History of Medicine. 2016. Vol. 3. № 3
DOI: 10.17720/2409-5834.v3.3.2016.23m

Galen on pharmacology: his scientific way of thinking and contribution to the pharmacology of Cyprus

Athina Malapani
National and Capodistrian University of Athens
30 Panepistimiou St., Athens, Greece, 10679

The article provides an overview of Galen's work on pharmacology taking into account the mindset and the general attitude towards medicine in the ancient era. Pharmacology was considered one of the three fields of medical science (surgery and dietology were the other two). The ancient people used a great many natural substances of vegetable or animal origin in order to produce many kinds of drugs for healing or alleviating the pain of the human body in a natural way. The evidence of the use of this kind of medical material in the ancient literature is evident, from the epic poems, tragedies and comedies to the medical literature, especially the texts of Galen, one of the most significant ancient medical writers, pharmacologists, and researchers. Galen's scientific way of thinking and the careful attention he paid to pharmacological concepts and methods of healing are illustrated by his observations concerning the inefficacy, errors and failure of pharmacological terms of his era. The aim of this article is to provide information about the medical material (materia medica) of Cyprus, which are found in many passages of Galen's works and try to explain the real origin of these substances. It is known that Galen had traveled to many places of the ancient world in order to explore the substances used or provided for pharmaceutical manufacturing, and one of his destinations was Cyprus. The author represents all these possible cases of the chronological determination of Galen's journey to Cyprus and the reasons for his visit which was to gather information concerning medical substances of vegetarian and animal origin and minerals (especially, copper). The research work and information about the use and utility of many minerals in pharmaceutical manufacturing were of great importance for the development of ancient Greek pharmacology. The author points out the importance of the references to the names of many ancient Cypriot doctors in Galen's texts for a researcher of today in order to complete the image of ancient medicine and pharmacology.

Keywords: *Galen, Cyprus, pharmacology, ancient medicine, materia medica*

For quotation: *Malapani A. Galen on pharmacology: his scientific way of thinking and contribution to the pharmacology of Cyprus. History of Medicine. 2016. Vol. 3. № 3. P. 230–242.*

About the author

Athina N. Malapani – Ph.D. Candidate, Université de Paris – Sorbonne (Paris); Magister in Classics, National and Capodistrian University of Athens (Athens).

1. Galen and his works on Pharmacology: Introduction

1.1 The sectors of the ancient Greek Medicine

What drugs will not cure, the knife will; what the knife will not cure, the cautery will; what the cautery will not cure, must be considered incurable. This passage from the Hippocratic *Aphorisms* (VII 87L) expresses in the best way the special meaning of the medical practitioners and their position in medical science in ancient times. So, it is understood that drug lore held the middle position within the tripartite system of ancient therapeutics [1, p. 304].

Except for this tripartite of the science of medicine,[1] there was also a great distinction among the physicians insofar as it concerned the specialization of each and every one of them. This characteristic was observed into a great degree in the Roman Empire, as Galen informs us in his

Received: 28.07.16

[1] There is also another distinction of the science of medicine according to the Art of Medicine of Galen; the medicine may have two categories, the *theoretical* and the *practical* part (*θεωρητικόν, πρακτικόν*). According to another categorization, medicine may be *normal* (*φυσιολογικόν*), *causative* (*αἰτιολογικόν*), *semiotic* (*σημειωτικόν*), *healthy* (*ὑγιεινόν*), t*herapeutic* (*θεραπευτικόν*); the category of semiotics may be divided into three sectors, *diagnostic* (*διαγνωστικόν*), *predictive* (*προγνωστικόν*), *commemorative* (*ἀναμνηστικόν*); For further information about the categories of medicine according to Galen, see [3].

works. The total number of inhabitants of the city of Rome and the architecture of this city with its aqueducts, drainage systems and bathhouses, freshwater fountains,[2] the *gymnasium*, the *taberna medica* (parts of the medical marketplace of Rome), the attention of jurists to the urban praetors' responsibility for the drains indicating them as civic monuments associated with the healthy living of the people in the Roman Empire were thought to be beneficial for the evolution of medicine [6, p. 128].

Hence, the education of the physicians in combination with the civic landscape and the particular arenas of the medical marketplace contributed to the specialization of doctors. For all those reasons, there were a lot of physicians, each and every one of them having his specialization in different sectors of the medical sciences concentrated in the city of Rome (such as physicians from Athens, Sicily, Smyrna, Pontus, Ephesus, Pergamum, Syria, Antioch) and remarkable medical centres were also constructed in order to offer scientific cures to medical tourists; thus, it is easily understood why medical tourism was so developed in the Roman Empire [6, p. 110–134]. On the whole, the contribution of the Roman Imperial authorities was very important for the development of medical science in antiquity, as many Roman emperors (e.g. Julius Caesar, Augustus and many others) enacted beneficial laws in order to contribute to increasing medical tourism forcing medical and pharmacological evolution at the same time [6, p.128–129].

However, it must be mentioned that the medical market not only in Rome, but also all over the ancient world, was made up from a great variety of *experts*, who were thought to be suitable for the medical cure of ancient people, such as religious, magical, empirical and medical practitioners [6, p. 32–35, 101][3]. Hence, the associations that existed between medical science on the one hand and religion or the magic practices and techniques, on the other hand, were very strong.

So, what is today called *ancient medicine* did not have the same meaning in antiquity, because it was completely differently understood, as many practices and methods of treatment are not common nowadays. In addition, there are many pharmaceutical products and substances, which are not used today as they are thought to be ineffective or even harmful; furthermore, as far as it concerns the medicines, there was a variety of *placebo*, which did not contribute to a patient's health.

Finally, the engagement of religious and magical practices, stereotypes and prejudices differentiated the scientific role of medicine provoking many difficulties and obstacles to today's researchers of ancient medicine. In any case, ancient medicine must be investigated and understood in the framework of the ancient way of thinking and the general attitude in antiquity. So, when investigating ancient pharmacology, which was a vital part of ancient medicine, modern

[2] Actually, there were many medicinal establishments in the Roman Empire, which are being explored by the archaeologists today in order to find out their meaning and function identifying their characteristics within the context of health and religion, as religion and medicinal science were associated in the ancient world. This association between the medicine and the religion is linked to the question whether mineral or natural water, as mineral water was of better quality than the natural one so as to be considered a gift from gods. Hence, the infrastructures built with the aim to exploit the health-giving properties of the mineral water. Thus, the functionality of these baths might be religious or healing., except for the social and leisure utility they had. In any case, there are many doubts as far as it concerns the association between the religion and the scientific treatment of the mineral water. However, the architectural organization shows a lot of spas all over the Roman Empire; hence, their gravity is proved; S.G. Soutelo [4].

For further information about the spas and their healing role, see also [5].

[3] One of the most characteristic examples of a physician and pharmacology living and working in Rome was Scribonius Largus; he was not a medicine, but a practicing physician. Although he was not a doctor himself, he must have been a very experienced practitioner with a wide range of medical knowledge and many and different clients, as it is mentioned that he cured some individuals from earache, others (the so-called *non ignotos* from him) from the disease of colic and finally, a slave of a perfume seller who was vomiting extremely. It is also remarkable that he wrote a work of high importance for the modern researchers of ancient medicine and especially, the ancient pharmacology, *Compositiones*, in which he mentions a great variety of drug compounds, prescriptions and many pharmaceutical products. Finally, it must be mentioned the moral question Largus had about the image of a physician, that is who a physician really was and what he had to do in order to be contributing to his patients.

researchers have to take into account the aspects of ancient people insofar as it concerns the healing effects of many substances and pharmaceutical production.

1.2 A brief story of Pharmacology

The pharmacological tradition has a long history as it has very ancient origins, which cannot be discerned very easily. A scientific debate has been provoked as far as it concerns the origins of drug lore, that is when the development of studies about drug lore may have happened; furthermore, the drug lore of the East had assimilated many influences from the drug lore of the West, so as to impose additional difficulties to modern scholars.

Moreover, drugs and a great variety of pharmaceutical products were very common in antiquity since a very early period, even from the Homeric period (see above), as there are references to Helen's and Circe's drugs [7, p. 94] it is also remarkable to note the presence of two doctors in the *Iliad*, Podalirius and Machaon, the sons of Asclepius and Epione, who were among the Greek heroes. However, not only professional physicians, but also ordinary people seemed to have had the ability to treat wounds and diseases; the most characteristic example is found in the *Iliad* is Achilles, who was thought to have received medical knowledge from Chiron the Centaur, a mythical creature which might have been his teacher. Patroclus had the same ability thanks to his friendship with Achilles, who taught him some remedies and treatments. In general, the descriptions of injuries and wounds in both the Homeric epic poems are presented in great detail and they are largely technically accurate, so as to make a nineteenth-century commentator believe that the Homeric poet may have been a military doctor.[4]

In addition, references to drug lore in antiquity are mentioned in many tragedies and comedies; the most characteristic example is Medea, a heroine of the tragedy who used her medical products in order to achieve her goals (killing their children as a punishment of her husband because of her abandonment) [7, p. 94]. In conclusion, it is easily understood the great popularization medical substances had in antiquity, so as to be known and used by anyone, because medicine was characterized as an *art* (*τέχνη*) in many works of the Hippocratic *corpus* and it did not demand regulation, certification and teaching or in general, a special education [9, p. 83].

The pharmacology of the ancient times – especially in the archaic and classical period – is characterized by the use of plants and herbs as raw materials for the manufacture of pharmaceuticals. Hence, this material of vegetable origin was thought to contribute to the treatment of many illnesses, so as to be used to a great degree for a long period of time. References to a great deal of plants and herbs with medicinal powers and the drugs produced from them can be found in the Hippocratic *corpus* and in the works of Galen, who are the most well-known among the researchers of this field; one of the most significant of his works is thought to be *De partibus artis medictivae* (especially paragraph 2.3), which was translated by M. Lyons from a ninth-century Arabic translation.[5] There are also many references to ancient medicine and pharmacology in other medical writers' works, such as Oribasius, Aetius of Amida,[6] Pliny the Elder, Dioscorides Pedanius, Celsus, Marcus Aurelius; these are the names of the medical writers in antiquity, whose contribution to the pharmacological evolution was of the highest importance.

In any case, except for the sources of medical writers, it must be mentioned that interesting information about the medicinal properties of plants and herbs an also be found in the works of the pre-Socratic philosophers, who got involved with pharmacology a long time before medical writers and the development of the science of medicine. The most characteristic examples are Theophrastus, Anaxagoras, Empedocles (the 5th century BC), Hippo of Croton, Leophanes (in the middle of the 5th century BC), Diogenes from Apollonia (the late 5th century BC), Democritus

[4] In any case, it cannot be supported that point of view with certainty, as there is also the Homeric issue and the debate among the scholars, who cannot decide whether Homer was a real person or a poetical persona and whether he really existed or not [8, p.15–16]. For further information about the role of the doctor in the ancient society, see [8, p. 17–58].

[5] For more information about this work of Galen and its Arabic translation, see [10].

[6] He wrote a summary of the pharmacological work of Galen with a few additions; a summary of pharmacological work of Galen is also left from Paulus from Aegina. See [11, p. 21–22].

(the 4th–5th centuries BC), Cleidemus from Athens (the 4th century BC), Nicolaus from Damascus the (4th century BC); however, conclusions are difficult to reach with certainty, because of the loss of the authentic works of the pre-Socratic philosophers. However, this intellectual gap can be filled with much information about the pharmacological use of plants, herbs and the medicinal material of vegetable origin in the works of the submittal philosophers in the classical period, Plato and Aristotle (see below about the contribution of the Aristotelian philosophy in the Hellenistic medicine and pharmacology).[7] It must also be mentioned that Galen, who is thought to be the most important doctor, medical writer and pharmacologist of ancient times, was influenced by Aristotle as far as it concerns his well-known theory of juices [12].

On the whole, the *materia medica* of vegetarian, animal or mineral origin was widely-used in pharmaceutical manufacturing in antiquity, even until the Hellenistic period. Especially in the Hellenistic period, the combination of medicine with Aristotelian philosophy and other natural sciences led to a remarkable development of the science of medicine. The survey became more systematic, the variety of prescriptions and pharmaceutical drugs became wider and more interesting, so as to be written down in many prescriptions and even poems referred to drug lore [7, p. 94]. Moreover, the importance of Alexander the Great and his successors must not be omitted, as they brought Greek ideas about medicine and pharmacology to the world of the East, to the borders of India and the sands of Libya; this popularization had, as a result, the enrichment of Greek medicine, based on the Hippocratic *corpus* and the theoretical pharmacological works of Galen up until that time [8, p. 27].

Some of the most significant medical writers and doctors of the Hellenistic period were Diocles of Carystus (340 a AD), Theophrastus (297 AD), Crateuas (1st century AD), Erasitratus (the 3rd century AD), Nicander (from the end of the 3rd – middle of the 2nd century AD), Andreas from the island of Carystus (in the second half of the 1st century AD), Apollonius (in the second half of the 1st century AD), Scribonius Largus the (the 1st century AD), Thessalus from Tralles (the 1st century AD) and many others too, who contributed to the evolution of pharmaceutical production and generally, to the development of the science of medicine. Their contribution was considered to be of the highest importance and remained so until the medieval period, as their theories and works continued to have influence during the Middle Ages [7, p. 94].

Hence, there is a great number of medicines or practitioners or medical writers, who left a remarkable variety of prescriptions [7, p. 94]. So, the great development of drug lore and its popularity demonstrates interest about pharmacology and medicine, even if it characterizes only a small part of the population, the scientific community.

1.3 Pharmacology: Definitions, Categorizations and Sources

Pharmacology was one of the three sectors of ancient medicine, along with dietetics and surgery. Despite this categorization, an excellent doctor was believed to be forced to know all of them excellent, although he had to choose which of them must be used in a specific case. However, there was dominated a holistic view of the human organism and its original balance, which must be restored and preserved [1, p. 304].

Pharmacology and surgery were thought to be the most invasive methods, so as to be chosen more often for the treatment of the negative influence of an illness, a wound or injury to the patient. On the contrary, dietics was thought to be a more gentle method for facing up to illness.

Dietics was defined not only as a programme of eating and generally the nutrition of any living organism, but also a way of life and thinking (*δίαιτα <διαιτάομαι, -ῶμαι, LSJ*[8]); for that reason, it was supposed to contribute to the cure of a number of illnesses. This sector of medical science does not have such a drastic influence on the human organism and its function [13, p. 44], so as not to be referred to in the Hippocratic *Aphorisms*.

[7] In addition, information or simple references to the medicinal properties of plants and herbs in antiquity can also be found in many poetical works, such as the Homeric *Odyssey* (10.390–94) and the *Metamorphoses* of Ovid (1.452–67). See [11, 56–62].

[8] Lindell H.G., Scott R., John H.S., McKenzie R., A Greek-English Lexicon. Oxford: Clarendon Press, New York: Oxford University Press, 1996, 804 p.

Generally, dietics was a non-invasive method of preserving human health rather than of curing a disease, in spite of being used to cure a middle disease and counteracting the harmful impact of an illness or wound [1, p. 304].

On the contrary, pharmacology was considered less interventionist to the human organism, but it was also thought to be more effective than dietics; in addition to this, pharmacology rejects the dangers of surgical and post-surgical effects on humans. Finally, surgery was considered as the most interventionist way of treating an illness; so, it was not preferred as the best solution to a health problem [1, p. 304].

On the whole, Galen strongly believed that the best doctor ought to give priority to dietics and pharmacology, because these methods were considered to be the best for treating any kind of health problem and malfunction; he also thought that even very grave illnesses and diseases may be cured with diet and/or pharmacology. However, medicines and medical products must be used in an appropriate way and without exaggeration in order to have the best possible results for anyone's health [1, p. 304].

However, the term pharmacology has became popular only recently, as this term was thought to be known since the age of Galen and his contemporaries. It is a creation of modern medicine (and science) and it means the scientific research regarding the ways and methods of pharmaceutical manufacturing, the medical material of any kind of origin used for the creation of medicines for any type of treatment and in general, how and in what extent the medicines of any kind can have influence on human's health and the function of her vital organs. In addition, it must be mentioned that the term *pharmacology* may be referred as *drug lore* in the international bibliography. In any case, the main interest and target of this scientific field is the study of medicines, medical material, substances and, on the whole, pharmaceutical manufacturing [1, p. 305; 13].

On the contrary, the term *pharmacy* (*φαρμακοποιία*) has a slightly different meaning, as it refers to the knowledge of how to prepare, dispense and employ meditation. Despite the exactness Galen might have in expressing his scientific theories, the ancients' knowledge about drugs and meditation does not deserve this modern distinction, so it is to be preferred to use the terms *pharmacology* or *drug lore* [1, p. 305; 13]. In any case, it is considered essential to point out the significance of the term *medicine*.

Medicine (*φάρμακον*) means the *drug*, the substance which may be appropriate for treatment or even the cause of damage or death. The etymology of this word is uncertain, although it may be known since very early on, as it is mentioned in plates with small texts written in Linear B. However, its etymology is uncertain; the most dominant version is that it derives from the verb *φαρμάσσ(ττ)ω*, which means *treat, cure, replace* (*LSJ*);[9] so, medicine is any drug or mixture of drugs used for the treatment of any type of illness [1, p. 306–307].

However, it is worth mentioning that the initial meaning of this word is *herb* (*LSJ*[9]). Taking also into consideration the aspect of Aristotle, who believed that medicines were connected with food (*Probl.* 1.42, 864b7–11), it must be mentioned that medicines were also connected with all those herbs and plants, which were believed to have healing properties in antiquity [1, p. 306–307].

It must also be mentioned that medicine had a double meaning in antiquity, as it may mean both the painkiller and the source of pain or harm or even death. The specific characteristic of a medicine -that is whether it was noxious or beneficial for anyone's health- is shown from certain adjectives, such as deadly (*θανάσιμος*), noxious (*δηλητήριος*), man-slaying (*ἀνδρόφονος*), utterly and destructive (*διαφθρατικός*) or soothing (*ἤπιον*) [1, p. 306–307].

Hence, the ancient Greek word *φάρμακον* also meant the venom or any kind of means used for succeeding in something, even if it may be harmful for someone. However, it must be mentioned that Galen had different views about the definition of venom. His predecessors believed that any kind of medicine may be turned into a poisonous drug when it is taken in high dosage; on the contrary, Galen thought that there dosage didn't matter, as any poisonous substance is generically poisonous and it has always this nature independently of its dosage [1, p. 306–307].

This double meaning of medicine was also declared from a great variety of adjectives in many

[9] See also for the meaning of this term [15].

texts of ancient Greek literature of all genres. The most characteristic examples can be found in both the Homeric epic poems and especially, the *Odyssey* [e.g. *πολλά μὲν (φάρμακα) ἐσθλά ... πολλά μὲν λυγρά* (4. 230), *φάρμακα ἤπια, ὀδυνήφατα* (10. 292), *κακά φάρμακα* (10.213), *φάρμακον οὐλόμενον* (κ 394), *φάρμακον ἀνδρόφονον* (1. 261), *θυμοφθόρα* (2. 329) and many others, too [16, p. 98].

Thus, this double meaning of the term is not the particular quality of any drug effect, but the more general, underlying fact that any kind of effects occur when the drug is introduced into the human or animal organism. The same results are observed when the foodstuff is introduced into the human organism. The human (or animal) organism accepts the different food and it metabolizes it, but drugs act upon the body causing different influences on different parts of the human organism [1, p. 306–307]. Each and every pharmaceutical product has its own characteristics and properties, the so-called *δυνάμεις* (*powers*). The powers of the medicines are thought to fall into two different categories, the *basics* and the *derivatives*. The basic powers of medicines are called *classes* or *distances* and they refer to the main nature of a substance (warm, cool, dry or liquid); they can also be subdivided into *energetic* and *passive*. The derivative powers of the medicines are those whose influences on the human body are depended on the conditions of the body of each and every patient [1, p. 308–309].

According to Galen, the power or powers of any medical substance or product exist in relation to a particular human organism or specific organ, as it affects it more or less. For instance, a hot medicine or medical substance can warm the organism and help the treatment of many diseases provoked by coldness and similarly -*mutandis mutandis*- with other causes and qualities. The roots of this Galenic theory are found in the works of physics and biology of Aristotle and the Hippocratic *Corpus* (420–390 BC), as the humoral theory had influenced his way of thinking in a high degree; in addition, the Galenic work, *De natura hominis* (400 BC), is based on the theory of humors, in which is presented for the first time. In general, the theory of humors, that is the causation of illnesses because of the imbalance of humors in our organism,[10] is related to the physical and physiological or even the psychological elements and demands of the human organism. This theory was very popular in antiquity and as a result, Galen's theories were also affected [1, p. 308–309; 7, p. 95–96]. Hence, Galen had thought about how to restore the balance of humors in the human organism with the appropriate combination of medical materials in the pharmaceutical manufacturing.

The uses of any medicine may be *internal* or *external*. As far as it concerns the external use of a medicine, there can be any kind of cream, salve and plasters; on the other hand, the internal use concludes the edible and drinking medicines. Thus, the uses of medicines remain the same since the very early age till nowadays [17].

Hence, it is understood that there are many kinds of medicines and the categorization of them caused many difficulties; so, there were a variety of categorizations have been mentioned by the ancient medical writers, which are dependant on different criteria [11, p. 305]. In any case, there were two main types of medicines the *simple* and the *composed* ones, which were made from the combination of simple drugs [18, p. 135].

One of the most significant categorization of medical products is that of Dioscorides Pedanius (the 1st century AD), whose categories depended on the different origin of any medical substance (e.g. vegetarian, animal or mineral drugs). The treatment characteristics of many substances of vegetarian and animal origin are also provided in the categorization of Pliny the Elder (23–79 AD) in his encyclopedic work, *Historia Naturalis*; especially the Books 20–32 are about the ancient pharmacology. Similar categorizations of medicines are also read in Celsus' work (2nd half of the 2nd century AD), *De Medicina* and in *Compositions* of Scribonius Largus, which was a medical book contained 271 prescriptions for different illnesses (47 AD) [19, p. 282–284, 326].

In any case, one of the most important categorization of medicines is that of Galen, who was considered one of the most important medical

[10] See for a brief reference to the theory of humors and how it explains the causes of many illnesses, [9, p. 87–90]. Even the epilepsy, which was called *sacred disease* (*ἱερή νόσος*) was thought to be caused because of the exaggeration of phlegm and/or bile in the human organism, affecting the brain. For more information, see [9, p. 49–51].

writers and researchers in ancient pharmacology. Galen contributed to the development of ancient pharmacology, as he provided much information about pharmaceutical manufacturing, the theoretical part of the medical production and its evaluation.[11] He divided the medical substances into the following four groups; there were the natural substances (*φυσικές*), those ones of animal origin (*ζωικές*), the minerals (*μεταλλικές ουσίες, μέταλλα*) and the substances originated from the sea water (*θαλάσσιες*) or the salty water, on the whole [19, p. 326]. What's more, a distinguished part of his corpus consists of the pharmacological works, which are *De alimentorum facultatibus, De simplicium medicamentorum temperamentis ac facultatibus, De compositione medicamentorum secundum locos, De compositione medicamentorum secindoum genera, Theriaca ad Pisonem, Theriaca ad Pamphilium, De antidotis* [7, p. 93].

Generally, Galen's works which are have been saved until nowadays consist of 1/8th of the total ancient Greek literature saved from the Homeric Age since the end of the 2nd century AD. So, his influence on the science of medicine is undoubted; taking also into consideration that he established the genre of the medical author, his importance is obvious [3, p. 105], because he developed a whole system of thought based in the combination of medicine, pharmacology, anatomy, pathology, even philosophy [6, p. 93]. Hence, his importance imposes a focus on his pharmacological theories and their contribution to the field of pharmacology and medicine, even up until the present day.

Basic principles in Galen's medical thinking: Inefficacy, Error and Failure in Pharmacological Definitions

The effectiveness of medicines was – and still is nowadays – the indispensable characteristic of the successful pharmaceutical production. Hence, the medicines and the medical substances can be divided into three categories regarding their effectiveness in the treatment of any kind of illness; there may be effect in treating the illnesses (*δραστικά, πρακτικά*) or ineffective (*ἄπρακτα, ἀδρανή*) or completely useless (*ἄχρηστα*). In addition, a subdivision into the medicines or medical substances which are considered more or less effective or ineffective or the most or the least effective in dealing with human health problems (*δραστικώτερος, ἀπρακτότερος*) has also been observed [26, p. 63]. Generally talking, there were many and different categorizations and categories of the ancient medicines and pharmaceutical products. Hence, even the vendors of the medicines were divided into two different categories.[12]

In any case, it is without any doubt that Galen had a scientific way of thinking. This developed mentality is proved by the first five books of *De simplicium medicamentorum temperamentis ac facultatibus*, where he organizes his material as far as it concerns the pharmaceutical manufacturing, the signification of specific terms and the distinction of many of them which are often used, the definition of the term *dynamis* (*δύναμις*) as the main characteristic of any kind of medicine or medical substance and many other questions about the pharmaceutical manufacturing of his time [23, p. 85; 26].

Furthermore, his observations as far as it concerns the inefficacy, the errors and failure on pharmacological terms show this scientific way of thinking and demonstrate how pioneering he was. Galen adopted a terminology based on scientific data and almost similar to this one used by Hippocrates and the Hippocratic doctors and medical writers. Although he had created his own theories, he did not refute opposing or opposite opinions (*μοχθηροτάτας δόξας*) expressed by many others of his colleagues [26, p. 65–66].

The dangers of failure or errors in definitions are of great importance, as they may provoke a

[11] For more information about Galen and his pharmacology, see also [20–25].

[12] More specifically, there were the *rizotomoi* (*ῥιζοτόμοι*), who had the task to find roots and collect herbs, and the *pharmakopolai* (*φαρμακοπῶλαι*), who were permanent or contemporary vendors of medical products in spite of many of them being crooks and exploiting people's prejudices and superstitions. The lack of public control in the commercial of medicines and the raw materials for their production made more difficult this situation be faced up to and it had a connection with the mixing of religious and magical practices with the logical ones (see above); In general, the pharmaceutical commercial was believed to be one of the most profitable professions in antiquity, so as to be preferred even from many doctors, who used to mock their patients and sell them antidotes, venoms and poisonous substances or cosmetics, which were not drastic [19, p. 342–343, 346].

practical ineffectiveness. Taking into consideration that the science of medicine is based on axiomatic theories regarding the body and the total function of the human (or animal) organism, the lack of understandable definitions or even the failure of them may have a great deal of negative effects on human organism and life. So, the precise expression and observation of the physical events, the precise definitions of the medicines and the medical material, the authenticity of many prescriptions are the main problems, which may be faced up to by a researcher of ancient pharmacology. Furthermore, the variety of the nature of these errors, such as epistemological, methodological, logic, ontological, linguistic, moral, cultural and educational, provokes an additional difficulty in dealing with the ancient pharmacology [26, p. 59–61]. In general, there would be a degree of difficulty in foreseeing the efficacy of any drug, particularly if the lack of the today's scientific means was taken into consideration; in addition, there were many factors involved in order to define the efficacy of any pharmaceutical product or substance [7, p. 101].

The problems of terminology and the difficulties or even dangers caused are characterized by a remarkable complexity, because there are many medical substances that can be problematic or ineffective, but when part of a medical mixture may be turned into an effective compound. In addition, the effectiveness of many medicines depends on the environmental conditions or the particular needs of each and every human organism [26, p. 64].

Another important factor is the origin of any medicine; for instance, if a medicine has a vegetarian or animal or mineral origin[13] plays an important role in its effectiveness; indeed, it must also be known the specific part of a plant or animal from which the medicine originates. For instance, if a medicine or medical substance originates from the stems or the roots or the trunk or the leaves or the flowers of a plant can be determinant to the effectiveness of the medical product; it is also remarkable that even the parts of an animal's body play an important role in the effectiveness in treating an illness [26, p. 64].

The lack of accuracy in medical terminology and the following failure in dealing with every disease could be a result of the written sources. Written texts are considered to have a high degree of unreliability even if they have been saved in many copies. It is also remarkable that Galen refers to the difficulty to change a text of medical character in his work, *De antidotis* 14.31–32 K. Indeed, there may be false interventions to any kind of an ancient text, so as not to help the researchers reach safe conclusions. In any case, Galen does not reject the necessity of writing in order to capture all the information in every sector of life; writing functions are thought to be a vital source of reminders (*ἀναμνήσεις*) and for that reason, it must not be underestimated [26, 67–68].

Another problem of the written sources and their reliability is the lack of specific mentions to the kind(s) of substances and the quantities used for the pharmaceutical manufacturing [26, p. 64]. The substances must be in balance -named after *συμμετρία*-, as this characteristic may influence the effectiveness of the pharmaceutical product [26, p. 70–71].

Problems may arise because of the lack of knowledge about specific powers (characteristics) of many pharmaceutical substances. So, there is a relevant vocabulary in Galen's works, such as *ἀγνοεῖν, ἀμαθής, μηδέποτε μεμαθηκότες, ἀπείρους εἶναι, τὰ σαφῶς γιγνωσκόμενα ἀγνοοῦσιν, ἄγνοια*, which demonstrates the lack of knowledge about the pharmaceutical production and the science of medicine. However, Galen's linguistic inventiveness is transformed into a useful tool used in recognizing the ineffectiveness of many substances [such as the black poplar (*αἴγειρος*), the resin (*ῥητίνη*), the feverfew (*κενταύριον μικρόν*)] and categorizing its degree [26, p. 81–82].

The inefficacy of a medicine may be a result of the plethora of prescriptions in the ancient world. Galen was baffled by the multiplicity of prescriptions and the great variety of the medical material mentioned [27, p. 271–282]. Moreover, there are prescriptions very similar to each other, presenting only a few differentiations, so as to be extremely difficult to distinguish from each other. There is also the uncertainty about the names of the plants and herbs; the ancient names of the plants may not be the same as the modern ones; hence, confusion and misunderstanding can easily arise.

[13] See Galen's categorization above.

From all of the above, the scientific way of thinking adopted by Galen is accepted without any doubt. So, the influence his works had for many centuries can be explained by taking his scientific way of thinking into consideration.

Galen's Pharmacology in Cyprus: Medical substances found in Cyprus or mentioned by Cyprian or considered as Cyprian doctors

3.1 What does the Ancient Literature of Cyprus *mean?*

The *corpus* of the ancient medical literature of Cyprus consists of many texts from the ancient Greek and the Latin literature, which are referred to as medical material found or used in Cyprus. This pharmacological material (of vegetarian, animal or mineral origin) may be found both in Cyprus and in many other places in Greece or all over the world or it may be unique to the flora of the island (e.g. *crocus Veneris*).[14] In addition, there are prescriptions mentioned regarding a wide range of pharmaceutical products, which were combined with substances of Cypriot origin or were believed to be written down by from Cypriot doctors. Furthermore, these classical texts refer to many names of doctors who were Cypriot or were thought to be Cypriot. The most often-mentioned among them is Apollonius from the region of Kition,[15] who had written a memorandum to the Hippocratic treatise *On the Joints*, which has been saved in a manuscript of the 10th century AD.[16] This doctor is mentioned many times in the ancient Greek and Latin *corpus* of texts, but it is not always for sure whether he was the Cyprian one or the other homonym medical writer, Apollonius Herophilius, who might have written a medicine for the mental disorder of epilepsy, which is mentioned by Alexander of Tralles [30, p. 83].

Another doctor who has puzzled modern scholars is Apollodorus of Kition.[17] Pliny the Elder had left many references to him in the sources of his books of his encyclopedic work, *Historia Naturalis* (probably, the sources of the books 11–13 and 33–35); he is also referred in the sources of the books 20–27 and in the 20th book characterized as *Citiensis*. Many prescriptions of antidotes to the venom or poison of many substances and to the stings or bites of scorpions and other venomous or harmful animals and insects; hence, it is thought that the doctor mentioned was another one, who lived during the 3rd century BC and he wrote many prescriptions for antidotes. References to this doctor are also found in the works of Dioscorides, Athenaeus and Nicander [30, p. 85–86].

Finally, other names of doctors who thought to be Cypriot are mentioned in the epigraphical sources, as there are many inscriptions found in the island of Cyprus from recent excavations, which inform the scholars about a few men who are characterized as doctors in their time. These names are Syennesis the Cypriot,[18] Paion Amathousios,[19] Diagoras the Cypriot,[20]

[14] This kind of crocus had named after that way, because its color was one of the color of Aphrodite's clothes as it is mentioned by Athenaeus (682d–e). Two other kinds of crocus of Cypriot origin were thought to be *crocus hartmannianus* and *cyprion*; see [28, 29].

[15] Testimonials for Apollonius can be found in Erotianus (4. 21–5.15, 5.8–10 N and κ 6, s.v. *κλαγγώδη*, α 1, s.v. *ἄμβην*), Galen (8.955.7–956.4 K), Celsus (*De med.* 7.2–3), Caelius Aurelius (*Tard. pass.* 1.139–40, 150–51. 3.55–56), Alexander of Tralles (*Therap*. 1. 559–61 Puschmann).

[16] A critical edition of this text with a Greek translation and images can be found in [30, p. 112–253].

[17] More specifically, the testimonials for this considered as Cyprian doctor are found in the sources of the books 11–13 and 20–27 of the encyclopedia of Pliny and in his work (*HN* 11.87–88, 20.25–26, 86, 21.116, 22.18–19, 31, 59, 24.167); in addition, a very important testimonial is found in Galen (14.181.12–182.2 and 184.1–12 K), where two prescriptions of antidotes are mentioned. Finally, Athenaeus mentions this name in a variety of information about the many kinds of flowers (15. 675 a-e and 681c-d).

[18] Testimonials for this doctor can be found in Yppocratis genus, vita dogma, p. 57 (Schone), in Aristotle (*Hist.animal.* 511b–512b).

[19] Testimonials for this doctor are found in Plutarch (*Thes.* 20.3–7), Hesychius (s.v. *Ἀφρόδιτος*), in the commentaries of the comedy of Aristophanes, *Clouds* (10 c) (see also Suid. s.v. *ἐγκεκορδυλημένος*).

[20] Testimonials for this doctor are found in the sources of the books 12-13, 20–27 and 33–35 of Pliny's *Historia Naturalis*; in addition, Pliny refers to his prescriptions for antidotes in *HN* 20.198, 200). What's more, references to him are also found in inscription in dactyliolitho in the area of Cition (Inscr. in dactyliolitho Citii, CM), in Erotianus (π 37, s.v. *περόνας*), in the work of Dioscorides, *Materia Medica* (4.64.5–6), in Oribasius (*Syn. Eust.* 3.158) and in Aetius Amidinus (*Iatr.* 7.110).

Apollonides the Cypriot,[21] Zenon the Cypriot,[22] Onasilos the son of Onaciprus,[23] Aristocrates the son of Pnytagorus,[24] Faitas the son of Damassagoras,[25] Moumenius Soleus the son of Demetrius,[26] Leonides the son of Skythinus,[27] Artemidorus, Pnytokrates, Octaouios the Doctor (*Iatros*),[28] Claudianus,[29] and Aurelius Ariston.[30]

Hence, in this *corpus* of texts which comprise the ancient literature of Cyprus, the references to Galen and his prescriptions will be examined.

3.2 Galen and the medical material of Cypriot origin

Galen had a close relationship with the ancient medical literature of Cyprus with his references to Cypriot or considered to be Cypriot doctors in spite of the problems in many of these passages (see the analysis below).

As far as it concerns his references to Cypriot or those considered to be Cypriot doctors, Galen refers to Apollonius and his point of view about the pulses (VIII 955.7–956.4 K). There is no additional characterization to this doctor, so as to be a little difficult to understand whether it is a mention to the Cypriot one or to anyone other. As it is understood from this passage, Galen refers to a doctor, who lived and worked in Alexandria. He dealt with surgery and pharmacology, as he had left a great variety of pharmacological works and many prescriptions. So, he may not be the Cypriot doctor.

The medical issue of pulses and relevant theories developed are also mentioned in another passage of the same work of Galen (IX 138.17–139.8 K). In this passage, there is a reference to Apollonides, who may be the Cypriot doctor, as Galen had referred to him in another passage, too (X 52.16–54.12 K). Apollonides was a common name in Cyprus, as many inscriptions show. According to Galen (X 52.16–54.12 K), he was Olympicus' student and Julianus' teacher and he may have been a surgeon.[31]

Galen refers also to Apollodore, who was considered to be a Cypriot doctor. A prescription for an antidote, which was a porridge of hemlock and henbane and many other ingredients too, was thought to be written by him (XIV 181.12–182.2 K). In addition, there was also another similar prescription for an antidote, which was a mixture of liquid form as its main ingredients were the wine and the rubbed and diluted semen of wild cumin (XIV 184.1–12 K). Probably both these references mention a doctor of the 3rd century BC, who left many prescriptions of antidotes against the venom of scorpions and other poisonous animals; so, perhaps these

[21] Testimonials for this doctor are found in Galen (9. 138.17–139.8 and 10.52.16–54.12 K), Artemidorus (*Dald. Onirocr.* 4.2), who characterizes him as surgeon (*Ἀπολλωνίδης ὁ χειρουργός*) and in a letter of Cornelius Fronto, which may be addressed to the Cypriot doctor, but it is not for sure (*Epist. ad amic.* 1.2).

[22] Testimonials for Zenon are found in Eunapius (*Vitae soph.* 19, s.v. *Ζήνων*; 20–22, s.v. *Μάγνος*, 21.1.1–4 and 2.7–8, s.v. *Ὀριβάσιος*, 22.1–2, s.v. *Ἰωνικός*), in two letters of Julianus (*Epist.* 45 and 48) and finally, in a letter of Libanius (*Epist.* 171).

[23] This doctor is thought to be Cypriot thanks to the name of his father, Onaciprus, which includes the name of the island. Information about him is found in an inscription dated back to the 5th century BC found in the area of Idalion, which was an ancient city in the south of Nicosia. This inscription is written in the syllabary of Idalion and it has been decoded and translated (see [30, p. 317])

[24] Testimonials for this doctor are found in Galen (12.878.16 and 879.3–8 K) and in an inscription in Attica (dated in the 4th century BC), which is now exposed in the Museum of Inscriptions in Athens (see also [30, p. 319]).

[25] The name of this doctor is mentioned in an inscription found in Palaipaphus, a Cypriot town in the south-east of the city of Paphus, and it is dated in the end of the 4th and the beginning of the 3rd century BC (see also [30, p. 323]); in addition, references are found in Anonymus Londiensis (*Iatr.* 12.36–43) and Athenaeus (14.643 e-f).

[26] Testimonials for this doctor is a reference to his name in an inscription in Palapaphus, dated back the end of the 3rd century BC (see also [30, p. 326]) and in another inscription of Lapithus, in the north of Cyprus, dated back in the beginning of the 3rd century BC (see also [30, p. 327]).

[27] The only testimonial for this doctor is five inscriptions found in the tombstones on the grave of Chytron (an ancient city in the north of the island, near Nicosia), dated back in the 2nd century BC, where his main characteristics are mentioned (see also [30, p. 328–329]).

[28] His name and his affiliation are found in an inscription in Palaipaphus, dated back in the 2nd or 1rst century BC (see further about this inscription in [30, p. 335–336]).

[29] His name and affiliation are found in an inscription found in the acropolis of Kourion (an ancient city of the southwestern coast of Cyprus) and dated back in the 2nd century AD (see also [30, p. 329–330]).

[30] The name and affiliation of Aurelius Ariston are found in an inscription in Kition, a city-kingdom in the southern coast of Cyprus, where there is the city of Larnaca today (2nd–3rd century AD). For further information about the main elements of all these doctors, see also [30, p. 81–91].

[31] See Artem. *Dald. Onirocr.* 4.2.

passages do not include mentions of a Cypriot doctor and medical writer.

Finally, Galen refers to another man considered to be a Cypriot doctor. There are two of Galen's prescriptions for a medical product useful for treating toothaches, which was named after coronal. Galen mentions two versions of this drug (XII 878.16–879.2 K and XII 879.3–8 K), whose main ingredient was honey, so it would be a sticky and slimy mixture. Both these versions of this drug were thought to be written down by Aristocrates. In the first version, there is no father's name or affiliation of this doctor; however, in the second version, Galen characterizes this medical writer as *Grammarian* (*Grammatikos*). There are also two other grammarians in Galen's works (XIV 208.14 K and XIII 84.10 K). The name of Aristocrates is not referred in any other passage of Galen's works. Although it was a usual name in Cyprus, it cannot be mentioned for sure that Galen refers to the Cypriot doctor.

Hence, it is obvious that the data existed cannot be always appropriate in clarifying whether a physician was Cypriot or not.

4. Conclusion: Galen and Cyprus

So, the survey and the study of the passages above provoke the following questions:

Was it true that Galen had been to Cyprus?

Is it possible to find out when exactly he reached the island?

What was/were the reason(s) he visited Cyprus?

First of all, it must be mentioned that Galen had visited many other places in the ancient world. The ancient physicians strongly believed that the most important element was the fieldwork, the so-called *autopsia* (*αὐτοψία*). Hence, they traveled a lot in order to find out the information required. Especially, as far as it concerns the medicinal material of vegetable origin, the ancient physicians thought that they had to observe the particular characteristics of each and every plant or herb [11, p.36–37, 37–41]. In addition, the concept of the *travelling doctor* was the Hippocratic ideal of that time; a doctor had to travel from city to city or even all over the world in order to work hard and earn his living [31, p. 165–166]. It can also be guessed that Galen could afford the trips to other places thanks to his birth into a wealthy family[32] [31, p. 161–162]. Hence, Galen traveled widely and his works include the best testimonials for all his journeys, as he traveled in many places in Greece, Cyprus, Palestine, Egypt and Italy [31, 165–166].

However as sure as his journey to Cyprus was, it is not certain when he traveled there. In general, an increasing interest about the chronological identification of Galen's activities has been observed. For instance, even his date of birth is not certain, there are many scholars who think that Galen was born between 128–131. From many references in his works it has been concluded that he might have been born in 129 or 128.[33]

What's more, the dates that Galen lived in Rome seem to be crucial in order to understand the flow of the events of his life. This chronological data is fixed as it is testified from literary, numismatic and epigraphic sources. Hence, in Galen's work *On Prognosis* (14.647 K), it is mentioned that he had left Rome before the return of the emperor Lucius Verus from the Parthian war. In addition, in the same work (14.169 K), Galen mentions that Lucius had not reached Rome when Galen was ready to leave Rome for Greece; hence, he was afraid of being forced to return. The emperor seemed to have returned to Rome at the end of August 166.[34] So Galen might have left Rome in the middle or in the beginning of August (or more generally, during the whole summer session) 166. There is also the testimonial that Galen had left Rome before the outbreak of the great plague, which happened after the return of L. Verus and his soldiers. Finally, Galen stayed in Rome for three years, as he left this city after the treatment of Eudemos, who was a family friend of his. However, Eudemos did not know that Galen was in Rome in 162/163; thus, Galen could not have come to Rome before 162. Hence, he must have come to Rome in the middle or at the end of 162 and he probably left in 165/166 [31, 159].

As far as it concerns his visit to Cyprus, it must be mentioned that Galen had probably visited this island when he traveled to Lycia and Syria thanks to Cyprus' proximity to these places. So, Galen

[32] His father was a famous architecture, who forced him to study and love the sciences and especially, mathematics.

[33] For further information as far as it concerns Galen's birthday date, see [31, p. 160–161].

[34] See *Vita Marci* 12.8; *Vita Commodi* 11.13.

might have traveled to the shores of the Dead Sea in 167/168 according to Walsh, although Ilberg thought that the doctor visited Cyprus in 161/162. A very strong argument against the opinion that he traveled there in 167/168 is that during that period, the governor of Libya, Flavius Boethus, used to be an influential family friend of Galen. However attractive as it may seem the theory that Galen had many oppurtunities to meet his friend, there is no indication for such a meeting of both these men. In addition, Galen had sent some books to Boethus in 169; so, he could not have met him during his journey to Libya. In addition, the reference to a Cypriot mineral, *cadmia* (a product of cooper),[35] shows that Galen probably traveled to Cyprus in 161/162. This mineral was first transferred to Asia Minor (where Galen was called upon as a doctor of gladiators in 157, shortly after his return from Rome) [31, p.162] and then, to Rome (some thirty years before the ninth book of *On the properties of the simple drugs* written). Hence, it is more likely for Galen to have traveled to Cyprus in 161/162 in this case it is taken into consideration that he reached Rome in the middle or at the end of the summer session in 162 [31, p.169–170].

After all these possible cases of the chronological determination of Galen's journey to Cyprus, the reason(s) for his visit must be mentioned. In the framework of fieldwork, Galen came to Cyprus in order to investigate the mineral substances. Cyprus was very famous for the wide range of minerals and their great quantities, too. The most characteristic among them was copper and its main products (like *cadmia* [31, p.170]).

Thus, Galen's love of exploring and seeking out more and more things relating to the sciences of medicine and pharmacology led him to Cyprus. Hence, his information about the use and utility of many minerals in pharmaceutical manufacturing is of high importance, as Galen was thought to be the best representative of the ancient Greek pharmacology.

[35] Galen refers to this material (12.219.7–221.14 K) and he mentions that it is a type of stone in the mountain of Soloi in Cyprus. He thought that although it had many similarities with a stone, it was a product of cooper.

REFERENCES

1. Vogt S. Drugs and Pharmacology. The Cambridge Companion to Galen. Ed. R.J. Hankinson. Cambridge: Cambridge University Press, 2008. 456 p.
2. Galen. *Sochineniya*. T. II. Obshch. red., sost., vstup. st. i komm. D.A. Balalykina (*Compositions*. Vol. II. General editor, author-preface, article and comments D.A. Balalykin). Moscow: Prakticheskaya meditsina, 2015. 800 p. [in Russian]
3. Koutroumpas C., Papadopoulos G. Γαληνού της Περγάμου Τέχνη Ίατρική: Επιτομή της Ιατρικής και των Τομέων της. In: Medicine and Healing in the Ancient Mediterranean World. Ed. D. Michaelides. Oxford; Philadelphia: Oxbow Books, 2014. P. 105–111.
4. Soutelo S.G. *Medicine and Spas in the Roman Period:* The Role of Doctors in Establishments with Mineral Medicinal Waters. In: Medicine and Healing in the Ancient Mediterranean World. Ed. D. Michaelides. Oxford; Philadelphia: Oxbow Books, 2014. P. 206–216 (with bibliographical references).
5. Dvobjetski E. *Leisure, Pleasure and Healing*. Spa, Culture and Medicine in Ancient Eastern Mediterranean. Leiden; Boston: Brill, 2007. 526 p.
6. Israelovich I. *Patients and Healers in the High Roman Empire*. Baltimore: John Hopkins University Press, 2015. 208 p.
7. Gazzaniga V. *Le Mani degli Dei:* I Farmaci di Galeno. In: Ars Medica. I Ferri del Mestiere. Ed. De Carolis. Rimini: Guaraldi, 2009.
8. Nutton V. *Healers in the medical market place:* towards a social history of Greco-Roman medicine. In: Medicine in Society. Historical Essays. Ed. A. Wear. Cambridge: Cambridge University Press, 1992. P. 15–58.
9. Walshe T. M., III. *Neurological Concepts in Ancient Greek Medicine*. New York: Oxford University Press, 2016. 224 p.
10. Von Staden H. *Galen's Alexandria*. In: Ancient Alexandria between Egypt and Greece. Ed. W.V. Harris, G. Ruffini. Leiden; Boston: Brill, 2004. P. 179–215.
11. Hardy G., Totelin L. Ancient Botany. London; New York: Routledge, 2016. 238 p.
12. Van Der Eijk, P. J. *Medicine and Philosophy in Classical Antiquity*. Doctors and Philosophers on Nature, Soul, Death and Disease. Cambridge: Cambridge University Press, 2005. P. 139–168.
13. King H. *Greek and Roman Medicine*. London: Bristol Classical Press, 2001. 84 p.
14. Pring J. T. *The Oxford Dictionary of Modern Greek*. Oxford: Clarendon Press, 1992. 388 p.
15. Montanari F. *Vocabolario della lingua greca*. Torino: Loescher, 2003. 2555 p.

16. Nutton V. *Ancient Medicine*. London; New York: Routledge, 2004 [2nd ed.: 2013]. 503 p.
17. Chantraine P. *Dictionnaire étymologique de la langue grecque*. Paris: Klincksieck, 1999.
18. Gourevitch D. *Pour une archéologie de la Médecine Romaine*. Paris: De Boccard, 2011. 251 p.
19. Pollak K. *Wissen und Weisheit der Alten Arzte*. Wien; Dusseldorf: Econ, 1968. 376 p.
20. Boudon-Millot V. *Galien de Pergame:* un médecin grec à Rome. Les Belles Lettres. Paris, 2012. 404 p.
21. *Galen and the World of Knowledge*. Ed. C. Gill, T. Whitmarsh, J. Wilkins. Cambridge: Cambridge University Press, 2009. 327 p.
22. Mattern S.P. Galen and the Rhetoric of Healing. Baltimore: The John Hopkins University Press, 2008. 279 p.
23. *Pharmacology, Philosophy, History of Medicine*. Proceedings of the 5th International Galen Colloquium. Lille, 16–18 March 1995. Ed. A. Derbu. Leiden; New York; Koln: Brill, 1997. 336 p.
24. Rocca J. *Galen on the Brain*. Anatomical Knowledge and Physiological Speculation in the Second Century AD. London; Boston: Brill, 2003. 328 p.
25. Temkin O. *Galenism, Rise and Decline of a Medical Philosophy*. Ithaca: Cornell University Press, 1973. 256 p.
26. Von Staden H. *Inefficacy, Error and Failure:* Galen on δόκιμα φάρμακα ἄπρακτα. In: Pharmacology, Philosophy, History of Medicine. Proceedings of the 5th International Galen Colloquium. Lille, 16–18 March 1995. Ed. A. Derbu. Leiden; New York; Koln: Brill, 1997.
27. Scarborough J. *Pharmacy and Drug Lore in Antiquity*. Greece, Rome, Byzantium. Burlington, VT: Ashgate Publishing Company, 2009. 384 p.
28. Stirling J. *Lexicon Nominum Herbarum*. Arborum Fructivumque Linguae Latinae, τομ. 2, Encyclopaedia. Budapestini, MCMXCV.
29. André J. *Les noms des plantes dans la Rome Antique*. Les Belles Lettres. Paris, 1985 [2nd ed.: 2010]. 336 p.
30. Βοσκός Ἀ. Ἰ. Ἀρχαία Κυπριακή Γραμματεία. Vol. 4: Ἰατρική (ΑΚυΓ[4]). Ἵδρυμα Ἀ. Γ. Λεβέντη. Λευκωσία, 2007.
31. Nutton V. *The Chronology of Galen's early career*. CQ. 1973; 1 (23): 159–170.

About the author

Athina N. Malapani – Ph.D. Candidate, Université de Paris – Sorbonne (Paris); Magister in Classics, National and Capodistrian University of Athens (Athens).