that he had planned to dissect the next day. "Here is my library from which I take my wisdom" answered Descartes to his friend [1].

Such a library as source of medical knowledge was first used by Aristotle in the 4<sup>th</sup> century BC and later by Herophilus (ca. 320–260 BC), Erasistratus (ca. 260 BC) and then by Galen (ca. 129–216 AD). What distinguished Galen from earlier Hippocratic physicians were his efforts to unite various medical schools, a turning point in the history of Greek medicine, without which they probably would not have prospered. It was Galen's work that shaped the medical curriculum of the

School of Alexandria. As intellectual heirs to this school, Islamic physicians hammered home the importance of dissection and anatomy in medical education. It is, however, striking that there was no single dissection undertaken by Islamic physicians. In any event, they were not reported or documented. Therefore, we have three major approaches (or readings) towards the relationship between medicine and anatomy before the modern period. They are distinguished by their inherent link between the form of anatomical pathology: Aristotelian, Galenic and Islamic. The aim of this paper is not to examine these three historical experiences in medicine, but to depict the impact of Galen on medicine in Islam, explore the epistemological gap between the Islamic hakims (philosopher-physicians) in the seventeenth and eighteenth century on the one hand, and their contemporary Western counterparts on the other. This article aims to understand why in Islam the most practical aspect in medicine, namely anatomy and dissection, were converted to "text" and knowledge of the human body was sought in books. In the West, "anatomical dissections" for Descartes were based on his prized physics

books and the “Experimental Medicine” of Claude Bernard, (1865) as inspired Emile Zola, who dispassionately wrote about French society in his novels. By examining the Islamic reading of Galen, this article attempts to identify the factors that caused this gap between the Christian West and Islamic East in their approach to Greek medicine. To do this, I will need to begin with Galen and the process of the transmission of Galenic medicine into Islam, not least because it is the process of assimilation of Greek science in Islam that informed the way it was conceived or perceived.

### Galen and Hippocratic medicine

Throughout the Hellenistic period, various medical approaches developed, including Hippocratic medicine<sup>1</sup>. During the first four years of his medical studies, Galen attended the courses of almost all the then-active medical schools (or rather approaches), the Dogmatic, Empiric, Methodic and the Pneumatic in Pergamon. It seems, however, that from this early stage Galen was more influenced by the Dogmatics, who, while following principles of the Hippocratic teachings, believed that the mere observation of the exterior of the body was not sufficient and a knowledge of anatomy was critical to medical practice [4, p. 7]. As we will see, the Dogmatic approach with an emphasis on anatomy emerged a century after Hippocrates (ca. 460–370 BC) under Aristotelian influence. In turn, the emergence of the Empirics was a reaction to the anatomical school of Alexandria [5, p. 32]. It was thanks to Galen that Hippocratic medicine triumphed, since in his time the Methodics and the Empirics were more numerous and probably more successful [6, p. 658]. Although Galen criticised the Empirics, believing that knowledge of inner structures and functions was essential to successful medical practice, he combined the two approaches of dogmatism and scientific experimentation, a method that was followed by Islamic physicians [7, p. 21].

### Galen’s works

Galen began writing when he was a teenager and continued until nearly the end of his life [5,

p. 14]. His surviving works include more than 120 titles, published in 22 hefty octavo volumes by Carolus Gottlob Kühn in the original Greek. In Leipzig they included an accompanying Latin translation, 1821–1833. Hunayn in his *Risâlah* provides details about 129 works of Galen that he and his collaborators translated from Greek into Syriac and/or Arabic [8, p. 25]. Campbell records 272 works of Galen, including some which have been lost [9]. However, none of these figures represent the entirety of Galen’s work [10]. The Arabic versions of Galen’s works are mostly attributed to Hunayn b. Ishâq (d. ca. 873) and his followers, such as his son Ishâq b. Hunayn (d. 910); but others, like the well-known Thâbet b. Qurrah (d. 901) contributed as well. In the interest of clarity and readability, Hunayn intended his translations to be idiomatic rather than literal, at times achieving greater lucidity than Galen himself, but at the cost of occasional errors [8, p. 30; 11, p. 119]. The content of Galen’s lost works can also be found in citations in works of later physicians such as Râzi who in his *Shukuk alâ Jâlinus* quotes Galen literally, or Ebn Sina, who in his Canon paraphrases him without specifying which of Galen’s works he is citing [12, p. 191, 192]. We might also find works that are wrongly attributed to Galen. The *Tâle’-nâma-ye Jâlinus*, for instance, obviously is not attributable to Galen. It is a genre of commentary in which Galen’s ideas are presented through the prism of Islamic or folk astrology [13].

The translations of Galen’s works were made from Galen’s original texts and from Late Antiquity Alexandrian summaries and commentaries. In Shahrazuri’s (active c. 685/1285) myth formulations, “from nearly 400 small and large tracts of Galen, [a summary made in] sixteen volumes were [at the most] read by medical students” [14, p. 332]. Shahrazuri would refer here to what “Onsor al-Ma’âli”, writing in 475/ca. 1082 [15, p. 213], and Nezâmi-ye “Aruzi”, writing in 550/1155 [16, p. 110], called the “Sixteen Books”, *setta-ye zaruriya*, and that recommended to medical students. Sometimes these Sixteen Books are mistaken for another set of text books based on Galen’s works called *Jawâme’ al-Eskandarânîyîn* or *Summariâ Alexandrinorum*. According to Savage-Smith [17, p. 126, 127, 131, 138], the “Sixteen Books” were written by Galen himself for “the beginner”,

<sup>1</sup> On Hippocrates and Hippocratic medicine, see: [2, 3].

while the so called *Javâme' al-Eskandarânîyîn* were the abridged version [by the Alexandrian physicians] of the sixteen Books [8, p. 13]. This assertion is supported by Ibn al-Qifti's notes (died in Egypt in 1248) that the *Eskandarânîyîn* were those who prepared abridged works of Galen (*jam'-e kalâm-e Jâlinus*) [18, p. 97]. Ullman believes that the prolixity and partial contradictions in Galen's original works resulted in the Islamic physicians having recourse to the summarised or coherent translation (in form of *Javâme'-e Eskandarânîyîn* or *Sett-ye zaruriya*) [19, p. 10]. However, it seems that as far as the *Javâme'-e Eskandarânîyîn* is concerned, its importance for the Islamic physicians was more fundamentally related to the importance of both Alexandrian medicine and Aristotelian philosophy in Islam<sup>2</sup>.

### Galen and Islamic medicine

Galen's influence on Islamic countries is linked to the wider impact of Greek sciences during the pre-Islamic and Islamic periods. In the pre-Islamic period, this was partly due to the introduction, or formation, of Hellenistic culture in the aftermath of the conquest of vast regions of Western Asia and the Middle East by Alexander of Macedonia (356 BC–323 BC). It can also be partially attributable to the introduction of Greek sciences into Middle Persia, i.e. Pahlavi, under the Sasanian kings. The ninth-century Pahlavi compilation *Wizidâgihâ i Zâdsparam*, known by its author, the priest-physician Zâdsparam, propounded the four humours (*âb*) – blood (*khun*), phlegm (*drêm*), red bile [Pahlavi transcription following MacKenzie] (*wish i suxr*), and black bile (*wish i syâ*). This echoed Greek humoral physiology and may be indicative of Greek influence on Sasanian medicine [8, p. 17]. According to some scholars, the religious Sasanian text of Denkart treated Greek sciences was part of Zoroastrian canons and that this was indicative of the pre-Islamic origins of Greek influence in Iran [20, 21]. However, medical literature in Iran after the advent of Islam had an entirely different origin. The linguistic and religious break with the pre-Islamic period might be viewed as the main factors of this

discontinuity. The possibility of a continuation of Iranian tradition in medical writings which did not pass through Arabic texts in the Islamic period remains uncertain [22, p. 142]. However, with regard to patient-doctor relationship, there are elements of continuity that bypassed Greek influence. According to the Hippocratic Oath, the interest of patient, regardless of social status or religious conviction, is central to the work of the physician [3, p. 59]. However, according to the Vandidad, the part of the Avesta where medicine is discussed, a Zoroastrian physician may treat a worshiper of Ahura Mazda only if he has three times successfully treated worshipers of Daeva (or the unbelievers). If he fails only once and the worshiper of Daeva dies, he is not allowed to treat a Zoroastrian patient. On the other hand, if the physician treats a worshiper of Ahura Mazda and the patient dies, the physician will be subjected to the pain of *barodhê-Varstha*, or death penalty [23, p. 11, 12]. A similar discrimination was observed in Islamic Iran. 'Onsor al-Ma'âli advised physicians to undertake numerous experimentations on ordinary or poor patients in hospitals, but not on noblemen [to acquire the skill necessary for the treatment of the latter], despite the fact that he recommended the physician read the Hippocratic Oath [15, p. 215, 216]. However, this contrast has theoretical rather than practical value. The Hippocratic Oath advocates the ideal form of doctor-patient relationship and it is unlikely that in Ancient Greece poor patients, including slaves or members of the Plebs, were never used as objects of medical investigation. This improved medical knowledge would be used for the benefit of the wealthy.

To appreciate Galen's influence on Islamic medicine, it needs to be viewed and studied from a wider context. Two questions remain in this medical historiography. The first is why the Moslems assimilated Greek sciences, Greek medicine in particular. The second question is why, despite adopting Greek science, the very principle of inquiry into nature was neglected and at times refuted. It is often held that Greek sciences were transmitted to Islam through the Sasanian channels. This is because the Abbasid Caliphate, under which Islam reached its apex in territorial expansion and state power, inherited the Sasanian state apparatus and its scientific

<sup>2</sup> About the role of the Nestorian physicians in the transmission of Alexandrian medicine to Islam, see Gul Russell [20].

legacy [7, p. 5–8]; the Sasanian state was largely based on Greek science.

This transmission, according to Gutas, was structurally framed in what he called the ‘imperial ideology’ that the Abbasid Caliphate borrowed from the Sasanians for the establishment of their own Empire [21]. One should nevertheless bear in mind that the Sasanians were highly eclectic in acquiring foreign sciences, and the Indian sciences, for instance, were no less common than the Greek sciences [11, p. 79–80]. On the other hand, the sciences of the Muslims, as Abu Rayhân Biruni emphasized, were almost entirely dependent on Greek learning and were not influenced by Indian science [23, p. 8]. Even under Ullmann’s assumption, who in any case acknowledges that they did not rely on direct evidence, “complete Greek medical works were translated into Pahlavi under Khorsrow I” [19, p. 17, 18]. However, this was certainly not the major conduit introducing Greek medicine into Islam. Its predominance in Islam seems to stem primarily from the fact that the integration of Greek sciences was part of the ideological and intellectual, or in other words, theology/faith-building process in the course of the formation of Islam itself [25].

A new religion, still in search of its dogma or ideology and within a socio-political framework of conflict between antagonistic powers and opinions, gave rise to intellectual debates alongside political conflicts. The formation of the four major Islamic schools of *Ash‘ari*, *Shâfe‘i*, *Hanafi* and *Mâleki* took place in such a context. Despite their (ideological) aversion for what was non-Islamic, all of these ‘schools’ came to adopt rational methods of arguing and debating, not only against each other but also to confront objections coming from Christians and Jews [26]<sup>3</sup>.

Origins of the introduction of Greek medicine into Iran after Islam should also be sought in all regions that had undergone Hellenization since their conquest by Alexander of Macedonia, before being conquered by Islam. It seems that the conquest of Egypt in the first decades of the Islamic expansion constituted the first major step in the integration of Galenic medicine, inasmuch

as Alexandria was by that time not only the cultural centre of Hellenism [28, p. 17] but also the place where Galenism had become the predominant medical system. The fact that the region where Islamic medicine was first developed had already inherited a portion of Hellenistic sciences, in philosophy, Aristotle and Plato, at the expense of Epicureans and Stoics, and Hippocratic medicine at the expense of theoretical developments of other schools such as the Methodists and the Pneumatics [29, p. 140], might explain why from a range of philosophical and medical ‘schools’ of the Hellenistic period, Aristotelian, Neoplatonic philosophy and Galenic medicine became predominant in Islam. As early as the middle of the fourth century AD, Galen’s medicine had been completely dominant in the eastern Hellenistic world [30, p. 61].

For Galen, philosophy and syllogistic reasoning were fundamental in medicine. His maxim that a good physician is philosopher [31, p. 1–7], is reminiscent of the internal debates between ‘philosophical medicine’ and medicine *tout court* during pre-Hellenistic Hippocratic medicine [3, p. 49–51]. But more fundamentally, by giving importance to philosophy, Galen represented the epistemological shift that occurred during the Hellenistic period, principally during the third century BC, under Aristotle’s influence. A shift from the Hippocratic tradition centred on the ‘problem of illness and clinic’ and was therefore prone to ‘approximation and empiricism’, to a medicine that also dealt with the state of health and was thus eager to penetrate the opacity of the body by anatomy and dissection [32, p. 68–71, 78]. Although this was based on animal anatomy, it led Greek medicine towards a new conception of the body and would in time, (claim to) be endowed with “scientific” precision. The theoretical background of Aristotelian anatomy was a teleological approach that established a relationship between the structure of the organs and their ‘normal’ function. In other words, it explained each organ in terms of its purpose. Galen borrowed this approach and advocated it in his *De usu partium* or *Manâfe‘ al-a‘zâ‘* [5, p. 70; 30, p. 41, 42] and in his other works [31]. It was this approach that was transmitted to Islamic physicians through Galen’s translations. Several physicians, including Ebn Sinâ, wrote

<sup>3</sup> For a medieval source underlining incompatibility between Islam and rational sciences, see [27, p. 129].

treatises entitled *Manâfe' al-a'zâ'*, emulating Galen's book<sup>4</sup>.

Bringing Islamic anatomical tracts into focus would help us to better understand Galen's influence because anatomy was the foundation of Galen's physiopathology. It was the Aristotelian heritage which Herophilus and Erasistratus had taken up before Galen. However, as mentioned, they failed to resolve problems of incompatibility between Hippocratic clinical practice and Aristotelian anatomy, between what could be seen in anatomy and the entities and structures that could not be seen (such as pneumata). The resolution of this issue was necessary to complete the theoretical puzzle<sup>5</sup>. But the inability of the followers of Herophilus and Erasistratus to solve the other problem that resulted from Aristotle's influence, namely the lack of theoretical connection, or continuity, between anatomic-physiology and clinical therapeutics, led to the abandonment of anatomy based on observation and dissection. There was a return to reliance on (the commentaries of) Hippocratic texts [32, p. 83, 84]. Galen, on the other hand, employed the teleological approach of Aristotle to close the gap that was inevitably created when zoological anatomy, practised by Aristotle, was to be used to explain organs and their functions in the human body.

In Islamic medicine, the terms *moshâhada* (observation) and *qiyâs* (analogical/syllogistic reasoning) were based on Greek concepts. However, due to philological problems due translation and the epistemological differences between Galen and Islamic physicians, they differed from the original Greek. Ebn Elyâs, for instance, in discussing various opinions about the hierarchy of the organs and precedence of their formation in the foetus, based his own argument that the heart was formed before brain (Aristotle's view) on *qiyâs*, even though he acknowledged that "Aristotle's method was *moshâhada* and not *qiyâs* and that for the anatomists *moshâhada* was preferable"<sup>6</sup>. Whether by *moshâhada* Ebn Elyâs

meant observations made during dissection or what was "theoretically observable", that is, admitting the existence of a structure or function that was invisible in anatomy but deemed necessary for the system – a concept belonging to Erasistratus [32, p. 86], is not clear. Partially, this conceptual uncertainty finds its in Galen's own ambiguity. Galen's sensual experience as a method of diagnosis and treatment [as versus the pure speculative medicine] [33, p. 119], should not be overemphasised. Although Galen insisted on dissection and anatomical experience, these were exclusively carried out on animals (mainly apes, pigs, sheep and goats) and not on human cadavers. During Galen's life, Roman authorities forbade human dissections and vivisections [36]. As a result, Galen's description of human anatomy was also based on analogical reasoning. However, it is safe to say that unlike Galen, for whom "observation" meant both physical and theoretical observation, for Islamic anatomists the predominant method was *qiyâs* (syllogistic reasoning), even for an original discovery such as Ibn Nafis' discovery of pulmonary transit of blood [37, p. 275; 38]<sup>7</sup>.

Galen always recommended for physicians to observe Nature for themselves by carrying out individual dissection rather than accepting the ideas and writings of their predecessors or contemporaries. Almost all of Galen's principles and rationale for the necessity of anatomy and dissection were accepted and emphasized by physicians in Islamic lands. In the introduction to his book on *tashrih*, Abol-Majd Tabib al-Baizâvi (writing before 1056/1646) provides two reasons why anatomy (*tashrih*) is important: First because by knowing the human body one realises the power of the creator, God. Second, if a physician knows about *tashrih*, a description of the human body, he would avoid mistakes when administering cures and medications. In fact, Baizâvi is repeating the two reasons put forward by Galen for the necessity of anatomy. But he does not give any indication as to how a physician should proceed to acquire anatomical knowledge or surgical skill. Unlike Galen, Baizâvi does not refer to any dissection performed by him. Following other anatomy texts, Baizâvi's book is divided into *bâbs* and

<sup>4</sup> See the short treatise of Ebn Sinâ (Arabic manuscript, Majles Library, Tehran, Ms No 14, p. 27–36) [34].

<sup>5</sup> On this question see Mario Vegetti [32, p. 91].

<sup>6</sup> Ahmad b. Elyâs, *Tashrih-e Mansuri* [35, fol. 2]; On Ebn Elyâs anatomy and Greek sources of the anatomical illustrations in his *Tashrih-e Mansuri*, see Gül Russel (in *Enc. Iranica*, vol. VIII: 16–20).

<sup>7</sup> For a detailed discussion on this subject see [8, p. 46–48].

*fasls*, each *fasl* describing one organ, such as eye, ear, mussels, bones, their functions and their usefulness [35, fols 1–2].

‘Abdol-Razzâq (whose dates are unknown) in his *Kholâsat al-tashrih* (Digest of anatomy), emphasizes the importance of anatomy in medicine, stating that without this knowledge a physician cannot accurately conduct his practice. However, just like Baizâvi, ‘Abdol Razzâq’s sources are not his own anatomical experience but writings of Avicenna, Majusi, Ibn al-Nafis Qurashi (d. 687/1288) and others<sup>8</sup>. Likewise Bokhâri in his *Hedâyat al-Mote’allemîn* (10<sup>th</sup> century AD) Baizâvi explicitly states that the number of muscles were observed by Galen but that he had not observed them himself [39, p. 60]. A more recent example is ‘Aqili-ye Khorâsâni (writing in India in the second part of the eighteenth century) who, recommending dissection of cadavers according to Galen’s method of immersing cadaver in the water to better observe veins and arteries, does not mention a practical case of dissection which he himself had conducted [40, p. 31]. Almost all other anatomical texts by Persian physicians are compilations of other books and do not reflect practice of anatomy and surgery.

While theoretical practice in Hellenistic medicine were grounded on anatomical observations, which after a period of abandon from the second part of the third century BC onward was taken up by Galen in the second century AD, in Islamic medicine anatomy-based theoretical innovation were almost non-existent. This may explain why ‘Abdol-Razzâq, just as Ebn Elyâs, accepted the incorrect theories of Galen and Avicenna rather than the correct ones of Ibn al-Nafis on blood circulation<sup>9</sup>. Similarly, lack of anatomical observation led outstanding physicians, such as Bahâ’ al-Dowleh Nurbakhshi and Emâd al Din Mahmud Shirâzi (physician to Shah Abbas I), to continue repeating the millenary theory, following Avicenna (Canon, IV: 5). According to this theory, the arteries carried blood and spirit, *ruh* [42, 43]. The hiatus between medicine and/or anatomy on the one hand, and philosophy, on the other, finds an expression in the *Shukuk alâ Jâlinus*, where Mohammad Zakariyâ Râzi, who

<sup>8</sup> Persian MS, Khanikoff 154, St Petersburg, National Library, fol. 3.

<sup>9</sup> ‘Abdol-Razzâq, fol. 51; Elgood [41].

is known for his clinical/experimental approach, addressed and criticised Galen’s thinking from philosophical dimension and not from medical viewpoint<sup>10</sup>. In any event, not in a way that would associate medical experimentation and theoretical knowledge. Interest in practical utility rather than theoretical innovation in Persian medicine is reflected in the tracts and handbooks that grew in medical literature, particularly after 13<sup>th</sup>–14<sup>th</sup> century. Generic titles, such as *Dastur al-‘alâj* (Prescription for Treatment), *Kholâsat al-hekmat* (Digest of Medical Knowledge), *Favâ’ed al-Yusofi* (The Useful [Advices] of Yusofi), etc., reflect this idea.

In medieval Iran, and up to the nineteenth century, the medical profession was characterised by a lack of any specific institutions to distinguish genuine physicians from the charlatans, opening the medical market to everyone who claimed medical knowledge and expertise. Raphael du Mans, visiting Esfahan around 1684, reported that the impersonator doctors set up their cabinet any place in the city where they found no other doctors nearby and women flocked to them with their children, as if they were the new Hippocrates [44, p. 353]. In such a situation, the textual knowledge of Galenic medicine was used to assert one’s professional status. In order to distinguish themselves from rank and file doctors, learned physicians relied on theoretical and literary knowledge as well as on skill. Their position could be reinforced by systems of examination and institutions represented by the office of *mohtaseb*<sup>11</sup>. Bokhâri (10<sup>th</sup> century), in his *Hedâyat al-mote’allemîn*<sup>12</sup>, distinguished true physicians from rank and file practitioners, based on their ability to use syllogistic reasoning (*qiyâs*); the latter, according to him, lacked such ability. Classical works on the history of Islamic medicine written in the medieval period, such as the *al-Fihrist* of Ibn al-Nadim (died 995/998), the *Tabaqât al-hokamâ* of Ibn Juljul (976-1009), the *Târikh al-atebbâ* of Ibn al-Qifti (d. 1248), or the ‘*Uyun al-anbâ’ fi Tabaqât al-atebbâ’* of Ibn Abi

<sup>10</sup> Mohaqqeq: 53.

<sup>11</sup> For question dealing with examinations, *imtihân*, assessing the capability of physicians see: Gary Leiser & Nouri Al-Khaleedy [45], specially p. 8–9; see also M. Dols [7, p. 33, 34], on the medical inspector, *Muhtaseb*, see G. Leiser [46].

<sup>12</sup> Manuscript version, fols. 508, 626, cited by de Crussol des Epesse, 2004: 240.

Usaybi (died 1270), consist of bibliographies of physicians, learned at different stages of Galenic or Hippocratic medicine.

Nevertheless, humoral theory also permeated folk medicine and Galen's influence is obviously reflected in manuals of popular medicine. In a book entitled *Khavâss al-ashyâ'*, an anonymous author emphasizes the magical power of objects, animals or parts of dead animals or humans. Along with their natural properties, the author refers to Galen's idea about the humoral qualities of these *ashyâ'* [47, p. 4, 12, 13, 36]<sup>13</sup>. A mixture of the natural properties and magical powers of drugs is apparent in Pliny's work and in Galen's writings, despite the assumption that Galen's ideas were all rational [48]. Therefore, it seems that the origin of this influence goes beyond Galen. Perhaps it is more accurate to talk about parallels in different civilisations. The above-mentioned *Khavâss al-ashyâ'* is quite similar in content to Part Three of a Syriac medical text, known as Syriac Book of Medicine, probably written in the sixth or seventh century. The latter contains folk remedies partly based on the natural properties of certain medicinal substances. Others rely on the magical powers of objects, such as a dog's tooth hung around one's neck prevents being bitten by a rabid dog [8, p. 19, 20]. One may also view Galen's influence on the medicine of the Prophet within the framework of these parallels and similarities [8, p. 24; 49].

The fact that Galen was the most respected medical reference in Iran did not prevent the development of a gap between Galen's ideas and the application or perception of those ideas. This might be explained by the fact that although in Iran Galen was cited more frequently than Hippocrates, Hippocratic bedside medicine was favoured at the expense of practical anatomy and surgery, which was fundamental for Galenic physiology. Bahâ' al-Dowleh Nurbakhshi (died in 1508–1509) [50, p. 64], for instance, did not practice surgery but advised calling in a surgeon for surgical cases [51, XIV]. This was in conformity with the Hippocratic Oath, advising doctors not to make incisions and to confer such practice to specialists, i.e., surgeons. In time, surgery, intrinsically related to anatomical

knowledge, would become the craft of non-physicians.

To be sure, empirical anatomy and surgery were lacking in medieval Islam and Christendom alike. It could not be otherwise: setting aside the potential religious and *fiqh* (Islamic jurisprudence) impediments, invasive surgical operation in the technical and material conditions of the time were fatally lethal. Dissection of cadavers in hot regions of the Islamic lands was impracticable. This lack of social and practical function of anatomy led it to become a purely descriptive, if not speculative, subject in medieval Islam [51, 129].

However, material and technical impracticality alone do not explain why dissection and surgery did not develop in Islamic medicine since these technical shortcomings could be overcome in some circumstances, like the developments that occurred in the West from fifteenth century onwards. As far as this goes, religious and theoretical factors seem more fundamental. Resistance to any "innovation" in medieval Islam is illustrated in a Persian source, probably of the Ilkhanid period, in which '*bad'at*' revision and '*qiyâs*' (analogical deduction), are considered worse than '*sherk*', polytheism or atheism<sup>14</sup>. To be sure, such a stance towards *qiyâs* was not shared by all Islamic jurists. In fact, by the end of the ninth century C.E., *qiyâs* was one of the sources or criteria for the elaboration of Islamic law (the three others being the Quran, the *sunna* and the *ijmâ'* (juristic consensus)). But in this case, *qiyâs* had to have "its starting point in the principles of the Quran, *sunna* or *ijmâ'*" [53, p. 3, 4] and was never meant to provide a legal/juristic method for innovation.

As mentioned above, the exact connotations of the terms *moshahada* and *qiyâs* have yet to be precisely defined. But there is a belief that in medieval Islam *moshâhada* was associated with sensual experience. Therefore, it could not have been widely observed or practiced and some leading physicians and philosophers vociferously voiced against it. According to Fakhr al-Din-e Râzi (1149–1209), of *Shâfe'î* persuasion, rational perception, *edrâk-e 'aqli*, is superior to sensual perception, *edrâk-e hessi*<sup>15</sup>. It is in line with this

<sup>13</sup> For a copy of this tract written in or before the seventeenth century see a Persian medical text – at the British Library dated 18 Jamâdi II 1100/April 1689.

<sup>14</sup> See Anonymous [on the refutation of *bad'at*] Persian MS, National Library, St. Petersburg [52].

<sup>15</sup> Abridge version of *Kanz al-Daqâyeq* of Râzi, by an anonymous author, Persian manuscript, Khanikof 19,

philosophy that Fakhr al-Din-e Râzi based his anatomical work entirely on teleology. Following Aristotle, Fakhr al-Din Râzi believed that the first organ created was the heart. This is not because the heart's muscle is stronger and harder, but because the heart is the seat of knowledge and thought. Therefore, the heart is the sovereign in the body, with other organs being its subjects. There are many bones of the head so that the heat of the body that tends to rise could leave through sutures between the head's bones<sup>16</sup>. Ebn Sina provides similar arguments, but for him, instead of the heat of the body, the vapour arising from brain escapes through the sutures [34, I, p. 56].

It seems that Islamic anatomists, despite the Aristotelian influence, never grasped the epistemological link between animal dissection and medical knowledge. Often, the lack of dissection in Islam is attributed to legal prohibition. However, this prohibition has always been a matter of interpretation rather than on a firm religious ban. Galen did not proceed to human dissection either, no matter what the rationale was behind such avoidance. However, the fundamental difference between Galen and his Islamic followers was that the former widely practiced animal dissection and the latter did not. The reason seems to be not only that Moslem anatomists in general based their anatomical knowledge on text rather than on experience, but also on the belief that humans were the noblest creature of God. Although there is no explicit statement that relates this principle with the state of anatomy in Islam, it is not hard to understand that it had certainly influenced Islamic physicians and their ideas about animal anatomy and its epistemological relation with medical knowledge. Setting aside Galen's pagan culture, or his attachment to Aristotle's worldview, the sole extent of animal dissection as the source of his writings indicates that he believed in a sort of affinity or continuity between animal and human structure and extrapolated the function of human body from his research on animal cadavers.

In the matter of humoral theory as well, Galen's influence was represented with

speculative repetition or in a few cases re-, or mis-, interpretation. Galen's theory of humours goes beyond Hippocrates [5, p. 52–54]. Just as in anatomy, Galenic humoral theory was influenced by Aristotelian philosophy [29, p. 145]. Galen conceived of things as composed of four elements: fire, air, earth and water. These elements were formed by the union of the matter and the four qualities of hot, cold, dry and moist. In the body, these elements are represented by the four humours respectively: blood, phlegm, black bile, and yellow bile. These humours are produced by the process of digestion of food and drink and air entering the body through respiration. What is found in the vein is in fact a mixture of the four humours and not only blood [30, p. 17]. The balance between the quantities or qualities of the humours maintained health, and their imbalance caused disease.

According to Bahâ' al-Dowleh, after being digested in the stomach through the help of the heat of the stomach and surrounding organs, food is first transformed into *Kilus*, a substance like *kashk* (whey). The finest and most cooked parts of the *kilus* are absorbed by the *jegar* (the liver) through minor veins, after being moved by the *mâsâriqâ* veins that relate the bottom of the stomach to the liver. The liver and its heat further digests the *kilus*. This cooking operation (*tabkh*) produces three substances: the first, *safrâ* (yellow bile), is like foam and floats on the top. The second is the *sowdâ* (black bile) and the most refined part is the blood. If there is a failure in the cooking operation in the liver, what remains uncooked (*khâm*) is called *balgham* (phlegm). But the production of phlegm in the liver is far less than in the stomach and intestines, while blood is produced only in the liver<sup>17</sup>.

According to Galen, there are nine types of temperaments: One ideal, in which all qualities are balanced. Four, in which one of the qualities, hot, cold, dry or moist predominates and four others, in which the predominating qualities appear in couples of hot and moist, hot and dry, cold and moist, cold and dry. Following Galen, Persian physicians believed in nine types of nature (*mazâj*). The 'absolute balanced nature (*mezâj-e mo'tadel-e haqiqi*), in which all humours are equal in quantity and quality; this *mazâj* does not exist

St Petersburg, National Library, fols. 114–115.

<sup>16</sup> *Ibid*, fol. 161.

<sup>17</sup> *Kholâsat al-Tajârob*, fol. 4 a [43].

in the reality. In the reality, natures are twofold: *basitah* (simple) and *morakabbah* (compound). Simple natures are four: hot, cold, moist and dry. The compound natures are also four: hot and dry, cold and dry, hot and moist, cold and moist [43, fol. 2a; 54]. The major difference is that, unlike Persian physicians, for Galen the well-balanced temperament existed [30, p. 19]. For both Galen and Islamic physicians the balanced-temperament was a point of reference to diagnose illness. However, for Galen the balanced temperament could be found in ordinary people, for the Islamic physicians this was the characteristic of the holy Imams [43, fol. 2a].

Quite similar to the Roman Empire, where the compilation, summaries and commentaries on Galen's works dominated medical literature<sup>18</sup>, in Iran after Islam compilation rather than creation characterised medical literature. Commentary became the dominant genre in medical literature, especially after Ebn Sinâ, on whose Canon several commentaries were written. This included the *Sharh-e Emâm Fakhr-e Râzi*, the commentary of Qotb al-Din Shirâzi titled *Tohfah al-Sa'diyya* (682/1283); the *Sharh-' Mujiz al-Qânun* by Nafis b. 'Evaz-e Kermâni, which was a commentary on the commentary of Ibn al-Nafis al Qurshi, *Mujiz al-Qânun* (the commentary on Canon in which he refuted Galen and Ebn Sinâ's ideas on the passage of blood between the two ventricles of the heart), the *Sharh al-Maghnâ* of Mowlânâ Sadid al-Din Kâzeruni, the commentary on Canon (753/1352) by Shams al-Din Mohammad b. Mahmud-e Amoli, the author of the *Nafâyes al-Fonun*, the *Sharh-e Qânun* of Hakim 'Ali-Guilâni (died in 1609), etc. [51, p. 77]. Some of these commentaries were written in order to make the original text more readable, while others were inspired by a spirit of criticism, and in this it seems that their authors were following Galen's advice not to rely on ancient sources but to undertake original research. Zakariyâ Râzi, in his *Shukuk al-Jâlinus* (Doubts about Galen), claims that in writing this book he followed this Galen's advice [37, p. 277]. However, the extent to which Zakariyâ Râzi followed Galen, the supreme medical

authority, or the intrinsic sense of his advice, that is, critical vision and spirit of inquiry, has yet to be investigated.

Occurrences of new ideas within the framework of humoral theories were exceptions to the predominating rule of compilation and respect of tradition. The common presumption dividing Islamic medicine into two periods, Golden Age and stagnation, appears to be mistaken. Such exceptions, or more precisely, "relative independence from transmitted learning or textual authorities" [55, p. 387, 388], did not end with Razi and Ebn Nafis. One finds them with Bahâ'al-Dowleh Nurbakhshi, whose clinical approach has duly been noticed and praised by Elgood. In his *Kholâsat al-Tajârob* (Quintessence of Experience) Bahâ'al-Dowleh gives the first description of Whooping Cough<sup>19</sup>, while his narrative and style of writing demonstrates his independence of mind rather than compilation. Similarly, Mirzâ Qâzi b. Kâshef al-Din Mohammad-e Yazdi (died in ca. 1664–1665) in his treatise, *Resâlah dar qahwa va chai va pâzahr va chub-e chini*, refuting the idea of 'Emâd al-Din Mahmud, who had maintained that the China Root was hot, contended that the China Root is not hot at the first degree but cold and, furthermore, that it is not the quality of hot or cold in the drugs that operates but another property that has nothing to do with hot and cold. By the same token, Yazdi refutes the dominant Galenic theory, according to which every disease should be cured by its opposite. As proof, he mentions the curing effect of *teryâq-e fâruq* that is hot but nevertheless good for typhus (*hasba siyâh*) which is also hot [56, fol. 2]. In fact, by objecting to the idea of 'Emâd al-Din Mahmud about the China Root, Kâshef-e Yazdi made an attempt to introduce a new concept, if not a new reading, of humoral pathology that obviously differed from that of the hot-cold paradigm. He believed that each drug had its own quality made of a specific composition of different properties (*morakkab al-qovâ*). Other influential physicians in the seventeenth and eighteenth centuries in Iran and in India such as Hakim Mir Mohammad (in his *Tohfah al-Mo'menîn*) and Akbar Arzâni (in his *Qarâbâdin-e Qâderi*) also believed that

<sup>18</sup> On the analogous social and intellectual context between Byzantine and the Medieval Islamic world see Stromaier [in: Grmek, 124–125]; [19, p. 22].

<sup>19</sup> *Safavid Medical Practice*: XII, XIV.

drugs are multi-natured (*morakkab al-qovâ*), but in this they followed Kâshef-e Yazdi. To give another example of intellectual dynamism after the so-called “demise of the Golden Age”, both Nurbakhshi (*Kholâsat al-Tajârob*) and ‘Emâd al-Din Mahmud Shirâzi (*Resâleh-ye Chub-e Chini*) recognised the contagiousness of syphilis, while Zakariyâ Râzi did not acknowledge the contagiousness of either smallpox or measles.

The two trends, one guided by the spirit of criticism and research and the other characterised by respect of tradition and authority, continued side by side. However, despite criticisms, the humoral paradigm was never called into question until Sâlih b. Nasr-allâ al-Halabi, called Ibn Sallûm, the court physician of Ottoman ruler, Sultân Mohammad IV (r. 1648–1687). He introduced the Paracelsian notion of iatrochemistry (chemical medicine) into Islamic medical literature and developed pathology based not on Galen’s humoral theory but on three basic substances, salt, mercury and sulphur [19, p. 50; 57]. The first Persian translation of Paracelsian medicine was made by Zeyn al-‘Âbedin Mashhadi Tabâtâbâ’î in the second part of the eighteenth century from the Arabic translation of the work of Oswald Croll by Ibn Sallum. At least two other Persian translations of Ibn Sallum’s book, *Ghâyat al-itqân fi tadbir-i badan al-ensân*, were made during the first part of the nineteenth century in Iran.

Islamic medicine’s preference for Aristotelian universals, to the exclusion of Galenic experimental medicine, played an enduring role in the way medicine developed in Islam until the sweeping waves of modernisation in the nineteenth century. These changes were propelled by political factors and by the pressures of an increasing number of soldiers injured by bullets, reminding physicians of the importance of surgery and anatomy in medicine. An army physician of traditional education in mid-nineteenth-century Iran, advocating the improvement of surgical skills amongst medical profession, criticised Hippocrates for downgrading the importance of surgery in medicine<sup>20</sup>. Significantly, he did not criticize Galen. According to Ibn al-Qifti, very probably

read by the anonymous author, based his medical knowledge on *tashrih* (dissection/anatomy), practiced surgery in military campaigns [18, p. 172] and took care of the gladiators in Pergamon by cleaning and stitching their wounds [5, p. 20; 29, p. 223].

### Conclusion

Galen’s work can be viewed as a watershed in the history of Greek medicine. It created a more inclusive Greek medical literature overcoming or reconciling divergences among different medical schools. It was a work fundamental in medical education. This achievement, however, occurred at a time when Christianity was about to expand its grips on science. Considering the historical environment under the Byzantine Empire, characterized by the hostility of the Church towards Greek science, the rise of Islam as a religion and political entity, rival to both Christianity and the Byzantine Empire, played a fundamental role in the dissemination of Greek medicine. In order to strive and expand, Islam needed ‘non-Islamic science’ and knowledge. Furthermore, Islam was born in a geographical and cultural space familiar with Hellenistic civilization. It provided a favorable political and material context for a new departure of Greek science. Nevertheless, the same factors that provided an opportunity for the revival of Greek science was also responsible for its alteration and corruption. If Greek science was born and developed in a historical context that allowed Plato, Aristotle and Hippocrates to thrive, after its adoption by Islam it developed in a different historical and socio-political environment and culture, specific to the Omayyad and Abbasid Caliphates and thereafter. Greek medicine was no longer a corpus of knowledge that could develop unfettered and studied by free thinkers. It was represented in a special way and it had to be understood as its step-father, Islam, wanted. In this article, I have tried to underline the major intellectual, socio-political and material factors that were the basis of how Galen was understood and studied by Islam. This should help understand why in the seventeenth century we witnessed a huge gap between Islamic physicians who learned, taught and practiced medicine through text, and Descartes who studied natural science, cultivated plants and dissected animals.

<sup>20</sup> Anonymous MSS; in H. Ebrahimnejad [58, p. 227, 228].

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