

What do we know about Erasistratus? Part 2

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Erasistratus is one of the greatest figures in the history of ancient medicine. He and Herophilus were outstanding physicians, who made a major contribution to the development of medicine. While historians have noted publication of differences in their opinions, they have generally regarded them as belonging to the same, Alexandrian, school of medicine.

The works of Galen are an important source of information on Erasistratus. They indicate that Herophilus and Erasistratus differed in their views on key aspects of medical theory and practice, and that there were two separate strands of medical thought in Alexandria at the time. A comprehensive analysis of Galen’s works enables us to form an idea of the approaches taken by Erasistratus and his followers to practical clinical objectives, while collating the information we have on them allows us to reconstruct his views. In the texts translated into Russian for the publication of Galen’s works, we can trace the agreement between the views of Chrysippus of Knidos and Erasistratus. The evidence we have indicates that Erasistratus’s views formed the basis of the teaching of the Methodic doctors.

In the second part of this article, the author moves on to an analysis and historical/medical commentary on two of Galen’s works: “De Venae Sectione adversus Erasistratum”, and “De Venae Sectione adversus Erasistrateos Romae Degentes”, two of the main sources of information on the celebrated Alexandrian physician of the third century BC. The author puts forward arguments in support of his opinion that Erasistratus’s clinical practice should be seen as the basis of the teaching of the Methodic doctors.

Keywords: *history of medicine, ancient medicine, Erasistratus, Methodic doctors*

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In Part 1 of this article,¹ I sought to outline the evidence for Erasistratus’s views on medical theory and practice. Here, I would like to draw attention to the sources: apart from his *The Function of the Parts of the Body*,² all Galen’s texts on which this research is based have been, or are being, made available to Russian researchers as part of a project to publish Galen’s

works in Russian.³ These texts by the great Roman physician, such as *The Doctrines of Hippocrates and Plato*⁴ and *Natural Capacities* tell us mainly about Erasistratus’s views on medical theory – issues of anatomy and physiology. This, however, is not enough to form a full impression of his approaches to clinical practice.

Previously, I suggested that Erasistratus’s natural philosophical beliefs were closely related

¹ Part 1 of this article appears in Issue 1 of *History of Medicine* [1].

² This work by Galen was first published in Russian in 1971 [2].

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³ So far, four volumes of Galen’s works have been published as part of this project [3–6]. Seventeen of his works have been published in Russian. Volume V is currently being prepared for publication, and will also include treatises by the great Roman physician that have not previously been published in Russian.

⁴ This treatise was first published in Russian in volumes III and IV of *The Works of Galen* [5, 6].

to atomism, and formed the basis of the clinical practice of the Methodic doctors. However, the sources then available in Russian were clearly insufficient to test this hypothesis. As part of the publication of Volume I of *The Works of Galen* [3] in Russian, his treatise *Bloodletting, against the Erasistrateans at Rome* [7] has been translated. I have to admit to underestimating the significance of this text. At present, another of Galen's works, *Bloodletting, against Erasistratus* [8], is being translated into Russian, while the translation of his *Bloodletting, against the Erasistrateans at Rome* published in Volume I has been significantly revised.⁵

A comprehensive analysis of these sources makes it possible to form an impression of the approaches taken by Erasistratus and his later followers to addressing practical clinical objectives, and to reconstruct Erasistratus's teaching. With the aim of verifying my earlier hypothesis, this article includes a detailed analysis of these texts, in which Galen discusses Erasistratus. In addition, I take a fresh look at *Bloodletting, against the Erasistrateans at Rome*, taking account of the revised translation and new reading of this text.

Bloodletting, against Erasistratus starts with the assertion that the famous Alexandrian physician did not perform phlebotomy, and does not describe the method in any of his works. Galen's claim here might seem highly categorical; he himself adds that Erasistratus ignored phlebotomy despite the fact that it was "a powerful and important remedy... esteemed by the ancients as in no way inferior to the most effective of all" [8, p. 147].⁶ In addition, Galen notes: "Erasistratus... was... so competent in the other branches of the Art,

and so meticulous about the minutest detail as to describe even the boiling of certain vegetables and of plasters – matters on which it would have sufficed anyone else just to say what was essential and to omit the mode of preparation, as a minor point which anyone could pick up as he went along" [8, p. 147].

Galen states: "The fact is that the word phlebotomy is scarcely to be found in any work of his; the one exception is in his book on bringing up blood, but even here he mentions it more, it would seem, in passing than as something he was considering with the care it deserves" [8, p. 148]. Notably, Galen does nevertheless name a work by Erasistratus in which the latter discusses phlebotomy. Next, the great Roman physician explains that Erasistratus regards phlebotomy as a treatment method that should not be used: he recommends doctors to use not phlebotomy, but bandaging, such as at the armpits and groin. Galen quotes Erasistratus's arguments on this: "Bandages should be applied at the armpits and groins, not in the manner of some imitators of the treatment, who do not realise that it is done for the sake of the blood, but rather squeezing it out thoroughly with the ligatures. A considerable amount of blood is sequestered in the bandaged parts of the limbs, as both the distension of the veins and phlebotomy show. It flows far more copiously when bandages are applied to the part of the body in which the vein is opened. In patients who bring up blood, most of the blood should be cut off by bindings on the legs and arms, since with the reduction in the amount of blood in the region of the chest, the ejection of blood will be alleviated. It is this same effect that the phlebotomists wish to achieve in patients who bring up blood. Chrysippus, however, is far better..." [8, p. 148].

Here, Galen quotes Erasistratus's comments on Chrysippus of Knidos, who did not regard phlebotomy as a method of choice either: "But Chrysippus, who transfers nourishment that has already been prepared in the body to unaffected parts, and will bring it back in the same way at the time when fainting threatens, thus making use of nutriment that is already there and not being compelled to administer food, is altogether pre-eminent in understanding and worthy of praise, and entirely self-consistent." [8, p. 149]. Chrysippus's argument is simple: the patient

⁵ A translation of this work by Galen ("De Venae Sectione adversus Erasistrateos Romae Degentes") into Russian is included in Volume I of *The Works of Galen* [3, p. 426–462]. However, recent translations of Galen's works into Russian put this source in a different light. This article uses a revised translation of this text by Zoya Barzakh.

⁶ The author cited the treatises *Bloodletting, against Erasistratus* and *Bloodletting, against the Erasistrateans at Rome* using the C.G. Kühn edition. The treatises were translated into English by Peter Brain. The names of these treatises in the book of Peter Brain are: "On Venesection against Erasistratus", "On Venesection against the Erasistrateans in Rome". See: Peter Brain *Galen on Bloodletting: A Study of the Origins, Development and Validity of His Opinions, with a Translation of the Three Works*. Cambridge University Press, 1986. – *Editor's note*.

may be weak, in which case venesection will only exacerbate their general condition.

Next, Galen comments on the above passage from Erasistratus: “It is clear to anyone that these are insignificant and random observations [*on phlebotomy — D.B.*], worthy neither of Erasistratus’ expertise in the Art nor of the power of the remedy” [8, p. 149]. He concludes that: “If no description of it were to be found in the works of Hippocrates, Diocles or Euryphon, or in those of any of Erasistratus’ predecessors at all, one might well think that he had disregarded it with good reason, since it had never been found useful or held in esteem by the most eminent men. But... in fact, other references to it are to be found, and there was already some considerable use of the remedy, not only in one disease or an unimportant one, but in the majority and the most acute; and... Hippocrates himself, whom we regard as the leader of all the distinguished men in the profession, and the other men of old clearly did use it” [8, p. 149–150].

Galen refers to physicians of the past (Hippocrates, Diocles, and Euryphon) who not only used phlebotomy but cured seriously ill patients with it. Here, Galen makes do without quotations or a detailed description of the nuances of the theory: even from the extant sources, it is clear that Hippocrates did not deny the importance of phlebotomy.

Galen states: “But he is so reluctant to show his hand in the matter of the efficacy of the remedy, that he does not indicate whether it should be used or not used, and does not dare to reveal what opinion he holds except once, as I said, in connection with one disease. And yet the gist of his opinion is manifest even from the occasions on which he says nothing; for surely he would not have disregarded venesection if he had approved of it, nor considered it necessary to describe insignificant things that were useful in the treatment of diseases, while assuming that anyone would be able to discover such an important one as bloodletting for himself, without any instruction from Erasistratus” [8, p. 150]. This assertion might seem doubtful, were Erasistratus the only critic of venesection. However, Galen names various well-known physicians of the past who had the same opinion: “The fellow-students of Erasistratus do not agree with the pupils of Chrysippus the Cnidian,

the very man who originated the dogma that phlebotomy should not be used. Not only is there no agreement whatever among these folk concerning the opinions of Chrysippus, but the utterances of Apoimantus and of Straton are laughable” [8, p. 151].

Their arguments concerned two aspects: the technical difficulty of the intervention, and the possibility that the harm done to the patient’s health might significantly exceed its benefits. Galen poses the following question: “What is the difference, they say, between unregulated phlebotomy and murder? Others, again, maintain that an inrush of pneuma into the veins might take place from the arteries, since pneuma must follow of necessity through the inosculation when the blood is emptied out. Still others say that since the inflammatory condition arises in the arteries, there is no point in emptying the veins. Even if such pronouncements might seem convincing to some, yet in relation to the truth itself they carry no conviction and are plainly false” [8, p. 152].

The great Roman physician emphasised that there was a theoretical rationale for using phlebotomy: “People who express such opinions would be far more convincing if they said what some other people, impelled by the nature of the humours, have said” [8, p. 152].

Galen then goes on to set out Erasistratus’s views, quoting at length from one of the celebrated Alexandrian’s works. Galen does not mention its name, but it is fair to assume that it is his work on bringing up blood. Such passages from Galen’s works are very important, since modern researchers do not have the opportunity to work with texts by Erasistratus himself. I will quote this passage in full: “[*Erasistratus — D.B.*] believes that the artery is the vessel of the pneuma, and the vein of the blood. The larger vessels, according to him, repeatedly split up into channels of lesser size but greater number, extending throughout the body — for there is no place where the end of a vessel is not situated — finally forming such minute terminations that by the closing of the mouths at their ends the blood is prevented from escaping and is retained inside them. As a result, although the mouths of the vein and of the artery lie alongside one another, the blood remains within its proper bounds and nowhere encroaches upon the vessels of the

pneuma. While this state of affairs continues, the animal is under the rule of a natural process. When, however, some violent cause diverts the blood from the veins into the arteries, disease must necessarily ensue forthwith. He believes further that there are other causes, the most important of which is an excess of blood, which has the dual effect of distending the coat of the vein and of forcing open the ends of the vessels which were previously closed, so that the blood passes across the arteries and thus collides with the pneuma sent along from the heart and gets in its way, changing somewhat the movement of the pneuma when it gets near it and on the side of its origin; this is the condition of fever. Further, he thinks that it is driven forwards by the pneuma and impacted into the ends of the arteries, and that this constitutes inflammation. According to this theory, where there is plethos the result is inflammation” [8, p. 153–154]. Galen notes that “everything he [*Erasistratus – D.B.*] says about fevers and inflammations is correct”, but immediately adds: “although I have shown in other works that nothing he says of these matters is true” [8, p. 154].

Galen gives the same explanation for fever as Erasistratus, while reminding his readers that Erasistratus believed that pneuma circulated in the arteries, and blood in the veins. Galen himself, following Herophilos,⁷ believed that the arteries contained blood and one of the forms of pneuma – the vital spirit, the formation of which the great Roman physician associated with the activities of the middle part of the soul, situated in the heart. Here we can see another key difference between the views of Herophilos and Erasistratus, which casts doubt on the widespread view that Erasistratus (like Herophilos) had significant experience of vivisection. After all, when vivisection is performed arterial bleeding is observed – it cannot not be seen when the major vessels are transected!

Where, then, could Galen have agreed with Erasistratus? What is most important here is the theory that bleeding is accompanied by inflammation. Erasistratus believed that this was caused by blood passing across to the arteries as a result of damage to both types of vessel (it should not be forgotten that the celebrated Alexandrian

physician believed that there was normally only one type of blood – venous). The flow of blood to the veins, according to Erasistratus, is a pathological phenomenon that leads to a further problem, in the shape of pressure from the pneuma (normally contained in the arteries) on the blood (which has entered the arteries from the venous channel as a result of the damage). This process gives rise to a local plethos, local repletion of a part of the body with blood, and its congestion and inflammation. Galen, while understanding that blood is contained in both the arteries and the veins, accepts Erasistratus’s theory of local repletion, congestion and inflammation (despite the differences in their theoretical views, they viewed the practical, “local” consequences in the same way).

However, Erasistratus believes, there are other causes of inflammation apart from wounding, “the most important of which is an excess of blood” [8, p. 155]. To illustrate this argument, Galen provides another quotation from Erasistratus, and is happy to give the source as the latter’s third book on fevers. “Round about the time, then, at which illnesses are beginning and of the onset of inflammatory conditions, all sloppy foods should be withdrawn... The inflammations that give rise to fevers arise for the most part as a result of plethora. So if nourishment is given at such times and digestion and distribution perform their functions, the vessels are filled with nutriment, and more powerful inflammations will ensue.” [8, p. 155].⁸

It is this part of the treatise that makes Erasistratus’s logic clear. Even if the bleeding is the result of an injury, food remains the source of origin of all new blood. In this, Erasistratus goes along with the majority of the natural philosophical theories popular at the time (Plato had regarded the liver as a haematopoietic organ that converted the substances ingested with food into blood). If this is the case, believes Erasistratus, the patient’s diet should be restricted.

Galen rightly points out that Erasistratus and his followers fall into their own logical trap here: if a patient with an inflammation is not fed, their body will become even weaker, while the risk of phlebotomy lies in the immediate reaction of the weakened body (which may even have

⁷ For more on Herophilos, see [9].

⁸ Galen also quotes this passage from Erasistratus in *Bloodletting, against the Erasistrateans at Rome* [7, p. 220–221].

a fatal outcome). According to Erasistratus, inflammation should not be treated with phlebotomy. Instead, fasting and bandaging should be prescribed. “Thus far this practice supports the contention of Erasistratus that one ought to evacuate the plethos, and that the veins cannot receive back the blood into themselves if they are filled and distended. The only question is in what way they should be evacuated. I have always thought that once evacuation has been decided on, the easiest and promptest course of action is to open a vein. In this way we would evacuate the actual inflammatory matters themselves, and nothing else; whereas fasting, apart from the long time it requires, evacuates the whole system indiscriminately, and this is not called for” [8, p. 156]. Galen, as ever, makes many critical and judgemental observations. These are emotional, but contain practically no definite facts of importance to the historian. It is worth noting the general theoretical position expressed by Galen, with reference to Hippocrates: “Even, however, if you did not see patients yourself, you might at least have read the works of Hippocrates, and learned how many cases nature, when she has been set in motion, brings to a crisis perfectly and faultlessly, and, as that man used to say, fittingly; and how, again, one may best imitate her when she is not attempting a crisis; and how, when she is, but is not sufficiently active, one should assist her” [8, p. 159–160]. Galen then gives several examples of how Hippocrates applied this principle in practice.⁹

Strength of Galen’s works on clinical issues is his focus on practice. He always gives specific examples, and is very accurate in his details: any doctor reading Galen’s works could use them as a practical guide. His description in *Bloodletting, against Erasistratus* of examples of the use of phlebotomy is a clear illustration of this approach. I have already drawn attention to the condescending tone often found in Russian historiography with regard to bloodletting.¹⁰ Galen, however, advises opening not just any vein, but a specific vessel, taking account of the topography of the venous channel overall, and the position of the specific vein in relation to the site of the inflammation. Galen stresses that this

principle was articulated by Hippocrates, whom he quotes: “If the pain is in the region of the clavicle, or there is the heaviness in the arm, or in the region of the breasts, or above the diaphragm, one should cut the inner vein at the bend of the elbow, and not hesitate to withdraw blood in quantity as long it has a distinctly redder colour as it flows, or is livid instead of being clear and red; for either may occur. If, however, the pain is below the diaphragm, and does not point in the direction of the clavicle, you should soften the bowels either with black hellebore or with peplium.” [8, p. 160–161].¹¹

Galen refers to the use of phlebotomy by well-known physicians of the past: “Among the dogmatists, I know that Diodes, Pleistonius, Dieuches, Menestheus, Praxagoras, Phylotimus, Herophilus and Asclepiades were phlebotomists: [8, p. 163]. The following remarks from Galen are particularly interesting: “And this even although Asclepiades was so contentious that he overturned almost all the earlier doctrines, sparing none of his predecessors, not even Hippocrates; and not hesitating to describe the medical practice of the ancients as an exercise in death. But not even this man attained such a height of shamelessness as to dare to remove phlebotomy altogether from the list of medical remedies” [8, p. 163].

The founder of the Methodic school of medicine certainly did not reject phlebotomy. Galen emphasises that the best-known Pneumatist doctors (Athenaeus, Agathinus and Archigenes) approved the method, while the empiricists were not entirely opposed to the clinical use of phlebotomy. This explains the general tenor of the discussion: not all the Methodic doctors contemporary to Galen opposed venesection. Evidently, they included a contingent who were influenced by Erasistratus’s ideas in certain areas. This explains why Galen’s criticism is targeted not at all the Methodic doctors, but only at those who call themselves followers of Erasistratus.

Galen regards bloodletting as a natural form of ‘evacuation’, similar to menstruation: “neither epilepsy nor apoplexy nor suspension of breathing nor loss of speech occur at any time

⁹ See [8, p. 160].

¹⁰ See [3, p. 5–91].

¹¹ Hippocrates. *On Regimen in Acute Diseases*, 7. Translated by V. I. Rudnev. [10, p. 402–403], as amended by Z.A. Barzakh.

if she is properly cleansed” [8, p. 165]. Women here are in a better position than men: “a woman who is well cleansed is not seized with gouty or arthritic or pleuritic or peripneumonic diseases” [8, p. 165]. He continues: “Has a woman ever been known to be stricken with phrenitis, or lethargy, or spasm, or tremor, or tetany, while her menstrual periods were coming? Or did you ever hear of a woman who suffered from melancholy or madness or haemoptysis or haematemesis, or a headache, or suffocation from synanche, or from any of the major and severe diseases, if her menstrual secretions were well established? And, on the other hand, if they are suppressed, she is certain to fall into every sort of illness” [8, p. 165–166].

Galen sees the issue in pathogenetic terms: an imbalance of the humours leads to repletion. By remedying this, a physician relieves the patient of numerous risks: “But enough of women for the present; come now to consider the men, and learn how those who eliminate the excess through a haemorrhoid all pass their lives unaffected by diseases, while those in whom the evacuations have been restrained have fallen into the gravest illnesses. Will you not let blood from these men, even if they become synanchic or peripneumonic? Does your arrogance extend to letting so many die because you refuse to retract your mistaken notions? I would not put it past you; I, on the other hand, have often cured, not only these conditions, but even spasm and dropsy, by the removal of blood. This is what long experience has taught me, and reason commands as well: to come to the cause and the nourishment of the cause” [8, p. 166]. Galen interprets bloodletting and menstruation taking account of the Hippocratic principle of “treating opposites with opposites”: “Who does not know that opposites are the cure for opposites? This is not the doctrine of Hippocrates alone; it is the common belief of all men. You, however, because of your feud with Hippocrates, seem to have become more stupid even than irrational brutes are. They do these things every day under the guidance of nature, curing hunger with feeding, and repletion with evacuation, cold with warming, and heat with cooling. What, after all, is the assimilation of nutriment but the establishment of a plethos? And what is defaecation but the evacuation of the overloaded

bowel? What is micturition if not a cure for the full bladder?” [8, p. 167].

The great Roman physician emphasises the continuity between his views and those of Hippocrates on phlebotomy. It was Hippocrates who identified the principle underlying the performance phlebotomy – that the major vein closest to the inflamed organ is opened. “Closest” here implies functional as well as anatomical similarity – opening a specific vein should ensure that the necessary volume of fluid flows away from the inflamed tissue. Historians of medicine need to acknowledge Galen’s priority in this area, since Hippocrates’s ideas on phlebotomy are to a large extent empirical, being based on the anatomical knowledge available in his day. At the time when the Hippocratic Corpus was being written, physicians had not yet fully distinguished between the venous and arterial sections of the circulatory system. : “Φλέβες” in the Corpus means blood vessels in general: their division into veins (φλέβες) and arteries (ἀρτηρία) was proposed by Praxagoras, while the differences in their anatomical structure were not described until even later. Galen draws on Hippocrates’s ideas, but sets out the practical aspects of the use of phlebotomy himself, being far more knowledgeable about anatomy and general pathology. “As I have said, the idea that one should simply let blood from patients who are at risk of a plethos of it is not yet worthy of Hippocrates’ art. I should prefer to have explained to me the manner in which the evacuation should be effected, and on what occasion, and to what extent. To establish when one should cut the vein in the forehead, and when those at the corners of the eyes or under the tongue, the one known as the shoulder vein, or the one through the axilla, or the veins in the hams or alongside the ankle” [8, p. 168–169].

Once again, we can see here that Galen could be highly emotional. For example, in discussing Hippocrates’s ideas, Galen allows himself some pointed barbs at Erasistratus: “But it is clear that Erasistratus, because of his enmity towards Hippocrates, does not share the opinions that are common to all the rest of humanity; he turns out to be even more unintelligent than the cranes” [8, p. 168]. The author seems to become increasingly emotional as he goes on: “But if you [*Erasistratus* — *D.B.*] would undertake to open

your ears, or, I should rather say, your mind, to receive the true doctrine, I might be prepared to overlook your hostility towards Hippocrates and tell you something worthy of that man's art" [8, p. 169].

Of course, such passages are interesting, but they contain no valuable information for the historian. However, we need to read Galen carefully. For example, various passages in this work contain emotional criticism of Erasistratus and his followers contemporary to Galen. The great Roman physician criticises his opponents not only for their rejection of phlebotomy, but also for their incorrect approaches to the use of purgatives, diuretics, and so on. Galen asks: "Why ever did Erasistratus himself use purgative drugs, and give wine mixed with cold water both to choleric and to patients with other conditions?" [8, p. 171]. He then adds: "He did not, after all, administer it at any odd time, but reserved this remedy for very acute crises. I do not censure him for this as long as he could judge the proper occasions with accuracy" [8, p. 171].

This illustrates once again the importance of Galen's works as a source: his comments on specific examples from clinical practice are sincere. Thanks to *Bloodletting, against Erasistratus*, we know that Erasistratus interpreted the condition of a patient with terminal cholera in a particular way. Our knowledge of infectious diseases today indicates that dehydration and toxicosis play a significant role if a disease proves fatal. What did Erasistratus do? He tried to replenish fluids and fought toxæmia! By adding wine to water, he also sought to produce a general tonic and detoxifier. From the viewpoint of modern medicine, this approach has to be regarded as entirely logical, without exaggerating its effectiveness. However, medicine was unable to come up with anything more radical and rational right up until the mid-twentieth century – i.e. until the appearance of sulfonamides, and, later, antibiotics!

In general, Galen, as a physician, prioritises the fight against toxicosis: "Whereas, on the other hand, if you give a drug purging downwards, an emetic, or diuretic, or a cathartic for the chest or the head, the initial administration is under your control, but subsequent events are at the disposal of fate. There is great danger in the administration of purgative drugs, either of the catharsis not being set in motion, or of the concourse to

the bowel not being readily excreted, or being excreted with distress, biting, colics and chills, or pulselessness and loss of consciousness, or of a grave disturbance of the entire body as a result of being evacuated either insufficiently or to excess. Indeed, the ultimate misfortune often ensues in this state" [8, p. 172–173].

The essence of the disagreements between Erasistratus and his followers on one hand, and Galen on the other is illustrated in the following passage: " 'Chrysippus, he [*Erasistratus — D.B.*] says, does far better, since he does not consider only the present, but takes impending dangers into account as well. Bringing up blood is dangerous because the danger of inflammation is linked with it, and in the presence of inflammation the nutrition of the patient presents a problem; a patient who has been phlebotomised in addition to being kept long without food is in danger of fainting.'¹² He tells us clearly in this passage that he is aware of the risks of starvation; risks which, he thinks must necessarily follow upon the rather long period during which, because of the inflammation, the patient is kept without food. But I need not go back to the raving Erasistrateans to tell me why he said that food should not be given to patients suffering from inflammation: I have Erasistratus himself expounding it, in the passages I quoted previously, both from the third book *On Fevers*, where he deals with the inflammations that arise from plethos, and from the first book *On injuries*. In both these books he says, not once but many times, that the veins, when emptied by starvation, will be better adapted to receive back again into themselves the blood that has flowed out alongside. How does he put it? 'The practice of not giving food to wounded patients during the time when inflammation is occurring is also consistent with these principles; for the veins, when emptied of nutriment, will more readily receive back the blood that has gone across to the arteries.' Being an evacuant remedy, in other words, fasting puts an end to inflammations. He gives no other reason for using it in inflammatory conditions, than this: that the evacuated veins will more readily receive back the blood that has gone across to the arteries. Ye gods! Anyone who wants

¹² Here (in the Greek version [8, p. 175]), Galen includes a quotation from Erasistratus that he has already used earlier [8, p. 148–149]. — *D.B.*

to empty the veins, then, must engage in a long struggle, when it is perfectly possible to achieve it without distress, and in a short time!" [8, p. 175–177].

Erasistratus fully understands the need to purge the body, and Galen agrees with him. The latter, however, following the Hippocratic principle of an individual approach to treating each patient, is well aware of the danger of catch-all remedies. Sometimes, a rapid deterioration in the patient's condition makes it necessary to act very quickly: "So, by heaven, Erasistratus' search for an evacuant remedy leads him to the feeblest of them all, passing by the effective ones and those that are able to lead quickly to the effect he desires" [8, p. 178].

If this is true for Erasistratus's first principle – treatment through lengthy fasting, it will also be correct for his second – the use of bandages to treat inflammation: "Let the plethos be carried to the chest, and suppose that one of the veins in it is in danger of bursting; shall we not then perform venesection, but bind the limbs with wool instead? Will that be enough? For God's sake, if you are going to use a revulsive remedy, don't you know that phlebotomy is a far more effective means of revulsion than that? I have had many patients who were bleeding uncontrollably until, by opening a vein, I stanching the haemorrhage. But Erasistratus, it seems, is ignorant of this too" [8, p. 178].

Both Erasistratus and Galen understand the need to relieve the patient of an "excess" of blood. Here, readers may recall another term widely used by physicians in the eighteenth and nineteenth centuries: "an excess of bad blood". The difference is that Erasistratus recommends conservative methods, while Galen favours an active surgical approach based on the patient's individual circumstances. "But I am exhausting myself unnecessarily; let me remind you of your own words. Have you not taught us yourself, in your first book *On health*, where in explaining the origin of plethos in the veins you describe the remedies in order, and, while you regard the object of all of them as evacuation, you say nevertheless that different forms of evacuation suit different patients? As evacuants of the plethora, however – for thus you see fit to call the plethos of nutriment in the veins – you prescribe exercises, frequent baths, and light diet" [8, p. 179–180].

Galen never tires of reminding us that all patients are different: one and the same disease can present in different ways in different people. A physician's arsenal of therapeutic interventions needs to be sufficiently extensive, and should be applied on an individual basis: "We shall not, therefore, attempt to evacuate the epileptic with baths; you are quite right in laying down this principle. Neither shall we prescribe gymnastics for the patient in whom there is any fear of a vessel in the chest bursting. For there is certainly a danger, in the violent exertions of gymnastics, that a rupture may occur in the chest of one who performs them, simply as a result of weakness, without any plethos being present" [8, p. 180].

A third method, besides fasting and bandaging, of "evacuating" the veins, according to Erasistratus, is "light diet". Galen specifically calls this the 'third' remedy, although from the context of his reasoning it is clear that Erasistratus's arguments in favour of this diet are the same as those he uses with respect to fasting. Evidently, Erasistratus himself defined it as a separate form of treatment, distinguishing "light diet" from fasting, so Galen sets out his arguments likewise.

The great Roman physician remarks: "Fasting, I take it, is not one of the things that exist, any more than blindness or deafness is; rather all such conditions are deprivations of things that exist. The administration of food, however, is one of the entities that do exist, and as a result you can work out its function for yourself: it is the nourishment of the body. Not giving food is not the same as one of the existing things; you cannot demonstrate any function for it, in the way in which you can assign an evaculatory function to sweats, phlebotomy and the enema, and a nourishing function to meals. Now fasting is midway between the two conditions, evacuation and nourishment; for it neither nourishes nor evacuates" [8, p. 183]. Galen continues: "The abundance of evacuant remedies that can replace fasting is remarkable. If we are going to use it on its own we shall achieve nothing, since it does not evacuate by itself. And when it is used in combination with a natural evacuant, its deleterious side-effects outweigh the benefits of the evacuation" [8, p. 185–186].

In *Bloodletting, against Erasistratus*, Galen advocates the pathogenetic principle and the individual approach to patient treatment. Any illness, in his view, has a particular mechanism

of development, and it is this that the physician needs to affect, using all the methods available. One of these is phlebotomy, which should be used only when strictly necessary, and should take account of the anatomy of the part of the body affected by the inflammation.

I have already drawn attention to the close connection between the practices of the Methodic doctors who were Galen's contemporaries, competitors and opponents and some aspects of Erasistratus's legacy, and even suggested that this could be linked to certain sympathies of Erasistratus towards the natural philosophy of atomism that are unclear to twenty-first century historians, but were well known to Galen and his contemporaries. This has been noted by Hermann Diels [11] and James Longrigg [12], who has pointed out that Erasistratus's theoretical views were based to a significant extent on the physics of Straton of Lampsacus.¹³ However, the mere absence of contradictions in the natural philosophical principles of their medical teaching is not enough to prove their links: they also need to share the same practical approaches. Galen's *Bloodletting, against Erasistratus* allows us conclusively to establish the nature of this relationship.

Evidently, it can be properly understood only through examining aspects of clinical practice. The essence of the Methodic doctrine has been accurately described by Vivian Nutton: its treatment aimed to be "easy, pleasant and painless" [13]. Fasting, light diet and bandaging fit in very well with this doctrine. Catch-all remedies and ready-made prescriptions for every case, requiring little understanding of anatomy and based on ignorance of the aetiological principle and the pathogenetic approach, were also typical of the Methodic doctors. Further evidence for this comes from another important source, Galen's *Bloodletting, against the Erasistrateans at Rome* [7].

This treatise starts with an account of some physicians whom Galen encountered when he first came to Rome. Straight away, he describes a case where, he believes, they acted wrongly: "In the case of a woman almost twenty-one years old, who had a red face and a slight cough and already some difficulty in breathing, as a result of

suppression of the menstrual catharsis, I found them lightly binding her limbs with woollen bandages and ordering her to fast, but neither using phlebotomy themselves nor permitting me to do so" [7, p. 187].¹⁴

For a doctor today, assessing this patient's condition is not easy: the information Galen provides is scanty, and there are many potential diagnoses, right up to a suspected pulmonary embolism. Readers should not be confused by Galen's explanation ("as a result of suppression of the menstrual catharsis"), which illustrates his clinical logic: if a repletion of blood is observed, attention should be paid to all the aspects associated with it. Galen clarifies that the woman's menstruation had been 'suppressed for four months', but knowing this brings us no closer to a correct diagnosis from a modern point of view. What is important is something else: Galen espouses bloodletting, as an emergency measure, whereas his opponents use bandaging as a therapeutic remedy. Galen then discusses various complicated case histories, in one of which a female patient recovers after a copious nosebleed, which had arisen spontaneously. All this, says the great physician, shows "how great a power the removal of blood has for the cure of such conditions" [7, p. 192].

Galen borrows Erasistratus's descriptions of clinical situations, while pointing out the mistakes committed by Erasistratus himself in treating patients.¹⁵ Galen's main theory is that Erasistratus rejected the benefits of phlebotomy in principle: "I think this is why Erasistratus himself omitted to mention phlebotomy in connection with any disease at all, thus clearly forbidding its use in the one condition that most requires it" [7, p. 195–196].

The following passage is of considerable interest: "Hence, leaving out the others, I shall refer only to Straton, who was a constant associate

¹³ See [1].

¹⁴ Comments on certain passages from this work that are of particular importance for reconstructing Erasistratus's views and understanding Galen's attitude to him and his followers are provided in Barzakh's translation. A number of my hypotheses put forward when this text was published in Volume I [3, p. 426–462] have been confirmed, which, coupled with what I have found in my research in recent years, makes it possible to draw the conclusions with which this article finishes.

¹⁵ See [7, p. 193–196].

of Erasistratus and wrote from his house, so that it was said of him that he was in the man's service. This man said that Erasistratus was deserving of praise because, among other reasons, he used to treat without phlebotomy diseases which the old physicians had tried to cure with it. And indeed it is clear from his own writings that Straton himself always undertook his treatments without phlebotomy. What wonder is it that Erasistratus follows Chrysippus the Cnidian in everything, when he has chosen in advance to abjure phlebotomy, just as that man did? So, it is clear, do Aristogenes and Medius, and all the others of Chrysippus' sect. As far as the welfare of their patients was concerned, therefore, it would have been better for those men to have believed that Erasistratus did use phlebotomy; for the Erasistrateans of today, however, it is better that they should not believe it? One would have to be quite mad to think that Erasistratus had been silent on the subject of phlebotomy in the diseases recently mentioned because he thought it right for the veins to be emptied and to establish this as the aim of treatment, if one were arguing from the conditions in which one found Erasistratus recommending fasting" [7, p. 197–198]. This passage, I believe, is revolutionary in its significance. I recall that Diels proposed the following explanation of Erasistratus's natural philosophical views: he studied at Piraeus and was a Peripatetic, but under the influence of the ideas of Straton of Lampsacus his theoretical reasoning took on elements of corpuscular theory. At the Lyceum, Erasistratus attended lectures by Theophrastus, as Diogenes Laërtius mentions [14]. From what we know of the lives of Theophrastus and Erasistratus, it appears that Theophrastus was then not yet an old man, while Erasistratus was by no means young. Only a philosopher with the requisite authority could have influenced the celebrated physician's worldview, whereas it appears that Straton was much younger than Erasistratus, and so could not have had a significant influence on the development of the celebrated Alexandrian's outlook. In all likelihood, the Straton mentioned by Galen here and the Straton of Lampsacus we know from the history of philosophy are the same person. Once again (as in the case of the Pythagoreans and Alcmaeon¹⁶), the question arises as to who

influenced whom. If we assume that Straton of Lampsacus was, in a sense, a pupil of Erasistratus, the cause and effect posed by Diels are reversed. It follows that Erasistratus, in consciously adhering to the atomistic views that tallied with his specific interpretation of broader clinical experience, influenced the younger Straton, bringing to his views those "elements of corpuscular theory" referred to by Diels. This hypothesis seems even more likely given that other sources indicate that Straton of Lampsacus had an interest in medicine. It turns out that Galen's *Bloodletting, against the Erasistrateans at Rome* helps us to understand the nature of this interest.

Galen analyses Erasistratus's errors in treating patients in great detail, and constantly emphasises the fundamental nature of his disagreements with him. According to Galen, bodily repletion, or a local plethos, that results in an acute condition in the patient requires immediate phlebotomy. A clear example of this is the case of a "girl from Chios". Galen accompanies his analysis of her case with lengthy quotations from Erasistratus: "In the first book, then, he [*Erasistratus — D.B.*] wrote as follows: 'In the case of the girl from Chios, the first thing was that the occurrence of the menstrual evacuations was suppressed for a long time. Next followed a cough, productive of phlegm. In the course of time she started to bring up blood; this recurred during the time of the menstrual purgations, sometimes every fourth and sometimes every second month. And if, at any time on the days when the purgations were taking place, the ejection of blood also occurred, it coincided with them for three or four days, making it perfectly clear that she was now suffering from this elimination in place of the menstrual purgations. There was a concomitant fever on those days; then it remitted.' Having said so much by way of preface, Erasistratus goes on to write about her treatment as follows: 'At first she tried treatment with potions, fomentations to the uterus, and pessaries, and the rest of the regimen adapted to this purpose, for there was, indeed, some slight thickening round the cervix uteri. When, however, the treatment not only proved totally unsuccessful, but during one particular menstrual period a heavy feeling developed in the loins, though there was no discharge, while the fevers were more continuous, penetrating somewhat into the body, and severe attacks of

¹⁶ See [14] and [15].

coughing followed, we therefore abandoned the local treatment to the uterus. We supposed that it would be difficult, while the fevers persisted, to bring on the menses; we employed, however, the rest of the therapeutic measures we were in the habit of applying in other such cases, and in accordance with the usual treatment when expecting menstruation, we withdrew food. The ejection of blood occurred only once, and that for a short time.’ He has mentioned nothing more, though we may suppose that pus was also being brought up. There is no word of phlebotomy here, although it would have been, to say the least, appropriate, as all experienced practitioners know, to use phlebotomy as the first remedy of all. Perhaps, however, one of those people who have no hesitation in expressing opinions on any subject whatsoever will say that these things were not done on the orders of Erasistratus as supervisor of the treatment, though he lists them here for us so that none of the things that were done should escape mention. A quotation, however, will confute these people, where he says: ‘We therefore abandoned the local treatment to the uterus. We supposed that it would be difficult, while the fevers persisted, to bring on the menses; we employed, however, the rest of the therapeutic measures for other such cases, and in accordance with the usual treatment when expecting menstruation, we withdrew food.’ ” [7, p. 200–202].

Even more characteristic is the case of a patient called Criton, whom Erasistratus unsuccessfully treated for “plethora” and “synanche” (inflammation of the throat): “Criton’s illness began with plethora, for he fell into a synanchic repletion, or in other words an inflammation of the fauces and epiglottis. Those who fall into this condition usually suffocate and die in a short time unless they are promptly treated. Since Criton, then, is in this state, on the first day we treat him by heating him with sponges in the usual way as soon as we stop applying plasters, that he is continuously under treatment. He is also given small pills of castoreum to move his bowels, with satisfactory results” [7, p. 206].

The patient’s condition deteriorated, and he felt pain in the region of his lungs and liver, and developed a fever. Soon afterwards, the patient also felt pain in the back of his neck, and fell into a stupor, losing control of his urination and other bodily functions. Soon afterwards, Criton died.

Galen’s description of Erasistratus’s views on human illnesses allows us to conclude that the Alexandrian physician regarded the condition known as “plethora” (or the presence of an excess of blood in the body) as one of the most dangerous. He believed it to carry particular risks for the patient, first of bleeding, and second of blood “flowing over” to various organs, with the danger of their “repletion” and subsequent “rupture”. Erasistratus devotes a significant part of his teaching on pathology to this syndrome: Erasistratus, says Galen, blamed both paralysis and gout on plethora. [7, p. 245]. Galen agrees that the condition is dangerous. The dispute in this work revolves around how to assess it, and how to deal with it – with bloodletting (as an emergency solution) or planned long-term measures (fasting and other forms of purging). In Galen’s view, “plethora” carries the risk of a rapid deterioration in the patient’s condition (right up to the patient’s death), which requires urgent intervention. His opponents, however, see things differently.

This treatise describes a number of practical discussions between the author and physicians who follow Erasistratus. At its start, Galen describes a case involving a female patient, which, in his opinion, required urgent venesection. The physicians opposed to him chose another approach to managing the patient, and recommended dietary and evacuatory measures. Galen tried to persuade them that an urgent intervention was required to reduce the patient’s blood pressure: bloodletting, – i.e. venesection. His opponent vehemently disagreed, and the patient, as predicted by Galen, suffered a tragic fate. The argument here centres on whether to perform phlebotomy (“opening of veins”) when the patient’s life is at risk, or to reject it in favour of a conservative approach to managing the patient. This example is not unique: Galen describes a whole range of case histories where the failure to perform venesection led to a deterioration in the patient’s condition, and even to their death.

Galen was well aware that phlebotomy needed to be performed in accordance with strict rules and only when necessary. By all accounts, many physicians in his day ignored the method of venesection. Galen rebukes these colleagues of his, pointing out their fundamental errors, identifying certain questions to consider: “First, whether it makes no difference which

vein is opened, as some think, or whether there are special veins for each of the affected parts, which quickly empty out their plethos. Secondly there is the question whether it is appropriate to remove blood once or several times; and thirdly, of defining the aim of the treatment, so that the amount of the evacuation may be accurately assessed. The fourth question is at what time the venesection should preferably be performed, in the absence of any special contraindication. This will be explained, with proofs" [7, p. 212]. Galen shows that Erasistratus wilfully disparaged venesection, even when the patient's life was at risk. Furthermore, he also deliberately ignored the experience of other physicians that had been accumulated before him and was undoubtedly widely known, despite the difference in the views of specific specialists: "Some say that it makes no difference which vein one chooses to cut, since the whole body can be evacuated equally well through any of them; others, however, take the contrary view that there is a very great difference, since some veins evacuate the affected part quickly, others in a longer time. But, as he [*Erasistratus – D.B.*] neither writes anything about these, nor lays down the indications for the amount of the bloodletting, it is clear from his neglect of all these topics that he did not use phlebotomy at all" [7, p. 219].

Galen frequently mentions the danger of discrediting phlebotomy because of the actions of inexperienced or insufficiently educated physicians: "But the fact that the new physicians have recourse to the remedy without knowing anything about the amount of blood that should be left and the veins that should be cut will do the greatest harm to patients, as I said right at the beginning" [7, p. 222–223].

By all accounts, many of Galen's opponents recognised that the therapeutic effect of phlebotomy, performed when necessary and technically correctly could not be denied: its solutions to complex clinical situations were too obvious. Accordingly, some followers of Erasistratus contemporary to Galen engaged in speculation aimed at toning down the celebrated Alexandrian physician's opposition to venesection. Galen tells us about them, reproving their attempts to ascribe to Erasistratus views he did not hold: "When he wrote in his book *On Fevers* as follows: 'Round about the time, then,

at which illnesses are beginning and of the onset of inflammatory conditions, all sloppy food, in addition to solids, should be withdrawn', what difficulty would there have been in adding 'and phlebotomy should be used'? so that the whole passage would read: 'Round about the time, then, when illnesses are beginning and of the onset of inflammatory conditions, all sloppy food, in addition to solids, should be withdrawn, and phlebotomy should be used'. This is what the men of today would like Erasistratus' opinion to have been.... In fact, to tell the truth, they have changed the doctrine of Erasistratus; for they phlebotomise and then feed the patient forthwith, whereas he forbade phlebotomy and recommended that food should not be given" [7, p. 222–224].

Galen believes that Erasistratus makes a significant error in thinking that an injury to a vessel is immediately accompanied by inflammation. In fact, if the patient is feverish and their general condition is deteriorating, bleeding sometimes happens of its own accord, as a consequence of a rupture of the vessel. When the site of the bleeding is examined, the vein is always seen to be inflamed: in fact, the vessel bursts as a result of phlebitis. Bleeding does not arise in veins in a normal condition. Erasistratus quite rightly identifies this phenomenon, but, according to Galen, misunderstands the cause-and-effect relationship behind it. The great Roman physician reasons as follows: the inflammation of a vessel precedes its rupture and develops as a result of a fever, indicating a deterioration in the patient's general condition. The latter, in turn, is caused by repletion, including a local plethos. According to Galen, physicians should not wait for such a general deterioration, when fever and inflammation may cause the vessel to burst. Phlebotomy should be performed and the patient treated before the onset of the critical phase. Erasistratus, believes Galen, is wrong to say that venesection is always accompanied by inflammation. Accordingly, Erasistratus's recommendation to purge the body through fasting, without using venesection, cannot be considered wise.¹⁷

In addition to other information on the celebrated Alexandrian's teaching, Galen's *Bloodletting, against the Erasistrateans at Rome*

¹⁷ See [7, p. 225–230].

presents some of the views of a well-known follower of Erasistratus – Chrysippus of Knidos.

Galen states that it was Chrysippus who set out the principles of a clinical approach to patient management involving a rejection of phlebotomy on principle. Erasistratus refers to this in his book *Bloodletting*. “Let us begin, then,” writes Galen, “by considering the exact words that Erasistratus himself wrote in his book on bringing up blood, where he is praising Chrysippus for rightly using bandages to the limbs in place of phlebotomy: ‘... Chrysippus, however, is far better, since he does not consider only the present, but takes impending dangers into account as well. Bringing up blood is dangerous because the danger of inflammation is linked with it, and in the presence of inflammation the nutrition of the patient presents a problem; a patient who is phlebotomised in addition to being kept long without food is in danger of fainting.’ He has not added the reason why he thinks it right to use starvation at the time when inflammation is occurring, since he has spoken of that in another passage in which he says: ‘The practice of not giving food to wounded patients, during the time when inflammation is occurring, is also consistent with these principles; for the veins, when emptied of nutriment, will more readily receive back the blood that has gone across to the arteries, and when this happens the inflammation will become less.’” [7, p. 225]. Chrysippus thought that all means available should be used to prevent bleeding or development of the inflammation. A patient whose condition was deteriorating was he believed, in serious danger as a result of repletion. Repletion needed to be treated, which meant preventing the entry into the body of new elements congesting it. Accordingly, the patient was prescribed fasting. Galen again quotes Erasistratus: “ ‘Chrysippus was right in not phlebotomising patients who bring up blood, because a little later they will need the evacuant remedy of fasting.’ ” In other words, he says, “One ought therefore not to evacuate patients who are bringing up blood, because soon afterwards, when inflammation is occurring, they will need evacuation” [7, p. 226].

Such logic exasperated Galen: in this and other works by him (*Natural Capacities* and *Bloodletting, against Erasistratus*) he also sharply criticises Erasistratus, Chrysippus and his contemporaries who shared this opinion. Galen’s reasoning is different: every disease has its cause, and in this

case an imbalance of qualities and humours results in repletion and plethora. The further progress of the disease carried the risk of inflammation, fever and a sharp deterioration in the patient’s condition. Consequently, it is necessary to prevent this, and, through venesection, to relieve the body of the excess of blood, the pressure and repletion. In other words, it is necessary to affect the cause of the illness, rather than its consequences or one of its symptoms. This is actually a pathogenetic approach, the conception of which the history of medicine owes to Hippocrates.

In my opinion, what we have here is not a difference in treatment practice, but rather a fundamental difference in approaches to understanding health and disease. Such a difference has to be grounded in the scientist’s particular worldview. Galen’s worldview is informed by the teaching of Hippocrates, Plato and Aristotle.¹⁸ Erasistratus and his followers, the Methodic doctors, were certainly influenced by atomic theory.

For the moment, I have not found conclusive evidence that Chrysippus of Knidos was a supporter of the natural philosophy of atomism. However, based on Galen’s *Bloodletting, against the Erasistrateans at Rome*, the works of Chrysippus may be regarded as the source of a number of important ideas that subsequently formed the basis of the clinical practice of the Methodic doctors.¹⁹ In quoting Chrysippus, via Erasistratus, Galen states that as well as avoidance of phlebotomy and fasting, the extensive use of bandages espoused by Erasistratus as an alternative to venesection was also proposed by Chrysippus.²⁰

Both Chrysippus and Erasistratus attach great importance to combining bandaging with fasting. Galen quotes an interesting passage from Erasistratus’s third book *On Fevers*: “Round about the time, then, at which illnesses are beginning and of the onset of inflammatory conditions, all sloppy food, in addition to solids, should be withdrawn... So if nourishment is given at such times and digestion and distribution perform their functions, the vessels are filled with nutriment,

¹⁸ Of course, my assessment that Galen was a follower of the Stagirite is not definitive. One only has to recall that in the first books of *On the Doctrines of Hippocrates and Plato* Galen sharply criticises some of Aristotle’s views [5].

¹⁹ See, for example, [7, p. 231–234].

²⁰ See [7, p. 234–236].

and more powerful inflammations will ensue.” [7, p. 220–221]. Erasistratus’s remarks here illustrate his view on this issue. As I see it, this is the logic of an atomist. A Hippocratic doctor understands that different foodstuffs consist of different combinations of the primary elements. Accordingly, their consumption affects the balance of qualities and humours in different ways. To a supporter of the natural philosophy of atomism, it is important how much food enters the human body. The number of atoms ingested increases, so bodily repletion, including of venous

blood, can be expected – such is Erasistratus’s reasoning. His treatment doctrine essentially aims to relieve patient of repletion by reducing the number of atoms entering the body or contained in it – hence his dietary recommendations and the advice to use sweating, bathing and exercise where possible [7, p. 238–243].²¹

²¹ The continuation of this article will be published in one of the following issues of the *History of Medicine*. – *Editor’s note*.

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