CHAPTER SEVEN
AIR, MIASMA AND CONTAGION IN
THE TIME OF HIPPOCRATES AND THE SURVIVAL
OF MIASMAS IN POST-HIPPOCRATIC MEDICINE
(RUFUS OF EPHESUS, GALEN AND PALLADIUS)

The Greek word *miasma*, which still survives in English, was described by Émile Littré, the editor of Hippocrates who is best known for his *Dictionnaire de la langue française* as a ‘medical term’. He gives it the following meaning: “Fumes that originate from organic substances and which, spreading through the air and attaching themselves to certain bodies, exercise a pernicious influence on animals. In particular, unpleasant smells that originate from certain contagious diseases. Variolous and pestilential miasmas.”

However, the Greek word *miasma* was not originally a medical term. Derived from the verb *miaino*, which means ‘to stain’ (for example with purple, and hence, by analogy, with blood), the noun *miasma* is first found in connection with the stain of blood spilt in a crime.¹ This is the meaning of its oldest uses, which appear in Greek tragedy.² Thus, *miasma* belonged firstly to a religious and legal, rather than medical, context. However, from the fifth century we begin to find the term *miasma* connected with disease in both tragic literature and in the first medical texts found in the Hippocratic Corpus, although its use is relatively rare.

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My aim in this paper is firstly to draw on those passages from the classical period where the Greek noun *miasma* (and sometimes the verb *miaino*, from which the noun is derived) appears in connection with disease, in order to study the role played by *miasma* and its relationship with contagion and air. We will see that there are two distinct models of use of *miasma* in connection with disease: one in religious medicine, where *miasma* is naturally connected with the notion of contagion, and the other in rational medicine, where *miasma* is connected with the air. My aim will then be to examine the survival, in rational medicine after Hippocrates, of the term *miasma*, rather than miasmatic theory as a whole.

*Miasma*’s connection with disease, whether an individual or general disease, is quite easily explained within the context of religious medicine. We will use two examples here: first, epilepsy, an individual disease; then *loimos*, a general disease.

Since an epileptic fit is very sudden and striking, the condition was naturally attributed to the patient’s violent possession by a god. From this perspective, the treatment recommended was of a magico-religious nature, comprising spells and purifications, as well as dietary prohibitions. The Hippocratic treatise *The Sacred Disease* is the most useful witness we possess on the treatment of epilepsy by magico-religious medicine, although it is presented in a polemical context, for the Hippocratic doctor contrasts the magico-religious conception with a rational one. Whilst criticising treatment by purifications, the Hippocratic medical writer denounces the connection that his adversaries, supporters of religious medicine, establish between the condition and *miasma* (ch. 1):

They make use of purifications (χαθάρµοσία) and incantations and, it seems to me, carry out a very sacrilegious and impious action. Indeed, they purify those gripped by the disease with blood and other similar things like those used in the case of those people who bear a stain (µίασµα), or cursed criminals, or those who have been enchanted or have committed a sacrilegious act; they should do the opposite, sacrifice and pray, take the patients to the temples to supplicate the gods. In fact, they do none of these things, but perform purifications; and sometimes they conceal the purificatory objects in the earth, sometimes they throw them into the sea, sometimes they carry them...

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3 The corresponding Latin term to *miasma* is *infectio*. Extremely useful is M. Grmek, “Les vicissitudes des notions d’infection, de contagion et de germe dans la médecine antique,” in G. Sabbah (ed.), *Textes médicaux latins antiques*, (Centre Jean Palerne, Mémoires 5) (Saint-Étienne, 1984), pp. 53–69.
away into the mountains where no one can touch or tread upon them. But these objects they should take to the sanctuaries and deposit them in offering to the god, if a god be the cause of the disease. However, I do not think that the body of man can be stained (μιαίνεσθαι) by a god, the most perishable thing there is by the most holy; for even if it happened that a human body, under the effect of some other thing, acquired a stain (μεμιασµένον) or were damaged, I think that it would be purified and sanctified rather than stained (μιαίνεσθαι) by a god. For it is the divinity which purifies and sanctifies the greatest and most impious offences, and which is the substance that cleanses us. We mark out the boundaries of the temples and the sacred spaces in the gods’ interest, so that no one may pass them unless he is pure, and when we enter them we are sprinkled with holy water, not in the idea that we bear a stain (µιαινµενοι), but with the intention of dismissing through this sanctification all impurity we previously had. This is my opinion on purifications (καθαρµένοι).

We are not concerned here with the polemical skill with which the author attacks his adversaries on their own ground, religion, nor his own remarkably refined conception of divinity. What interests us here is the relationship between the condition and miasma that is implied by the magico-religious treatment. The use of purifications implies that the condition is considered as a miasma. Indeed, the purification used to treat an epileptic is the same as that used to try and remove miasma. Should we understand miasma here as a stain in general, or more particularly the stain of spilt blood? We cannot be sure, but the act of purification by blood seems to correspond to a cathartic logic which removes like by like. Followers of magico-religious medicine use sacrificial spilt blood to purify a condition whose stain is comparable to spilt blood. Thus, whatever the exact meaning of miasma (in a wider or narrower sense), the first important conclusion to take from the text is the idea that, from the perspective of popular religious medicine, there is a similarity between disease and miasma. The second important conclusion is that it concerns a contagious disease, in so far as all miasma, from a religious perspective, is considered contagious. This is implied here not by the actual performance of purification, but rather by

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5 We may compare the idea, suggested by the medical writer, that man cannot be stained by a divinity, with the complementary idea, suggested in Greek tragedy, that a divinity cannot be stained by man. Creon, in Sophocles’ Antigone (1043f.), says: “I know that no man can stain (µιαινειν) the gods.” However, the argument is then undermined by Sophocles, since it is spoken by Creon when he loses his temper (clearly in the wrong) against the seer Teiresias who, drawing on the traditional concept of contagion of staining, had accused him of having stained the altars of the gods by banning the burial of Polynices and of being responsible for the city’s disease (1015 νοςει παλις). [See also ch. 6 in this volume].
the means by which purification is brought about. Indeed, the instruments that served for the patient’s purification, and that were supposed to have been taken by them to transfer the *miasma*, are then removed as far away as possible from the community of the living, to avoid any contact with them. Thus, this implicitly means that the condition, before purification, is as transmittable by contact as *miasma*.

There is another type of disease that popular religious medicine connects with *miasma*: the general disease that descends on a city, which in Greek is called *loimos*. This is generally translated as ‘plague’, but should be translated, at least for the classical period, as ‘pestilence’, since the plague caused by *Yersinia pestis* does not seem to be known in this period. It is tragedy, not rational medicine, which informs us about the link between pestilence and miasma. The most important witness is Sophocles’ *Oedipus Rex*. At the start of the tragedy, we learn that the city of Thebes is suffering from a general disease that affects not only humans, but also plants and flocks. The disease is called *loimos* (lines 27–30):

A fever-bearing goddess, the most odious Pestilence (*loimos*), descends upon the city; due to her, the house of Cadmus is empty, whilst black Hades is filled with groans and tears.

The Delphic oracle, officially consulted by the city on how to bring an end to the pestilence, gives the order to dispel the *miasma* from the country (97). The *miasma* is undoubtedly spilt blood, since it is the blood spilt from the murder of the old king of the city that produced the city’s torment (101). Thus, the pestilence is related to *miasma*, just like epilepsy in the preceding case, and it is not surprising that the treatment should be comparable: the *loimos*, like epilepsy, should disappear following purification. In fact, having heard the oracle’s demand that the *miasma* be dispelled, Oedipus asks: “through what purification?” (99 Ποιήσας καθαρίσθω;). Nevertheless, the relationship between *miasma* and *loimos* is slightly different because *miasma* and the disease are not one and the same, but rather *miasma* is its cause.

We find this conception of pestilence caused by miasma not only in religious medicine, but also in the rational medicine of the *Hippocratic Corpus*. For example, in ch. 6 of the Hippocratic treatise *Breaths*, we read that general fever, which is called *loimos*, is caused by *miasmata*. Thus, we observe the same connection between the Greek terms *loimos* and *miasma* as in Sophocles’ *Oedipus Rex*, and the nature of this relationship is identical. In both cases, the *loimos* is caused by *miasma*. However, there

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6 Hippocrates, *Breaths*, ch. 6, p. 109,6 f., ed. Jouanna (λοίµος) and 110,7 (µιάσµατα).
is a formal difference: the use of the noun in the plural by the medical writer (miasmata) and in the singular (miasma) in the religious context. This formal difference is due to a semantic difference, since the term no longer has anything to do with the stain of spilt blood, but rather refers to morbid miasmas carried in the air. Here are the two passages of the treatise where we find the plural miasmata:

- ch. 5: The author of *Breaths* supposes that all diseases are caused by the air. He states:
  
  Immediately after this, we can say that the source of diseases is, in all probability, nothing other than this principle (i.e. air) when there is too much or too little of it, or it has become too massive, or when it is stained by morbid miasmas (μεμιασμένον νοσηρόι μιάσμασιν) that enter into the body.\(^7\)

- ch. 6: “Thus, when the air is full of miasmas (χρωσθή μιάσμασιν), whose properties are hostile to human nature, this is when men are ill; but when the air is not suitable for another type of living beings, these beings are then ill.”\(^8\)

What should we understand by these ‘miasmas’ that stain or fill the air? Commentators have supposed that they are either unpleasant smells descending from the stars, rising odours (from the earth or marshes), or fumes coming from decomposing cadavers.\(^9\) Thus, *miasma* in the Hippocratic text is a physical and natural cause, whereas in tragedy, *miasma* is a stain resulting from breaking a moral or religious prohibition. In the Hippocratic text, *miasma* has shed all notion of individual or collective responsibility and the cause of a disease is no longer individual behaviour and its relationship with religious and moral values, but rather human nature and its relationship with the surrounding environment. Pestilence in the Hippocratic text, caused by a pathogenic element carried in the air, selectively affects humans or different species of animals according to the laws of compatibility or incompatibility between the pathogenic element and the nature of each species, whilst pestilence in tragedy, which is inherited from the epic tradition (Homer, Hesiod), is a punishment that is inflicted indiscriminately on all types of life in the community to which the guilty person belongs.

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9 See Ps.-Galen, *On the Cause of Affections* (ed. Helmreich 18f.). See also Galen, *On Differences between Fevers* 1, ch. 6, 7.289,4–290,11 K. and Palladius, *Commentary on Hippocrates’ Epidemics* 6 (Dietz II 2,18–23); these two texts are quoted in the second part of this article; see also Galen, *Commentary on Hippocrates’ Nature of Man* (ed. Mewaldt CMG V 9,1, p. 63,18–20), where he discusses fumes originating from marshes, ponds, seas or swampy land.
The different understanding of *miasma* as a cause of *loimos* also leads to a different understanding of treatment. Hippocratic medicine no longer looks to purifications, but rather natural methods. The treatment is described not in *Breaths*, but in another Hippocratic treatise, *Nature of Man*. Like the author of *Breaths*, the author of *Nature of Man* attributes general diseases (which he calls *epidemic* diseases, not *loimos*) to the same cause, but uses the term *apokrisis*, not *miasma*, to refer to the emanations contained in the air. Here is the treatment he recommends:

(In the case of an ‘epidemic’ disease) this is the advice that should be given to people: do not change regimen, since this is not the cause of the disease, but rather see to it that the body is extremely thinned and weakened, by removing food and drink from the habitual regimen little by little ... By contrast, as far as the air is concerned, here are the precautions to take: breathe in as little air as possible and as little contaminated air as possible; for this, remove the patient from the areas contaminated with the disease, then follow a weight loss cure, since this is the best way of avoiding the need to breathe frequently.

This treatment is perfectly logical: it aims to reduce, as far as possible, the patient’s inhalation of miasmas contained in the air by reducing the amount of air inhaled and by removing the patient from places filled with miasmas. We might mock this treatment, which is more preventative than curative. However, it is clear that the doctor seeks to avoid the spread of the pestilence by strictly natural and rational procedures.

This conception of *miasma* also leads to a difference in the conception of the way in which diseases are transmitted. Since the miasmas enter man through respiration, the spread of a general disease does not occur through contact (either direct or indirect) between individuals, but rather through inhaled air that contains miasmas. Paradoxically, the medical, rational conception of *miasma* is further distanced from the modern understanding of infection than the magico-religious conception of *miasma* that is transmitted through contact.

We may add a final difference in the understanding of *miasma* between rational and magico-religious medicine. Whilst magico-religious medicine connected both individual and general diseases with *miasma*, rational medicine distinguishes between individual and general diseases. The cause of these two categories of disease is well differentiated: general diseases originate from miasmas contained in the air, and individual diseases originate from regimen. This distinction is made in two treatises, *Breaths* and *Nature*.

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of Man, which discuss pathogenic emanations carried in the air. Here is the passage from the treatise Nature of Man, where the contrast between the two categories of disease and the two types of causes is asserted with the greatest clarity:

Diseases come either from regimen or from the air that we breathe in to live. The diagnosis for each of these two categories is done like this: when a single disease affects a great number of individuals at the same time, we must attribute this to the most common cause, to that which we all use the most; and this is what we breathe. Indeed, it is clear that individual regimen cannot be the cause of the disease, since it attacks everyone, young and old, women and men and, without distinction, those who drink wine and those who drink water, those who eat barley bread and those who eat wheat bread, those who do a lot of exercise and those who do little. Thus, regimen cannot be the cause when, despite the great diversity in regimen, individuals are affected by the same disease. However, when there are different diseases that are produced at the same time, it is clear that the cause is, in each case, the individual’s regimen; in treatment, we must combat the cause of the disease, as I have explained elsewhere, and continue with changes in the regimen … but when it concerns a single disease established in the form of an epidemic, it is clear that the cause is not regimen; it is the air that we breathe which is the cause; and it is clear that the air is harmful because it contains a pathogenic emanation (νοσερὴν τὴν ἀπόκρισιν) (there follows the treatment quoted above).\(^{11}\)

We find the same distinction in Breaths between individual fevers caused by an unhealthy regimen, and general fevers caused by miasmas contained in the air. However, since the author supposes that all diseases come from the air, he integrates the traditional distinction into his own theory by also attributing to the air individual diseases that are caused by an unhealthy regimen. However, it is not air stained by miasmas that is the cause, but rather air inhaled at the same time as eating.\(^ {12}\) Despite these different explanations of individual diseases, it is clear that in both treatises miasmas or emanations carried in the air are the causes of general diseases, which affect the entire community of a city, and not of individual diseases.

Thus, in classical Greece we find two contemporary, yet different, conceptions of miasma within two very different understandings of disease. The first, which we find above all in Greek tragedy or in the critical refutations by rationalist doctors, is a magico-religious medicine, which associates disease with a stain of spilt blood or sees the stain of spilt blood as

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\(^{11}\) Hippocrates, Nature of Man, ch. 9, pp. 188,10–190,15, ed. Jouanna.

the cause of disease. This means that the disease is transmittable like the stain, and the treatment necessarily comprises purificatory procedures. We find the second in the rational medicine of the Hippocratic Corpus, particularly in the treatise *Breaths*. Here, miasmas are also seen as a cause of disease, but they have no connection with spilt blood, and are instead connected with the surrounding air and environment; they are fumes originating mainly from marshes or cadavers that are carried in the air and that enter men’s bodies through respiration and cause general diseases or pestilences.

Despite these differences in the meaning of *miasma* and its place within both approaches to disease, its use nevertheless presents continuity between magico-religious and rational medicine. We should add that this continuity is also marked by the use of the opposing term to *miasma*, *katharos*. *The Sacred Disease* used the term to refer to the process of purification in magico-religious medicine. However, we also find it in the rational medicine of the Hippocratic Corpus to refer to purgation. Here, then, is a second example of continuity and change between religious and medical vocabulary.

These are the two principal understandings of the relationship between disease, miasma, air and contagion in classical medicine. However, in the rational medicine of the Hippocratic Corpus we find a further, third model, which explains general diseases by environmental factors and where miasmas play no role. The treatise *Airs, Waters, Places* distinguishes between individual diseases that are caused by an unhealthy regimen, and general diseases. However, general diseases are divided into two types: local diseases, which are explained by the orientation of the city to the winds and the sun and by the nature of the various kinds of water (which would later be called endemic diseases), and more general diseases, which correspond to epidemic diseases. The author expressly says that these more general diseases are caused by a change in seasons (what we would call climate), i.e. by variations in the elemental quality of the air (hot, cold, dry, wet). Thus, air affects man not due to miasmas, but rather directly through the influence of its elemental qualities. At no time does the author of *Airs, Waters, Places*

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13 On the religious meaning of καθαρός, see Hippocrates, *The Sacred Disease*, ch. 1, 6.352, 9 L.; 354,3 and 7 L.; 362, 6 and 13 L.; 364,8 L. On the medical meaning of καθαρός, see Hippocrates, *Nature of Women*, ch. 18, 7.338, 17 L. and *Diseases of Women* 2, ch. 128, 8.276, 5 L.

allude to miasmas or to pathogenic emanations originating from marshes. Although marshes are harmful to one’s health, it is to the extent that one drinks their water.\textsuperscript{15}

What became of the use of the word \textit{miasma} in post-Hippocratic Greek medicine? Surprisingly, references to pathogenic emanations contained in the air by the term \textit{miasma} in post-Hippocratic Greek medicine are rare. We can contrast the fortune of the word ‘miasme’, which became relatively frequent in French medical vocabulary ever since it was borrowed from the Greek in the sixteenth century, with the rarity of the term in post-Hippocratic Greek medicine in the sense of ‘miasma’ contained in the air. For example, we do not find the term in the Aristotelian corpus. Even the historian Diodorus, who uses the miasmatic theory to explain the ‘plague’ of Athens, does not use the word \textit{miasma} to refer to the fumes rising from heated and putrefied stagnant waters, which pollute the air. He speaks of thick and foul-smelling ‘vapours’ (\textit{ἀτμίδας}) which, once ‘exhaled’ (\textit{ἀναθυμιωμένας}), pollute (\textit{διαφθείρειν}) the surrounding air.\textsuperscript{16}

In the medical literature between Hippocrates and Galen, we find the word \textit{miasma} (in its technical sense) in a single passage, a discussion of various kinds of water by Rufus of Ephesus preserved in Oribasius. It is concerned with ‘miasmas’ from the earth that are washed away by rain water.\textsuperscript{17} The use of terms related to \textit{miasma} to refer to causes of pestilence is no more frequent. In this regard, there is a significant gloss by Erotian on a passage from \textit{Breaths}, the first text to formulate the miasmatic theory of pestilences. It shows the need to explain the participle \textit{memiasmenon}, ‘stained’, describing the air, by ‘having become pestilential’.\textsuperscript{18} It is proof that,


\textsuperscript{16} Diodorus of Sicily 12.58.3. Similarly, when he describes the pestilence that decimated the Carthaginians during their siege of Syracuse (396–395), Diodorus understands the prompting causes of the disease to be the bad smell originating from the dead bodies and the putrefaction originating from the marshes (\textit{τὸν ἀπὸ τῶν ἐλών σηπεδόνα}); but the word \textit{miasma} is not used. Indeed, Diodorus never uses the word \textit{miasma}.

\textsuperscript{17} Rufus of Ephesus, quoted by Oribasius (\textit{Coll. Med.} 5.3.9, p. 118,2 Raeder): \textit{μᾶσσατα} Matthaei; \textit{μισσατα} codd. Aretaeus of Cappadocia (first century AD) uses the word \textit{miasma} once, but in the sense of ‘stain of spilt blood’, in his discussion of the treatment of epilepsy (7.7–8, Hude\textsuperscript{2} p. 154,3–6): ‘I have seen people place a vial on a man’s recently cut wound, and drink his blood. They exclaim, Oh power of the present need, treat one wrong by another wrong, this stain (\textit{μᾶσσατα})! Whether people were cured by this, no one can tell me exactly.”

\textsuperscript{18} Erotian (ed. Nachmanson M 8, p. 60, 1. 1) s.v. \textit{μεμιασμένον λοιμώδες γεγονός}. = \textit{Breaths}, ch. 5 (quoted above).
in the age of Nero, the technical use of terms related to *miasma* had become so rare that they needed an explanation. However, an important text by Galen, where the word *miasma* is used, is the most precise continuance we find of the connection between miasma and disease present in the Hippocratic Corpus. It is a passage from the treatise *On Differences between Fevers*, book 1, ch. 6, and it is, moreover, the only passage where Galen uses the noun *miasma*. It is not surprising to note that in Galen, as in the Hippocratic treatise *Breaths*, this word refers to the ‘miasmas’ carried by the air in a pestilential fever. Here is a translation of the whole passage:

> The constitutions of the air that surrounds us, when they are quite warm, like those that occur especially during the rising of the Dog Star, directly warm the heart itself through inhalation; moreover, since they surround the body, they make all of it warm, in particular the arteries, since these attract something from the substance of the air that surrounds us; through all these things the heart is necessarily affected, becoming excessively hot and first and foremost reaching a feverish state, which it transmits to the whole body.

> In *pestilential* constitutions (λοιµδεῖς), the inhalation (of air) is the most important cause. For, if the fever is sometimes caused by the humours in the body that are susceptible to causing putrefaction, when the living being receives a slight impetus from the ambient air for the beginning of the fever, most often it is following inhalation that the fever starts, inhalation of the surrounding air which is *polluted* (µιασμένος) by putrefied odours (ὑπὸ στηπιδονώδους ἀναθυμίσεως). The origin of putrefaction is either a mass of cadavers that have not been cremated, as normally happens during combat, or fumes from swamps or lakes during the summer.

> There are times when the starting point of a fever is an excessive heat of the surrounding air, as was the case during the pestilence that struck the Athenians, as Thucydides says: “Since they lived in stifling huts during summer, destruction descended onto the bodies.” Due to the presence, following an unhealthy regimen, of humours in the body susceptible to causing putrefaction, the start of the pestilential fever occurred. It could also be, immediately after, a flux of putrefying *miasmas* (µᾶσµατα) coming from Ethiopia, miasmas known to cause fever in those whose body is susceptible to being damaged by them.

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19 Thus, it is not totally correct to say that in Galen “the terminology has lost all ambiguity” and that the “miasmas were replaced by exhalations” (A. Debru, *Le corps respirant. La pensée physiologique chez Galien*, (Studies in Ancient Medicine 13) (Leiden, 1996), p. 234). Although the word ‘miasmas’ is as rare in Galen as it is in the *Hippocratic Corpus* to mean pathogenic emanations contained in the air (one passage in both corpora), it nevertheless exists. “[See also my “Miasme, maladie et semence de la maladie: Galien lecteur d’Hippocrate,” in D. Manetti, *Studi su Galeno. Scienza, filosofia, retorica e filologia: Atti del seminario, Firenze 13 novembre 1998*, (Studi e testi 17) (Florence, 2000), pp. 59–92].”
Indeed, we must remember throughout our discussion that none of the causes can act without the susceptibility of the patient; if not, those who spent their time in the summer sun would all have fever, as well as those who are particularly active, who drink a lot of wine or who have outbursts of anger or who are distressed. If not, I think, everyone would be ill and die of pestilence at the rising of the Dog Star. However, as we said, what constitutes a great part of the origin of diseases is the susceptibility of the body that suffers. Thus, let us assume by way of example that in the air that surrounds us, pestilential seeds (σπέρματα) are introduced and that amongst the bodies that are in contact with it, some are full of all types of residues ready to putrefy, and the others are without residues and pure. Moreover, let us assume that the former have obstructed passages, the state called plethora, an inactive life with an excess of nourishment, intoxication, excessive lovemaking and indigestions necessarily resulting from all the ways of life mentioned. On the other hand, for all the other bodies, which are pure and without residues, let us assume that they have both good respiration through the unobstructed and unrestricted passages, as well as proportioned exercises and a sensible regimen. Following these suppositions, you need to reflect on how each of these two categories will probably cope with this inhaled putrid air. Is it not likely that some will receive the start of the putrefaction from the first breath and will deteriorate quickly, whilst of all those who are without residues and pure, some will not suffer at all and some will suffer a little, since a return to a normal state is very easy for them? Likewise, when the mixture of the air differs excessively from its natural state towards wetness or heat, diseases are necessarily pestilential and those who suffer above all from these diseases are those who are filled beforehand with superfluous wetness, while those who practise moderate exercise and follow a well-ordered life style, will remain completely unaffected by any of these conditions. This discussion was based on a single example, but it proves true for all types of causes. Whoever wishes to acquire complete training in this matter, let him read the treatise On Antecedent Causes.²⁰

This passage is important because it presents the different possible causes of pestilential fever according to Galen, taking as his example the famous ‘plague’ of Athens reported by Thucydides. Whilst Thucydides refused to hypothesise on the cause (2.48, 3), Galen presents three explanations for the Athenian ‘plague’, which correspond to the theoretical distinctions made in the first part of the passage.

In the theoretical part, Galen distinguishes between two fevers which have a general cause: those that originate from excessively hot air (first

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paragraph) and those that are produced by the ‘pestilential constitution’ of the air. In the second paragraph we find stains and miasmas. When the constitution of the air is ‘pestilential’, the most frequent cause of pestilence is the inhalation of air which is stained by unpleasant fumes, i.e. miasmas as they were understood by the Hippocratic author of *Breaths*. However, Galen is more explicit than the Hippocratic author on what is understood by these miasmas, since he gives examples: emanations coming from cadavers that are not cremated, or given off from stagnant waters in summer. We find another new term in Galen to refer to these emanations: not ἀπόχρωσις as in *Nature of Man*, but ἀναθυμίασις, which is an Aristotelian term.\(^{21}\) Moreover, to this most frequent external cause we can add an internal one: the presence of humours susceptible to causing putrefaction, on the condition that there is a prompting factor (ἀφορμὴν τίνα) originating from the heat of the surrounding air. Thus, the air, in the case of a pestilential constitution, can be not only the initial cause of pestilential fevers via the intermediary of miasmas, which are factors of putrefaction, but also a prompting cause, in certain cases, through the excess of elemental qualities (heat and wetness).

In the section on the Athenian ‘plague’, Galen very skilfully uses information from Thucydides’ description to uncover these three possible causes. First, the prompting factor is a stifling heat caused by the surrounding air; then, the internal cause is the presence of humours susceptible to causing putrefaction, which are caused by an unhealthy regimen. Finally, the presence of miasmas originating from Ethiopia was a cause itself for those whose body was susceptible to be attacked by these miasmas. We may recall that Thucydides reports the rumour that the disease came from Ethiopia (2.48, 1 Ἐλθοσπικας), although he never mentioned miasmas. Thus, Galen interprets Thucydides’ text in the light of the Hippocratic theory of miasmas formulated in *Breaths*. Moreover, he adopts the idea that miasmas act in a selective way. However, whilst in the Hippocratic treatise this selective action differed from one species of animal to another, in Galen it differs also from one category of individuals to another. Miasmas have a dangerous effect on bodies whose state is predisposed to them. According to Galen, the body’s predisposition plays a very large role in the origin of diseases. He discusses this idea, which he regards as fundamental, using the example of miasmas in the air, which he also calls ‘seeds of pestilence’ (λοιµοῦ

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\(^{21}\) It is only from the Aristotelian corpus onwards that we find the term ἀναθυμίασις, which is particularly frequent.
He thus contrasts those bodies which are full of residues and which have obstructed passages, with those without residues and clear passages, and he connects this state of the body with regimen, too abundant in...

Galen, *On Differences between Fevers* 1, ch. 6, 7.291,3 f. K. The metaphor of the ‘seed’ of disease applied to miasmas is a novelty of Galen and is not found in Hippocrates. For a detailed commentary on this passage, and on two other passages from Galen where ‘seeds’ of disease are mentioned, see K. Sudhoff, “Vom ‘Pestsamen’ des Galenos,” *Mitteilungen zur Geschichte der Medizin und der Naturwissenschaften* 14 (1915), 227–229; V. Nutton, “The seeds of disease: An explanation of contagion and infection from the Greeks to the Renaissance,” *Medical History* 27 (1983), 1–34 (taken from *From Democedes to Harvey: Studies in the History of Medicine*, (Variorum Reprints CS277) (London, 1988), XI, p. 5 f.). However, V. Nutton does not mention, in connection with the passage from *On Differences between Fevers*, the relationship between miasmas (τινα σηπεδονώδη μιάκατα) and seeds (τινα λοιμού σπέρματα). In *On Differences between Fevers*, the ‘seeds of plague’ refer to elements outside the body that spread through the air (note the clear distinction between seeds and bodies in κατὰ μὲν τὰ περιεχον ἐμφέσταθαι τινα λοιμού σπέρματα and ἐκ ὁμολογων σωμάτων τὰ μὲν ... τὰ δὲ ...). This appears to be a metaphorical expression meaning the same thing as ‘miasmas’ or ‘emanations that stain the air’, since there was discussion at the start of the passage about the causes of pestilence. Matters contained in the air are the cause of putrefaction (ἐμανάταιντα), which exist outside man, originating from the sky or the hot and parched earth, and which are carried in the air (De rerum natura 6, 1095–1101) and inhaled by man (Lucretius 6, 1129 f.). In Galen, the ‘seeds’ of pestilence are “the origin of putrefaction” (ἀρχὴν τοῦ σήπεσθαι), to which Galen’s polemic against Erasistratus, who denies the existence of antecedent causes of fever, such as heat, cold, repletion or tiredness. The expression ‘seeds of fevers’ is used with respect to a fever caused not by a pestilential constitution, but by an excess of...

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22 Galen, *On Differences between Fevers* 1, ch. 6, 7.291,3 f. K. The metaphor of the ‘seed’ of disease applied to miasmas is a novelty of Galen and is not found in Hippocrates. For a detailed commentary on this passage, and on two other passages from Galen where ‘seeds’ of disease are mentioned, see K. Sudhoff, “Vom ‘Pestsamen’ des Galenos,” *Mitteilungen zur Geschichte der Medizin und der Naturwissenschaften* 14 (1915), 227–229; V. Nutton, “The seeds of disease: An explanation of contagion and infection from the Greeks to the Renaissance,” *Medical History* 27 (1983), 1–34 (taken from *From Democedes to Harvey: Studies in the History of Medicine*, (Variorum Reprints CS277) (London, 1988), XI, p. 5 f.). However, V. Nutton does not mention, in connection with the passage from *On Differences between Fevers*, the relationship between miasmas (τινα σηπεδονώδη μιάκατα) and seeds (τινα λοιμού σπέρματα). In *On Differences between Fevers*, the ‘seeds of plague’ refer to elements outside the body that spread through the air (note the clear distinction between seeds and bodies in κατὰ μὲν τὰ περιεχον ἐμφέσταθαι τινα λοιμού σπέρματα and ἐκ ὁμολογων σωμάτων τὰ μὲν ... τὰ δὲ ...). This appears to be a metaphorical expression meaning the same thing as ‘miasmas’ or ‘emanations that stain the air’, since there was discussion at the start of the passage about the causes of pestilence. Matters contained in the air are the cause of putrefaction (σηπεδονώδη). They enter the body through being inhaled but do not cause putrefaction unless the ‘land’ is favourable. There does not seem to be a fundamental difference between these ‘seeds’ (σπέρματα) of pestilence in Galen’s treatise and the seeds (σεμινα) of disease in Lucretius which exist outside man, originating from the sky or the hot and parched earth, and which are carried in the air (De rerum natura 6, 1095–1101) and inhaled by man (Lucretius 6, 1129 f.). In Galen, the ‘seeds’ of pestilence are “the origin of putrefaction” (ἀρχὴν τοῦ σήπεσθαι), to which Galen’s polemic against Erasistratus, who denies the existence of antecedent causes of fever, such as heat, cold, repletion or tiredness. The expression ‘seeds of fevers’ is used with respect to a fever caused not by a pestilential constitution, but by an excess of...
some and abstemious in others. Some will fall ill at the first breath of polluted air and will be affected by a grave illness, whilst others will not be ill at all, or will be so only slightly and recover easily.

However, by incorporating bad regimen into the explanation of pestilence, Galen no longer accounts for the clear distinction established by the Hippocratic writers of *Breaths* and *Nature of Man* between an unhealthy regimen, the cause of individual diseases, and miasmas, the cause of pestilences. Finally, by adding that the heat of the surrounding air can have a direct influence on the body and be the prompting cause of fever, Galen seems to adopt the model of causation that we find in *Airs, Waters, Places*, but which did not appear in those treatises that attributed pestilences to miasmas or emanations contained in the air.\(^{23}\)

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heat or cold in the air. Indeed, a little earlier Galen used the example of a crowd attending a show at the theatre under a hot sun where only certain spectators are seized by fever (*On Antecedent Causes* 100) and discusses here the example of cold that does not cause a fever in everyone. Thus, the ‘seed of fevers’ must mean in this treatise not the inhaled miasmas, but the cold or heat which penetrates man above all through inhalation, and also sweat (cf. *On Differences between Fevers* ch. 6, cited above: “The constitutions of the air that surrounds us, when they are quite warm … directly warm the heart itself through their being breathed in; moreover, since they surround the body, they make all of it warm, in particular the arteries, since these attract something from the substance of the air that surrounds us”). What is certainly common to these three examples of the ‘seed’ of diseases in Galen is not only the metaphor of the seed that is at the root of disease, but also an inherent idea behind this metaphor, which is fundamental in Galen, i.e. that this seed, whether it comes from the outside or not, develops into disease only if it finds a favourable ‘land’ with which it is compatible (an unhealthy state of the body caused by an unhealthy regimen). On seeds of disease in Galen, compare M. Grmek, “Les vicissitudes des notions d’infection, de contagion et de germe dans la médecine antique” (see above, n. 3), p. 62 f.

\(^{23}\) The difference between Galen and Hippocratic medicine concerning the cause of general diseases can also be found in his *Commentary on Hippocrates’ Nature of Man* (ed. Mewaldt CMG V 9, 1, p. 62 f.). Whilst the Hippocratic doctor contrasts individual and general diseases and discusses the causes (passage cited *supra* footnote 16), Galen, whilst agreeing with the text overall, liberally criticises it, since he did not believe this part to be authentic. He criticises the author for being incomplete on the cause of general diseases, which were caused not only by the air, but also by an unhealthy regimen shared by everyone, such as rotten cereals eaten in a famine (ergotism), or bad water drunk by all the soldiers in a camp. Galen also criticises the author for being incomplete on the causes and treatment of general diseases caused by air. The Hippocratic author highlights a single cause: emanations (cf. νοσερήν τήν ἀπόκρισιν) contained in the air. Galen recognises that this is the most general cause and he transposes the Hippocratic term ἀπόκρισιν into his own language, speaking in terms of ἀνάθυµισις, following a usage that has already been noted (see above, p. 23); he also approves of the double treatment proposed by the author in this case (to remove the patient as far away as possible or to inhale as little as possible). However, Galen adds that air can be the cause of a general disease without containing pathogenic emanations, but because
In short, Galen reads Thucydides and Hippocrates and reconstructs them. Whilst retaining the miasmatic conception of pestilences which goes back to the Hippocratic treatise *Breaths*, he adds more complex explanations than the Hippocratic ones, both removing fundamental distinctions and combining models of explanation that appeared to be exclusive of each other, or were at least separate, in the Hippocratic authors. Nevertheless, from the moment that Galen admits the transmission of miasmas through the inhalation of air, he no longer admits the phenomenon of contagion through contact (just like the Hippocratic doctors), despite the fact that Thucydides had implicitly observed it. However, even here Galen creates an original synthesis between observation and Hippocratic theory, since he admits that it is dangerous to live with those affected by pestilence; but it is because the patients exhale polluted air, which healthy people risk inhaling.

From Hippocrates to Galen, the theory of miasmas contained in the air and the causes of pestilence did not become more rational; it already was from the start. However, the details of its physiological or pathological processes were made more explicit and its etiology more complex with the combination and addition of external and internal causes.

In post-Galenic Greek medicine, the medical use of ‘miasmas’ concerning general diseases reappears at Alexandria in Palladius in the sixth century, in the introduction to his *Commentary on Hippocrates’ Epidemics 6*. Discussing his classification of diseases, Palladius distinguishes sporadic diseases from general diseases. Within general diseases he distinguishes endemic diseases from epidemic diseases. Endemic diseases are those which are habitual to a place due either to the water drunk by the inhabitants or to the orientation of the proportion of its elemental qualities in relation to the seasons. This is what I called the explicative model of *Airs, Waters, Places*. Galen also completes the treatment of general diseases, when its cause is exclusively an excess of elemental qualities (heat and wetness), with a treatment or prophylactic based on the principle of contraries.

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24 Thucydides (2.47.4) notes that doctors were amongst the most numerous to die because they dealt most with the sick; cf. also 2.51.4: contagion through treating the sick. Thucydides provides the first testimonium for the transmission of a disease through contact. See M. Grmek, “Les vicissitudes des notions d’infection, de contagion et de germe dans la médecine antique” (see above, n. 3), p. 56 f., with bibliography in footnote 19.


26 One of the new notions compared to the Hippocratic authors of *Breaths* and *Nature of Man* is that the miasmas or emanations are causes of putrefaction. As A. Debru, *Le corps respirant. La pensée physiologique chez Galien* (see above, n. 19) p. 238, remarks, “the vocabulary of pestilence and putrefaction are constantly entwined” in Galen.
of places. Epidemic diseases are due to changes in the quality of the air (hot, cold, dry, wet) when they do not correspond to the habitual nature of the seasons. However, ‘miasmas’ appear during a particular case of epidemic disease. Here is the passage:

It is not only the quality of the air that changes, but it also receives miasmas (μιάζματα), either coming from cadavers (or) from tombs, or coming from stagnant water, from which some diseases also come. And if many people die, the affection is called loimos.27

This passage by Palladius uses the term ‘miasmas’ in the same technical sense as Hippocrates or Galen: they are emanations contained in the air. In addition, the provenance of these miasmas, which was not clarified in Hippocrates, is explained here in exactly the same way as Galen does in the only passage where he uses the word ‘miasmas’. We can conclude from this that Palladius is directly influenced here by Galen’s treatise On Differences between Fevers. This influence is all the more probable because Palladius, like Galen, also explains pestilence by referring to those causes originating from the quality of the air (hot, cold, dry, wet), and those that come from the miasmas contained in the air, whilst these two explanations are attested independently in the Hippocratic medical writers. Thus, whilst Palladius comments directly on Hippocrates, his reading of Hippocratism on the matter of air, miasmas and pestilence, seems to be attributable to Galen.

It is certainly true that the Greek term miasma, in the technical sense of miasmas contained in the air (or in the earth), is relatively rare, although it is attested at different periods of Greek medicine, between Hippocrates and his commentator Palladius, in the Hippocratist doctors Rufus of Ephesus and Galen. It competes with terms completely devoid of religious connotation (such as ‘emanation’, ‘exhalation’, ‘corruption’). Thus, there is a contrast between the rarity of the Greek term miasma and the frequency of the expression “miasmatic theory” used in modern scholarship to refer to causes of pestilence, i.e. pathogenic materials contained in the air. This is probably a sign of the persistence of Hippocratic influence even amongst modern scholars, and in this case of the treatise Breaths, which was the first medical treatise to present both the technical term and the theory.

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27 Palladius, Commentary on Hippocrates’ Epidemics 6 (Preamble, Dietz II, 2, 18–23).