Some aspects of the ancient medical knowledge during the beginning of Christian era in the Byzantine Empire

Mihaela Pop

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Abstract

Medical knowledge is one of the most interesting domains of intellectual history. In Europe its development and evolution is based mostly on the Greek contribution, especially on Hippocrates’ and Galen’s works. Our intention is to get a synthetic image of medical thought during the Middle Ages and to show how Galen’s contribution was interpreted over a time span of more than 1200 years. In this article we will make some introductory remarks on Hippocrates' and Galen’s thought and then will try to review some main aspects of the medical thought and institutions in the Byzantine Empire. We shall examine medical theories, physicians and their works, hospitals and medical instruments, as well. In a later article we hope to show some Jewish and Arab influences on the medical thought of the Western Medieval life.

Keywords: medicine, medical knowledge, diagnosis, medical treatment, illness, medical learning.

For almost 1500 years beginning with late Antiquity and throughout the Middle Ages Galen’s thought exercised an overwhelming influence over the entire medical activity. Our attempt to trace the extent of this influence in a few pages is by no means an easy task, especially if we take into consideration the vast bibliography dedicated to it. Consequently, our paper will try to provide a synthesis assuming the inevitable risk of not offering complete and detailed explanations for each aspect discussed in the text.

Galen was a renowned doctor who lived during the 2nd century A.D. He was born in Pergamon and studied in various cities of the Roman Empire. His father, a well-known architect in his town, insisted that his son should get a thorough education, including philosophy. This parental decision helped Galen acquire not only a professional, but also a wider knowledge, based on logic, ontology, and ethics. As a consequence, Galen became familiar not only with Aristotle’s works, but he was also able to comment on Plato’s thought. After completing his studies in Smyrna and Alexandria, Galen returned to Pergamon, where he accepted to treat the wounds of the gladiators who fought in the arenas.
of those times. This was a great opportunity for Galen to extend his science of human anatomy. After 162 he went to Rome where, due to his celebrity and deep knowledge, he became the personal doctor of Emperor Marcus Aurelius and of his son, the future emperor Commodus.

Why Galen’s thought was so important and how did his works survive during the Middle Age? These are the questions to which we shall try to find an answer in what follows.

Galen’s thought is based mainly on that of Hippocrates. In fact, considering his role in reviving the interest for the Hippocratic medical school of Ancient Greece, Galen could be regarded as the great Commentator of the Hippocratic corpus.

Hippocrates (5th century B.C.) thought that human body could be understood only if taken as a whole. Thus for him, treating an illness meant treating the entire body. This theory was based on physis regarded as an inner energy capable of generating and maintaining this unity by means of various biological components, especially by the balance of humors. A healthy condition resulted from a balanced state of humors, whereas any imbalance could generate unhealthy physiological processes. Under the influence of the Pythagorean philosophy, Hippocrates also established a strong, harmonious connection between the microcosm and the macrocosm, between the harmony of the human body and that of the universe. Drawing on the philosophical theory of the four primordial material elements and on the theory of the balance of the opposites, he also worked out a theory of the four humors: blood, phlegm, yellow and black bile, and of the two pairs of opposing qualities: wet/dry and worm/cold. The humors responsible for the good functioning of the human body and soul were the following fluids: blood (humid and worm), phlegm (humid and cold), yellow bile (dry and worm) and black bile (dry and cold) and each one was dominant in a balanced humoral combination. This specificity determined a temperamental typology of human beings: 1. sanguine, 2. phlegmatic, 3. choleric and 4. melancholic. Any quantitative excess or deficiency in a certain humor could generate sickness and thereby lead to a degradation of the normal condition, or the just measure (which was an Aristotelian concept), and to its replacement by an abnormal state or disorder.

The doctor had the difficult mission to reestablish the balance of humors, which was a sign of a healthy condition. He had to provide the correct diagnosis, which was the most important part of his duty. In his Aphorisms, Hippocrates shows that although the diagnosis could look like an oracle prognostication, it was in fact based on attentive observation and profound knowledge. The doctor was to take into consideration not only the appearance of the body but external factors such as winds, places, waters, airs, food, living conditions as well. The diagnosis was a real gnosis that involved profound and
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vast knowledge. The doctor was supposed to be a rational and learned person, as Roger French points out in his study.²

The Hippocratic corpus had been put together gradually over a long period (430-330 B.C.). In fact, what was, as a rule, taken to be the Hippocratic corpus, consisted of a collection of texts of medical knowledge and wisdom synthesized in the works of many authors over a broad period of time, which also included components of Platonic and Aristotelian philosophy. Aristotle thought that each living being had a fundamental purpose (telos), namely to reach the entire capacity of its form. His research on nature (physis) dealt with the four primordial elements and their qualities and drew the attention to the fundamental role played by movement (kinesis), which covered all processes of becoming (genesis) and destruction (phthora). His theory of the four main causes, especially the teleological or final cause, was another theory applied to the study of nature and living beings. Aristotle was also deeply interested in sensitivity and its role in the process of cognition. All these topics, meticulously studied in his Physics and Meteorology, are doubled by experimental observation. R. French considers that Aristotle himself used to practice dissections on animals, as he considered that direct experience was necessary for a correct understanding of a natural process.³ In this respect a host of examples can be found in the History of Animals. On the contrary, his Parts of Animals focuses mostly on theoretical aspects, such as principles, general concepts, and philosophical conclusions. The study of the human being was by far seen as the most significant and complex. Two aspects seemed to be particularly relevant: the study of the soul as nous (rational thinking) and the study of the human body. Thus, philosophy and medicine were connected as they both pointed out that, in order to get correct answers, both rational thought, based on experience, and a rigorous system of concepts and principles were necessary. In his Parts of Animals, Aristotle also underlines the role played by the inductive syllogism in medical knowledge.⁴

During the Hellenistic period, above all during the Ptolemaic age (3rd-1st centuries B.C.), Alexandria was one of the most important centres of medical studies. Doctors used to practice dissections, especially on animals. The study of anatomy was well developed and human skeletons were used for classes. According to Celsus⁵, in the 3rd century B.C, there were two famous doctors, Herophilus (330-260) and Erasistratos (315-240), who practised not only dissections, but also vivisections, on human beings. Apart from the cruelty of such an action, vivisection had a special scientific reason, namely to observe the real functioning of various organs inside the body. Herophilus, who had knowledge of the nervous

³ Ibidem, p. 28.
⁴ Ibidem, p. 29.
⁵ Ibidem, p. 30.
system and the brains, was able to distinguish among certain classes of nerves. Herophilus was the disciple of Praxagoras of Cos, one of Hippocrates’ disciples. This explains the fact that Alexandria became the first centre where the Hippocratic corpus had its first commentaries, as R. French claims.

Galen (129-200 A.D.), too, studied in Alexandria after some preparations in Smyrna and Corinth. His practical experience was considerably enlarged during his appointment as a doctor for gladiators in Pergamon, where he had the opportunity to see and heal many open wounds and to increase his knowledge on anatomy and physiology. He could also apply Aristotle’s general principles and theories. By 162, when he came to Rome, he was confronted with various medical schools, each one with its own medical theory. A first opposition could be seen between rationalists or dogmatists and empiricists. The former were strongly in favor of Aristotelian conception, based on logic and rational thought, while their opponents stressed the importance of empirical or practical medicine. This ancient opposition, which was influenced by Aristotle, went back to the 4th century B.C. In the 1st century B.C. two other groups appeared: the Methodists, whose thought was based on the philosophical theory of atoms, and the Pneumatics, who tried to combine the theory of humors with Stoic logic. Each school had different theories on various internal organs and their functions.

The empiricists refused to accept that the body could be perfectly intelligible, by that meaning that rational knowledge could be applied to reestablish health. Celsus wrote about the debates between the empiricists and the rationalists during the 1st century. The empiricists were against vivisection, considering it extremely cruel and useless. The rationalists, on the other hand, pleaded for the positive aspect of such a practice, claiming it could contribute to a better understanding (as the body is intelligible) by means of rational thinking. To acquire more knowledge about the body and its organs was to find out how it functioned. This point of view was a medical expression of the Aristotelian theory of the final, teleological cause.

Galen manifested a deep interest in the functioning of the brain. He supported the Platonic theory advanced in the Timaeus according to which the soul was inserted in the body by a divine force, the Demiourgos, who planned the unity between soul and body in a rational way. That was why the body could be intelligible. A first proof was to demonstrate that the brains and the nervous system controlled the entire body and its functioning. In his work De locis affectis, Galen describes a case when a patient who had been operated on his throat remained dumb even if his larynx had not been injured. Galen thought that the only explanation for this strange situation was that the laryngeal nerve had been affected during operation.

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6 Ibidem.
As R. French mentions, Galen had also a rich knowledge of respiratory mechanics. One of his teachers, Pelops had taught him the functioning of the diaphragm muscle and the role of intercostals’ muscles. In 163, in Rome, Galen was challenged by his competitors to perform a public demonstration of his knowledge in front of all the medical schools. He proved that he was able to control the body (the voice) by pressing the nerve responsible for vocal sounds. This way he also demonstrated that he was a learned and a rational doctor. Galen also suggested that his position differed from Aristotle’s, who claimed that which produced the voice was the heart or the vital centre of the body. By his demonstration Galen seemed to plead in favor of Plato’s theory about the fundamental role of the brains as centre of the soul and of the nervous system. Here there is a significant aspect that deserves to be recalled: the body could be understood, that is, was intelligible, because it was created by a rational divinity, which Galen named Demiourgos (as Plato) but also physis, which controlled the entire matter of the body.

An interesting example used to prove this strong body-soul connection is the following: Galen thought that the nerves controlling the basic stimuli as hunger or thirst had to connect the brains to the internal organs and the mouth. It was a very long way and they needed some points to reinforce their capacities; these points were the ganglions. This new theory was based on the knowledge Galen had inherited from one of his former teachers, Eudemus, an Aristotelian philosopher. Eudemus used to apply the Aristotelian theory of causes. Thus, the ganglions were considered the result of an efficient rational cause by Galenus.

Another example of such theoretical applications was fever, which was believed to be a heating process. A local consequence of the excess of heat, fever first affected the heart and afterwards spread through the arteries into the entire body. Fever outburst was considered an expression of an imperative need of the body to clear away heat excess. The solution Galen proposed was bleeding, as he thought that in such circumstances blood itself was heated up and blood pressure increased too much. The empiricists argued that bleeding was a dangerous method and had a different theory. In their view bleeding, which presupposed the evacuation of blood from the veins, enabled the pneuma (the spirit), which flowed through arteries, to pass from arteries to veins and this could have dangerous consequences for the patient’s life.

In this wide field of debates Galen considered it opportune to revive the medical interest for Hippocrates’ works and theories.

According to French, this revival had several reasons:

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7 This Greek word was usually translated in Latin by *natura* especially in his *De usu partium corporis humani*.

8 The Hippocratic *corpus* contains currently 11 works and the Galenic *corpus*, 16 works. It seems that initially the Hippocratic *corpus* consisted of up to 60 works.

the texts of the Hippocratic corpus were written in an antiquated Greek, which needed to be “updated” in accordance with the new, contemporary knowledge and terminology;

− many texts, like Hippocrates’ Aphorisms for example, were not very precise and needed many explanations and interpretations;

− to these two reasons we could add a third, personal reason: by offering a new interpretation, Galen could insert his own knowledge thus obtaining a certain auctoritas due to this textual “neighborhood” with the Father of medical thought.

A significant text for this new interpretation is On the Opinions on Plato and Hippocrates, which was a kind of Prolegomena to Galen’s own theories. Here Galen reasserts the Platonic idea that the soul was situated in the brains, and not, as Aristotle claimed, in the heart (as principle of life). Thus, for Galen, it was the brains that were the bodily centre of life. In his commentaries to the Aphorisms, Galen insisted on the fact that medical diagnosis should not be identified with oracular or magic prognostication or prediction. Diagnosis was based on a vast and profound rational knowledge, capable to provide proofs and to rationally demonstrate any medical decision. He also pleaded for a deep knowledge of the specific organ to be treated, in opposition to Hippocrates, who thought that the medical healing should take into consideration the entire body, as a unity. The fact that Galen re-oriented the entire medical attention towards the sick organ made possible the development of specific cures, which are bound to take into account specific data of that organ (position into the body, role, functions, specificity, etc.). As Kate Kelly notes, this way of thinking had positive consequences for medical thought.

On the other hand, Galen’s theory on blood circulation significantly delayed medical progress. The sanguine system and its functioning were at the core of an important debate, which separated the medical schools of thought. The Egyptians had been the first to study the system of blood vessels. Plato records it in his Timaeus 70AB and Aristotle in his Parts of animals III, 4, 665b-666a. According to the Greek philosophers, the heart was the source of blood, which the lungs were able to absorb as a sponge. Galen was the one who established how the blood system functioned but he did not consider the heart as its centre. Instead, he maintained that the heart generated the vessels and made possible the circulation of pneuma (spirit) through the entire body, while the lungs had no role in blood circulation. Galen had no clue about the oxygenation process in the lungs. He thought, as all the doctors of ancient and medieval times did, that the blood passed directly from the veins to the arteries through a porous wall situated between the ventricles of the heart. In fact, this theory,

which was already present in Aristotle’s History of Animals III, 3, 513b, persisted up to the 17th century, when William Harvey (1578-1657) established the correct structure of the blood system and its circulation through the entire body. Actually, as Elinor Lieber11 remarks, it appears that the first correct description of the blood transfer through lungs from the right to the left side of the heart belongs to an Arab physician, Ibn an Nafis, who lived during the 13th century A.D. Kelly also mentions this.12

During the 4th and 5th centuries A.D., Galen’s works and its numerous commentaries formed a real corpus, which was consolidated around 600 A.D., when it became the medical Canon for many centuries. The corpus survived despite the difficult circumstances such as the decline of the Roman Empire, the fall of Western Europe, the emerging of the Eastern part of the empire as the first Christian, Byzantine Empire. Given the historical events one can easily see why, for several centuries, the Galenic tradition was preserved better in the East the Mediterranean world.

The Galenic Tradition in the Eastern Mediterranean World

During the first centuries of the Christian era, medical thought developed in the entire Eastern region of the Mediterranean Sea. A prominent place in this universe appeared to be held by Alexandria. Medical thought was generally based on the works of Hippocrates and Galen, but there were also other physicians, who offered specialized knowledge in therapy, anatomy, physiology, mental illnesses, women’s specific illnesses, and pharmacology. At the same time, the theoretical side of this domain applied many philosophical theories, especially those of Plato, Aristotle, and the Stoics. For instance, among the methods of diagnosis there were those used by Plato: abstraction (aphairesis) and division (diairesis). The latter was successfully employed particularly in organ or symptoms description. If the subject was blood diagnosis, the elements studied were smell, degree of heat, blood consistency, pulse rhythm, force, the diastolic/systolic periods, blood pressure, number of heart beatings, their regularity, etc. If the subject was urine diagnosis the analysis took into account color (there were even diagrams ranging from blue, black, dark red to various nuances of yellow), smell, density, sediments, etc.

Medical teaching consisted basically in the perpetuation of the Galenic commentary tradition and in the interpretation of ancient texts. The study began with an inquiry into the meaning of the terms in a wide range of texts, it would

12 K. Kelly, op. cit, p. 27.
continue with an examination of every meaning within its context and it would end with a review of commentaries on these terms written by famous commentators. Through this multi-layered analysis the student became able to reach a correct interpretation of the text. Surviving manuscripts do not mention many names of teachers. Sophronius of Jerusalem, who wrote a text *The Miracles Made by Saints Cyrus and John* recalls a certain Gesius, professor of medical knowledge who lived during the 7th century. His name is also mentioned in the 10th century Byzantine Encyclopedia *Souda*.

The doctors and professors who taught medical thought were named *iatrosophoi*.

Among the most famous physicians who lived and wrote commentaries on the Hippocratic and Galenic works we can mention Rufus of Ephesus, whose name is already in Galen’s works. In his *Bibliotheke*, Patriarch Photius (10th century) speaks of the texts written by Dioscorides, a physician of the first century A.D. A philosopher who lived in Alexandria in the 5th century, Philoponus, who wrote commentaries on Aristotelian works, dedicated large chapters to medical knowledge, especially in his commentary to *De anima*. The Galenic works were also known to Aristotelian commentators such as Alexander of Aphrodisia (3rd century A.D.) or Neo-Platonists such as Marinus or Proclus (5th century).

Oribasius was another famous physician who lived in the 4th century and whose works on medical knowledge were inserted afterwards in the medical corpus. He wrote a *Synopsis*. Oribasius considered Galen’s works to be the medical thought *par excellence*. He also mentioned Ruphus of Ephesus. Other names of these centuries could be Soranus, Paul of Egina, Magnus of Nisibis, Nemesius of Emessa. Magnus and Nemesius seem to have been Nestorians. We have to add here the Nestorian school of Emessa, which was very interested in medical studies. Their doctrine concerning the human nature of Jesus Christ made the study of the body a religious imperative.

In the 6th century mention is made of Alexander of Tralles, a Byzantine physician who had a good knowledge of therapeutic methods. In his texts Procopius of Cesarea, Emperor Justinian’s historian, gives many details about medical activities, hospitals, and medical treatments applied in the Byzantine world of his time.

During the 10th century the interest in the preservation of ancient knowledge became part of a cultural plan elaborated by a well-known emperor-philosopher, Constantine VII Porphyrogenetus. Constantine coordinated the collecting and re-writing of ancient manuscripts in a more fluent writing style. The manuscripts were organized thematically according to the fundamental cultural domains: law, political thought, military art (tactics), philosophy,

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14 *Iatros* = physician, doctor; *Sophos* = wise man.
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theology, literature, agriculture, and medical thought. Iatrika was the medical encyclopedia while Souda was a philosophical one. Constantine Porphyrogenetus was the author of three works on political and administrative issues. The most famous is The Book of Ceremonies.

The 11th century philosopher Michael Psellos gives us numerous details about the medical treatment applied to Emperor Romanus III and about the medical knowledge of his time. Psellos himself was very interested in the study of medicine and wrote a poem, Ars medica (1373 lines) as well as a dictionary of all the diseases commented in ancient works15.

The Church Interference

When, in the 4th century, the Christian religion was officially accepted in the Roman Empire by Constantine the Great, medical thought began to have more and more problems. Thus, in 480 Diadocus of Photicea considered that the hope for recovery should not be directed towards a physician, whose knowledge was limited, but towards God Almighty. Subsequently, the idea of paying too much attention to the body began to be interpreted as a kind of weakness of the religious belief. Similar ideas were to be expressed by Pope Gregory the Great by the end of the 6th century.

Step by step, the Christian Church tried to replace the authority of the physician. While the practical and rational knowledge of the physician concentrated on the body, the religious authority of the Christian doctrine made use of the image of Jesus Christ as Savior, whose teachings promised to heal the soul. Hence, the concept of Christus medicus (Soter in Greek) began to acquire an ever growing importance. Instead of thinking of the ephemeral body health, the Christian believer was asked to subordinate the pains of this body to a more important purpose, namely the preparation of the soul for the Last Judgment and for its redemption. The hermit’s ascetic life became the most appreciated way of living. Meanwhile, those who practiced medicine found out that their activities began to be suspected of connections with pagan, or even heretical, beliefs. Under the circumstances, as a measure of protection, many physicians began to include in their prescriptions not only medical potions, but also instructions about prayers to be recited during the medical treatment. An example is Alexandre of Tralles (6th century). V. Nutton believes that the attitude promoted by the Church was not something previously unknown. The Stoics, too, had pleaded for self-restraint. Their doctrines encouraged the noble character of those who suffered bodily pains without complaining. To this Stoic heritage, the

Christian religion added the concept of pain as a Gospel of Redemption. Tertullian, for instance, thought that famine or epidemics were the visible manifestations of God’s will. Athanasius of Sinai wondered whether it was necessary to avoid illness and pains if sent by divine will. Thus, during these first Christian centuries, there was an evident transfer of individual authority from the ancient iatrosophos and his medical knowledge to the Christian priest or monk representing the Christian Church and religious Biblical knowledge. This made it possible for the somatic explanation of an illness to be replaced by a religious one.

Various esoteric, Gnostic beliefs, magic, spells, and heretical attitudes inherited from the Hellenistic period perpetuated during the first Christian centuries. In this imaginary universe, illness became the image of a universal battle between good and evil, between angels and demons. These various beliefs seemed to corrode even the Christian religion, especially during the 6th and the 7th centuries, when holy images (icons) acquired such an important role in the Christian life that they began to be worshiped for themselves and not as a means of access to divine grace. Icons came to be considered similar to pagan idols. The reaction of the Byzantine emperors, which was the decision to condemn any cult of holy images, generated an entire religious movement known as iconoclasm.

During this period various pagan beliefs coexisted with idolatrous Christian attitudes. Correct attitudes encouraged the proliferation of pilgrimages to shrines of various healing saints like Symeon Stylites, who practiced a very rigorous asceticism on the top of a very high column, Saints Cyrus and John, or Saint Tecla. During the 6th and 7th centuries the phenomenon of pilgrimage to certain healing places also encouraged a wide diffusion of amulets, spells, and prayers for health. For example, at the shrine dedicated to Saint Tecla in Seleucia, archeologists discovered little amulets representing two eyes and a text: “O, Mighty God, help me! And fulfill my hopes”. The amulets contained the image of the sick organ. Theodore of Cyrus wrote “Christians come to pray for their health to the altars of Christian martyrs and they bring images of eyes, legs, hands, made of gold and wood.”

This dissemination of magic beliefs was also possible due to the fact that medical teaching as well as other fields of knowledge lost their ground, particularly after the decision of Emperor Justinian (529) to close all schools whose teacher was not a Christian. Thus, after 550 A.D, what used to be the cultural auctoritas of the Antiquity, based on the rational and humanistic knowledge in its ancient meaning, began to crumble...

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16 Ibidem, p. 8.
down. Its place, especially in the rural areas, was gradually taken over by Christian dogmas as well as by a number of beliefs and magic practices.

Another aspect deserves to be mentioned here in connection with medical knowledge. Most of the time, we tend to focus exclusively on highly educated physicians, such as those above. However, highly educated physicians were not many in these centuries. There is another side of medical knowledge, which was represented by so-called healers. Common figures in small communities such as little villages and cities, these played a mixed role: they were familiar not only with many practical medical aspects but also with magic rituals. The connection between the two sides of social life was quite normal, especially in the rural regions. Healers survived throughout the Middle Ages and even long after, their presence in the Balkan and Carpathian areas being attested as late as the 20th century.

**Medical Practice – Hospitals**

It is generally accepted that one of the most significant Christian contributions to the social life of the first centuries was the doctrine of charity. From the Christian point of view, in the context of medical life, the hospital was regarded as a shelter for all the members of the community. During the Roman rule, hospitals hosted military men and the servants of the aristocratic families. Jewish hospitals, on the other hand, had a quite different role, being destined to the pilgrims who travelled to Jerusalem. Christian authorities extended significantly the number of social categories treated in hospitals, which came to be the poor, the homeless, the old, the insane, the handicapped and, obviously, the sick. This is evident if we analyze the Greek words for hospital. *Nosokomeion* designated the hospital as an institution for treating ill persons (*nosos* = illness) while *xenones* meant an institution that provided shelter to those who did not belong to the community (foreigners, those who were having their religious pilgrimage). In addition there was the *ptochotropheion*, a shelter that offered food and bed for a short period of time.

Historical evidence documents the construction of many hospitals, especially beginning with the 4th century A.D. Thus, during 344 - 358 a hospital was built in Antioch. In 370 Saint Basil of Caesarea insisted in favor of a new hospital outside the city walls and so did Saint John Chrysostom in Constantinople, Saint Ephrem of Edessa and Fabiola, Bishop of Rome, for their cities.

As Timothy Miller remarks, it was influential and wealthy aristocrats that funded Byzantine hospitals. There were also charitable societies, who protected, nourished, and paid for the treatment of sick persons. Step by step,

the hospital became an institution distinct from the asylum or the hospice. Its objective was to cure the sick. At the beginning of the 7th century the Byzantine Empire counted numerous hospitals. In Constantinople there were at least five or six hospitals: Sampson, Euboulos (built in 450), Saint Irene of Perm (built in the same period), Narses (built during the 6th century under the reign of the emperor Mauritius), Saint Panteleimon and Christodotes, both built after 600 A.D., and the Irene (built after 787 by the empress Irene, who succeeded to put a temporary end to the iconoclastic battle against the holy images). During the 9th century, the iconoclast emperor Theophilus (829-842) founded another hospital. In 1136 one of the largest and most renowned Byzantine hospitals, Saint Pantokrator, was built in Constantinople. But Constantinople was not the only town to have hospitals. It seems that each town, even the small ones, had their own hospital. Hospitals were also erected in Crete, Nicomedia, Antioch, Thessaloniki, and Nicaea. By the end of the 14th century there are no more documents attesting new constructions of hospitals. There were also hospitals in the rural parishes and in the nearby important monasteries, such as the hospital of the Grand Lavra on Mount Athos, built in the 10th century.

The people who worked in these hospitals were not always the same. At the beginning, monks and people who had dedicated their lives to asceticism had accepted to work there. As hospitals became larger, those who worked inside became more specialized and trained. A hierarchic structure was established especially after the imperial decision of Valentinianus I in 370 A.D. In the 8th century, in his writings, Theodore of Studios, a famous theologian who fought against the iconoclastic movement, speaks of at least three levels of responsibilities. These ranged from the head of the doctors (protarchos), to doctors responsible for each section of the hospital (archiatroi), and to young doctors, practitioners and students. There were also clinics that solved the simple cases and selected those who were to be sent to hospitals for extended treatment.

Doctors were supposed to work in hospital seven days per week over a period of six months. Their wages were not very impressive but during the other six months of the year they were allowed to practice their profession independently, which helped them increase their income significantly.

The most important hospitals became so famous that, beginning with the 7th and 8th centuries, more and more people of high society came to be treated there. According to the historian Zonaras, during the 12th century, there was a well-known physician, Aktouarius, who worked in the hospital Xenon Magnaura. One day, accompanied by two other colleagues, he transferred Emperor Alexius I, who was in a critical condition, from Palace Magnaura to the hospital situated in its proximity. This detail reveals the important role that doctors and hospitals played in the Byzantine Empire, especially in large cities. In fact, the Byzantines, especially the aristocrats, were very proud of their hospitals.

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Theodore Metochites, an important political figure of the 14th century and also a great scholar of his times, expressed his pride saying that the Byzantine hospitals were the most obvious proof of the cultural development of the Byzantine world.

**Medical Instruments**

Only a very small number of surgical instruments have survived. In his *Epitome VI*, Paul of Aegina (7th century) mentions almost 120 surgical operations and their instruments. It seems that Byzantine doctors practiced successfully mastectomy, extirpation of certain tumors, and bladder operations. Three groups of medical instruments were found: 1. A group of bronze instruments from the 9th-12th centuries were discovered near Korinthos, which included a scalpel, a probe, spatulas, a kind of fork used to widen an open wound; 2. Another group, of 56 nicely decorated instruments was discovered in Cairo. 3. The Ustinov group, named after their former owner, the Russian baronet Ustinov, was discovered in Palestine. Lawrence Bliquez notes that, judging by their inscriptions, some of these objects could be very old, going back to the 3rd century.

In a 9th century text, written by a certain Leon, there are descriptions of 40 operations, including trepanations and limb amputations, and of 150 medical instruments. Bliquez also mentions two manuscripts, the 9th century *Codex Parisinus Latinus* 11.219, containing a list of 65 instruments and the 11th century *Laurentianus Grecus* LXXIV-2, containing a list of 89 instruments. Another 10th century text records a separation of Siamese twins at the upper level of the abdomen. One of the two children was already dead before the operation and the other survived only three days. General anesthesia was used only in special cases. According to Bliquez, dissection on human bodies was practiced during the entire period of the Byzantine Empire on corpses of people who had suffered death penalty. Simon the New Theologian tells us that autopsies were also performed. Surgeons knew how to implant certain prostheses. Quite frequently, the operations were public. John Chrysostom says that doctors wanted to prove by these public operations that sick persons could be cured by rational knowledge.

**Pharmacology**

In addition to diagnosis, equally important in medical activity was the manner in which the patient was healed. A profound knowledge of substances

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22 *Ibidem*, p. 199.
and their quantities was needed in order to prepare the correct medication. Jerry Stannard says\textsuperscript{23} that the Byzantine medical texts employed quotations from ancient works of Democritus, Dioscorides or Posidonius. Over 450 plants were used. To these other medical substances were added, extracted from insects, arachnids, crustaceans, wine, vinegar, olive oil, butter, cheese, or bread. Diets were in strict connection with calendar and astrological predictions. Byzantines doctors like Diocles of Charistos (4\textsuperscript{th} century B.C.) or Theophrastus had inherited the ancient knowledge mentioned by Homer in \textit{Odyssey}, X, 304-316. Some of the doctors had studied the properties of these substances. Theophrastus wrote a \textit{Historia plantarum} and \textit{De causis plantarum}. During the 2\textsuperscript{nd} century B.C. Nicandrus of Colophonus wrote two poems about toxicology, \textit{Theriaca}. Researchers suspect that for his poems Nicandrus employed an older work of Apollodorus about toxic substances collected from serpents, insects, scorpions, etc. In the first century A.D. Dioscorides of Anazarbos wrote a fundamental work of pharmacology, \textit{Materia Medica}, which later became a real \textit{Canon} in the field and was used for nearly 1800 years. More than 600 plants are listed in this work. Galen himself wrote about drugs made of either of a single substance or containing various combinations of active substances. He provided lists of drugs connected to sick organs and to types of diseases and indicated antidotes. Drugs were made taking into consideration heat, moisture, taste, smell, or even touch. Quantity was also very important.

In the 4\textsuperscript{th} century, in reply to the demand made by Emperor Julian the Apostate, Oribasius succeeded to create a \textit{Synopsis} of all the works written by Galen. It seems that the corpus contained 70 books, 40 of which have survived to this day. This \textit{Synopsis} proves the interest for Galen’s teaching. Oribasius combines 450 drugs that he found in Galen’s works with some others from Dioscorides. The result is an immense list of 600 medical drugs.

Other physicians interested in pharmacology were Priscian, who lived at the imperial court of Gratian (375-383) and Hesychius of Damascus, who lived during the same century. A famous 7\textsuperscript{th} century pharmacologist was Theophilus, who wrote a book on \textit{The Structure of the Human Body} and two others about urine and excrements and their role in the diagnosis. Another renowned physician of the same period was Paul of Aegina, who wrote 7 books dedicated to the study of drugs, in which he gives 600 plants.

\textbf{BIBLIOGRAPHY}


\textsuperscript{23} Jerry Stannard, “Aspects of \textit{Materia Medica}”, \textit{D.O.P.} 34/1984, pp. 205-211.


