

The Use of Prediction in Meteorology and Medicine

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In ancient meteorology and ancient medicine, the ability to predict was an important part of both practices.² Predicting the weather was vital for ancient people growing crops and navigating the seas and predicting the course of disease became an important part of a physician's skill when attempting to treat a patient.³

Daryn Lehoux and Liba Taub have explored ancient methods of weather prediction and scholars such as Jacques Jouanna and Maria Sassi have studied methods of ancient medical prognosis.⁴ Volker Langholf has examined how disease patterns and weather patterns correlate in Hippocratic thought and how by observing weather patterns the Hippocratic physicians attempted to predict disease patterns.

This paper hopes to build on Langholf's work by showing that, according to Hippocratic thought, disease patterns were a direct result of weather patterns. It aims to demonstrate how ancient physicians used their skill at predicting the weather for the year in order to predict the diseases for the year. The main focus of this paper will centre around texts from the Hippocratic Corpus dated to the fifth and fourth centuries that address the relationship between climate and the human body such as *Airs, Waters, Places*, *On the Nature of Man*, and parts of the *Aphorisms*. A more in-

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² It should be noted that 'meteorology' in the ancient world was a very different concept to what it is today. For the ancients, the term not only covered the weather but it could refer to phenomena such as comets and shooting stars as well as phenomena associated with seismology and geology. Liba Taub, *Ancient Meteorology* (London: Routledge, 2003), p. 2.

I have used the word prediction rather than 'prognosis' or 'forecast' because the latter words have strong medical and meteorological connotations respectively. The Greek texts I refer to use a number of words meaning 'to foresee' and 'forecasting.' However, it is interesting that words from the verb '*proginwskw*' meaning 'to know beforehand' are used for both prediction in meteorology and prediction in medicine. See Hippocrates, *Prognostic*, 1.12 and *Airs, Waters, Places*, 2.18.

³ Hippocrates, *Prognostic*, 1.1-10; Maria M. Sassi, *The Science of Man in Ancient Greece*, trans. by Paul Tucker (Chicago; London: University of Chicago Press, 2001), p. 146.

⁴ The word prognosis in Hippocratic thought is knowing the 'past, present, and future' of the patient's condition (Hippocrates, *Prognostic*, 1.2-4). In modern practice, this is akin to building up a case history, diagnosing the patient and giving a prognosis. Nutton p. 89.

depth study of the *Epidemics* will be carried out focusing specifically on the parts of these treatises dealing with what is referred to as *katastasis* or 'constitution'. The *katastaseis* describe the weather conditions and the diseases that occurred throughout different years on the island of Thasos. These parts of the *Epidemics* attempt to correlate the island's meteorological and nosological phenomena and show ancient physicians building up a body of knowledge about climate and disease in a specific place in order to aid prediction of disease via the prediction of the weather.

Therefore, before the methods of prediction in meteorology and medicine are examined, it is important to explore how the climate and disease were linked in Hippocratic thought. The initial section of this paper will explore the Hippocratic theories relating to how weather dictated prevalent diseases and how the changes in the weather were the catalyst for the change in disease.

The relationship between meteorological phenomena and disease

From the early Greek poets such as Hesiod and Homer in the seventh and eighth centuries BC respectively to Hellenistic works such as Ptolemy's *Tetrabiblos*, there is evidence of ancient people using the stars to mark different times of year and preparing for the different types of weather that lay ahead.⁵ In addition, by at least the late second century BC and possibly as far back as the fifth century BC, astrometeorological *parapegmata* consisting of lists of weather predictions with their associated star phase were being compiled.⁶ In both the astrometeorological literature and *parapegmata*, the resultant correlation of weather patterns and star phases came from a collection of data over a long period of time.⁷ It seems likely that over a period of years both star phases and meteorological phenomena were noted and collated into a general weather pattern for the year defined by the timeframe of the stars.

By knowing the cycle of the fixed stars in a given place and associating different weather phenomena with different times of year according to the stars,

⁵ Rosmary Wright, *Cosmology in Antiquity* (London; New York: Routledge, 1995), p. 17; Taub, pp. 33-36.

⁶ Taub, pp. 8, 20-1.

⁷ Taub, p. 20.

weather predictions could be made.⁸ As Lehoux points out, not only could weather be predicted in the long term with the marking of the seasons throughout the year, but it could also be predicted in the short term such as when predicting the weather for the next season as we shall see later.⁹

In the Hippocratic Corpus, the ability to carry out prediction was considered a vital part of a physician's skill or *technē*. Indeed, it added creditability to the idea that medicine was itself an art in the strict sense as prediction was based on systematic observation, the use of an extensive body of knowledge built up and learned over time, and followed by the application of skill to a task.¹⁰ In the numerous works attributed to the Hippocratic Corpus, physicians attempt to use their knowledge base and skill to make a prognosis in order to prepare the patient for what lay ahead.¹¹

The idea that certain diseases were particularly prevalent at different times of year can be seen as early as Homeric poetry. For example, in the *Iliad*, the rise of the Dog Star brought on fevers during the late summer.¹² In certain Hippocratic texts, physicians are advised to practice astronomy so that they may predict the weather for the coming year in order to know what diseases may arise. For example, in *Airs, Waters, Places*, the author advises other physicians to know what each season and star phase brings in order to ensure health in a particular place.¹³

In the Hippocratic texts that explore both disease patterns and the climate of certain places, there is a direct link made between the type of weather experienced in a certain place and the diseases experienced by the inhabitants. For example, in *Airs, Waters, Places*, cities that experience hot winds are home to phlegmatic people who have a particular set of diseases associated with moisture. These diseases are opposite in character to those experienced by cities exposed to cold winds where the

⁸ Daryn Lehoux, *Astronomy, Weather, and Calendars in the Ancient World: parapegmata and related texts in Classical and Near Eastern societies* (Cambridge: Cambridge University Press, 2007), pp. 59-61.

⁹ Lehoux, p. 6; Hesiod, *Works and Days*, 663-77.

¹⁰ Sassi, p. 146.

¹¹ Hippocrates, *Prognostic*, 1.1-10; It should be noted that the treatise *Prognostic* does not focus on the prediction of disease patterns but on the course of disease and the signs that can be read on the body which indicate the progress of disease in a patient. As Jouanna points out, this author concentrates on the symptoms displayed by a patient suffering disease that occur irrespective of the local or seasonal conditions. However, the author does mention seasonal diseases at the end of this treatise suggesting that they are an important part of prognosis and that he does not want to be criticised for omitting this factor. Jacques Jouanna, *Hippocrate Pronostic*, Tome III 1re partie, (Paris: Les Belles Lettres, 2013), p. 79 n.1 and p. 267 n. 3; Hippocrates, *Prognostic*, 25.8-20.

¹² Homer, *Iliad*, 22.26-31.

¹³ Hippocrates, *Airs, Waters, Places*, 2.9-20.

people are bilious and their diseases are associated with dryness rather than moisture.¹⁴ Furthermore, the author of *Aphorisms* states that particular diseases occur in particular weather conditions.¹⁵

The change in weather as the cycle of the seasons ran its course was also directly linked to the change in disease.¹⁶ In the Hippocratic treatise *On the Nature of Man*, each humour in the body becomes predominant at a particular season of the year because each humour shares characteristics with its associated season.¹⁷ For example, the author states that phlegm increases in the winter because phlegm is the coldest humour in the body and is therefore the humour most like winter.¹⁸

The humours have certain types of diseases associated with them and the different humours become more or less predominant according to which season suits them. For example, in winter phlegm causes diseases that are phlegmatic in nature.¹⁹ However, as winter gives way to spring and summer, blood rises in the body and this causes diseases such as dysenteries and nose bleeds.²⁰

In this treatise and in other treatises in the Hippocratic Corpus such as *Epidemics* and *Airs, Waters, Places*, the seasons act as more than just a timeframe for the physician noting the changes of weather and disease, the change in climate is very much a catalyst for the change in disease.²¹ Indeed, the author of *Humours* goes further than the author of *On the Nature of Man* when he states that the climate not only dictates the disease pattern for that year but any abnormalities in the weather lead to abnormalities in the patterns of disease:

When the spring turns out wintry, with after-winter storms, the diseases too are wintry, with coughs, pneumonia or angina. So in autumn, should there be sudden and unseasonable wintry weather, symptoms are not continuously autumnal, because they began in their wrong season, but irregularities occur. So seasons, like diseases, can fail to show crisis²² or to remain true to type, should they break out suddenly, or be determined too soon, or be left behind. For seasons, too, suffer from relapses, and so cause diseases. Accordingly,

¹⁴ Hippocrates, *Airs, Waters, Places*, 3.3-13 and 18-19, 4.1-12 and 13-21.

¹⁵ Hippocrates, *Aphorisms III*, 16.1-6.

¹⁶ Hippocrates, *Epidemics I*, 2, 3, 5, 14, 18; *Epidemics III*, 3, 6, 15.

¹⁷ Hippocrates, *On the Nature of Man*, 7.1-33.

¹⁸ *Ibid.*, 7.1-4.

¹⁹ *Ibid.*, 7.12-6.

²⁰ *Ibid.*, 7.18-27.

²¹ Hippocrates, *Epidemics III*, 15.6-8; *On the Nature of Man*, 7-8 ; *Airs, Waters, Places*, 2.24-6.

²² The crisis of disease is the time when a disease changes either for the better or for the worse.

account must be taken of the condition of the body when the seasons come upon it. (Hippocrates, *Humours*, 13.17-28, Jones trans.)

In addition, the author of *Epidemics II* notes that the inhabitants of a certain place had an unseasonable amount of rain at one stage in the year and this proved to be the cause of diseases that would not normally occur.²³ This physician also states that ‘in stable times and years which produce seasonal things at their proper times, diseases are dependable and have proper crises, but in unstable years they are unstable and have bad crises.’ (Hippocrates, *Epidemics II*, 1.5, Smith trans.) This idea is repeated in *Aphorisms III* when the author states that ‘in seasons that are normal, and bring seasonable things at seasonable times, diseases prove normal and have an easy crisis; in abnormal seasons diseases are abnormal and have a difficult crisis.’ (Hippocrates, *Aphorisms, III*, 8.1-4, Jones trans.)

From these examples, it is clear that there was a direct link between weather patterns and disease patterns in these treatises. It is also clear that the general climate was not the only factor taken into account but the effects of unseasonable weather were explored. Indeed, the ancient physicians who wrote the *Epidemics* seem to categorise and schematise the different weather phenomena occurring in different types of years, as we shall see later.

The *Epidemics* are a prime example of the process whereby information was collected in order to extract general themes and universal truths about disease and the environment with particular emphasis on the changes in the weather.²⁴ These treatises show physicians observing and recording specific details of weather, time of year, prevalent diseases that could be classed as ‘epidemic,’ and timeframes of recovery.²⁵ In short, the Hippocratic physicians were trying to build a picture of how a disease unfolds and what factors affect it so that a prognosis could be made.

The observations made are gathered together in the parts of the *Epidemics* entitled *katastasis* or ‘constitution,’ which record the general nature of a given year

²³ Hippocrates, *Epidemics II*, 1.1.

²⁴ Philip van der Eijk, ‘Exegesis, Explanation, and Epistemology in Galen’s Commentaries on Epidemics, Books One and Two,’ in *‘Epidemics’ in Context: Greek commentaries on Hippocrates in the Arabic tradition*, ed. by Peter E. Pormann (Berlin; Boston: Walter de Gruyter, 2012), pp. 25-48 (p. 38).

²⁵ Galen in his *Commentary on Epidemics I* describes epidemic diseases as those diseases which attack many people at the same time (*Galen in Hippocratis Epidemiarum libros 1 Commentaria III*, p. 3, trans. by Ernst Wenkebach in Ernst Wenkebach and Franz Pfaff ed. *Corpus Medicorum Graecorum* V.10.1 (Berlin: Academiae Berolinensis Lipsiensis, 1934); van der Eijk, pp. 25-7.

and the diseases that prevailed during that year. There are four of these, three in *Epidemics I* and the fourth in *Epidemics III*. Here, *katastasis* is not referring to the constitution of the human body but refers to the state of the year in terms of the prevailing nature of the climate and the prevailing diseases.

As Langholf points out, the word *katastasis* can mean “condition,” “situation,” or “state” which can be used for the “state” of a disease as well as for the “condition” of the weather’ in the Hippocratic texts.²⁶ However, the term *katastasis* is more complicated than this as it suggests a process of becoming. Not only does *katastasis* suggest a settled state or condition, but it also suggests a condition that is likely to change.²⁷ This becomes apparent when one considers that both the weather and disease operated within a specific timeframe but existed in a continual state of change. For example, though *katastasis* can refer to a predominant weather pattern and associated disease pattern, the Hippocratic physicians considered these constitutions likely to change to another constitution over a period of time. The changes of the weather during the year were often classed as ‘southerly’ or ‘northerly,’ ‘wet’ or ‘dry’ by the Hippocratic physicians. These classifications referred to different types of year in terms of prevalent weather patterns as the physicians attempted to fit the nature of the climate into specific schemas, as we shall see later.²⁸

Therefore, in short, though the weather is in constant change, it changes within the boundaries of a specific type of year and, though these types of year have a form of settled state, they too are subject to change from one settled state to another. Langholf notes that it is often not clear in the Hippocratic texts whether the author is referring to the environment or to the disease.²⁹ This reinforces the idea that the natural environment, the human body and disease are inextricably linked.

Moreover, in the *katastaseis* the change in seasons and the change in disease are linked to the rate of fatalities suggesting that the change in the weather aggravated or calmed the disease:

²⁶ Volker Langholf, *Medical Theories in Hippocrates: early texts and the ‘Epidemics’* (Berlin; New York: Walter de Gruyter, 1990), p. 169.

²⁷ Liddell-Scott-Jones, eds, *The Online Liddell-Scott-Jones Greek-English Lexicon*, (2011) *Katastasis* translates as a settled state but the Greek word has connotations of becoming and suggests that this is a state into which something has passed.

²⁸ Hippocrates, *Epidemics I*, 5.1-4; *III*, 2.13-5.

²⁹ Langholf, p. 170.

In all cases described spring was the worst enemy, and caused the most deaths; summer was the most favourable season in which fewest died. In autumn and during the season of the Pleiades, on the other hand, there were again deaths, usually on the fourth day. (Hippocrates, *Epidemics III*, 15.1-5, Jones trans.)

The changes in the weather had a direct effect on disease according to the authors of these Hippocratic texts. Because of this link between weather and disease patterns, the ancient physicians believed that if one could predict the weather pattern then the disease pattern caused by the weather could also be predicted. Indeed, the physicians writing the Hippocratic treatises referred to observing the risings and settings of stars to predict both changes in weather and changes in disease. For example, the author of *Airs, Waters, Places* not only associates the change in weather for the year with epidemic diseases but also states that by observing the changes of the seasons and the movement of the stars, one will know the nature of the year and what diseases will attack a city:

As time and the year passes he (the physician) will be able to tell what epidemic diseases will attack the city either in summer or in winter[...]for knowing the changes of the seasons, and the risings and settings of the stars, with the circumstances of each of these phenomena, he will know beforehand the nature of the year that is coming. Through these considerations and by learning the times beforehand, he will have full knowledge of each particular case, will succeed best in securing health, and will achieve the greatest triumphs in the practice of his art. (Hippocrates, *Airs, Waters, Places*, 2.9-21, Jones trans.)

The author of *Humours* also acknowledges that by predicting the weather one can predict disease. Indeed, he takes this idea a step further by stating that by observing the patterns of disease, one could predict the weather:

As it is possible to infer diseases from the seasons, so occasionally it is possible from diseases to forecast rains, winds and droughts; for example north winds and south winds. For he who has noticed symptoms carefully and accurately has evidence on which to work; certain skin diseases for instance, and pains at the joints are irritating when rain threatens, to quote one example out of many. (Hippocrates, *Humours*, 17.1-7, Jones trans.)

When we consider that the Hippocratic physicians believed the pattern of the weather and the pattern of disease to be linked, it is important to understand how the stars acted as a timeframe for these two cycles of phenomena. The next section will explore how the stars provided a timeframe for the patterns of weather and disease

in the Hippocratic texts building on the ancient tradition of astronomy set out in Hesiod's poem.

Timeframes

It is obvious that the ancient physicians recognised a cycle of seasons occurring within the timeframe of a year each of which have their own distinctive weather patterns. However, they also believed that diseases fitted into a certain timeframe since diseases had their own seasonal cycles. These seasonal cycles would run their course depending on a series of factors, many of which were linked to the timeframes in which the weather took its course. For example, the author of *Airs, Waters, Places* famously states 'For with the seasons men's diseases, like their digestive organs, suffer change.' (Hippocrates, *Airs, Waters, Places*, II.24-6, Jones trans.) The same text states that a study of astronomy is important for establishing a timeframe from which to make observations.³⁰

As stated above, the use of the stars as timeframes for indicating different times of year stretched as far back as Hesiod in the seventh century BC. However, it should be noted that there is a crucial difference between how Hesiod uses the stars for prediction and how the Hippocratic physicians use them. For example, Hesiod states that the Dog Star, or Sirius, is the cause of an increase in temperature and dries up the human body '[...]Sirius parches their head and knees, and their skin is dried out with the heat.' (Hesiod, *Works and Days*, 587-88, West trans.) Holberg suggests that Sirius was the direct cause of the hot days in ancient Greek thought and that this direct causal link between Sirius and the hot days could also be seen in the Hippocratic Corpus.³¹

However, the Hippocratic physicians follow the tradition of using the stars as a fixed timeframe, but they do not suggest that the appearance or movement of certain stars are the direct cause of certain weather events. Galen states in his *Commentary on Airs, Waters, Places* that the rising of the stars 'effect the changes of the seasons' and, in his *Commentary on Epidemics I*, that the risings of the stars

³⁰ Hippocrates, *Airs, Waters, Places*, 2.22-4.

³¹ Holberg, Jay, *Sirius: Brightest Diamond in the Night Sky*, (New York: Springer, 2007), p. 20.

mark the change in the seasons.³² However, Langholf notes that it is not clear in the Hippocratic texts whether astronomical phenomena are considered the causes of the changes in the weather and in the body.³³

It is more likely that in the Hippocratic texts the stars are heralding a possible change in the weather rather than causing it. For example, if we examine *Airs, Waters, Places* and *Epidemics I* and *III*, it is not suggested that the stars are the direct causes of a change in the weather. Indeed, the author of the *katastaseis* within the *Epidemics* notes the changes of the weather near the rising of certain stars and in each *katastasis* these changes are different. Moreover, the author of *Airs, Waters, Places* is not suggesting that the risings of stars were the causes of certain weather patterns or phenomena because he states that the stars do not always bring the same weather:

If at the rising of the Dog Star, stormy rain occurs and the Etesian winds blow, there is hope that the distempers will cease and that the autumn will be healthy [...] But if the weather be northerly and dry, with no rain either during the Dog Star or at Arcturus, it is very beneficial to those who have a phlegmatic or humid constitution [...] (Hippocrates, *Airs, Waters, Places*, 10.25-86, Jones trans.)

In addition, the author(s) of the *katastaseis* refer to the rising and setting of stars in order to indicate the start of the timeframe they wish to describe.³⁴ For example, the author of *Epidemics I* states ‘In Thasos during autumn, about the time of the equinox to near the setting of the Pleiades, there were many rains[...]’. (Hippocrates, *Epidemics I*, 1.1-3, Jones trans.)

The stars are not the catalysts for the change in weather or the change in diseases; they are markers for different times of year and indicate that the weather might change. Indeed, according to the Hippocratic physicians, it is possible that the weather did not change at the times indicated by the rising and setting of certain stars. This phenomenon was classed as an “abnormal” year in terms of weather and therefore in terms of disease. In the next section, abnormal and normal weather

³² Galen, *Commentary on Epidemics I*, 1, 16-7, L16-8; Galen, *Commentary on Airs, Waters, Places*, G.6, p. 21 trans. by Abraham Wasserstein in Abraham Wasserstein, ed., *Galen's Commentary on the Hippocratic Treatise, Airs, Waters, Places: in the Hebrew Translation of Solomon ha-Me'ati*. (Jerusalem: Israel Academy of Sciences and Humanities, 1982).

³³ Langholf, pp. 168-70; It should be noted that Langholf does not apply this statement to the *Epidemics* which he concedes do use the stars as a timeframe only.

³⁴ Langholf, pp. 168-70.

conditions in the Hippocratic Corpus will be considered and the schematisation of weather phenomena into different types of years with their correlating disease patterns will be addressed. In addition, how this gathering of data and its subsequent schematisation into different types of year aided prediction of disease through observing different weather patterns will be explored.

The correlation of weather and disease: Normal and abnormal patterns

In order to predict disease patterns, a physician had to establish what weather regularly occurred in a given place over a year and what diseases normally followed this pattern. In the Hippocratic treatises that note the climate and correlating disease patterns there is often a description of what the weather is normally like in a given place.³⁵ This normal weather pattern was what the Hippocratic physicians considered healthy weather as the regular course of diseases followed it. For example, the author of *Airs, Waters, Places* states that:

As to the seasons, a consideration of the following points will make it possible to decide whether the year will prove unhealthy or healthy. If the signs prove normal when the stars set and rise; if there be rains in autumn, if the winter be moderate, neither too mild nor unseasonably cold, and if the rains be seasonable in spring and in summer, the year is likely to be very healthy. (Hippocrates, *Airs, Waters, Places*, 10.2-10, Jones trans.)

Moreover, Galen states in his *Commentary on Epidemics I*, that during a normal year, there is no occurrence of either epidemic or plague.³⁶ This categorisation of normal weather served as a good comparison for the patterns of abnormal weather, which were also categorised and schematised.

Once the general climate was established for a particular place, the physician could recognise what was abnormal in terms of both the change in weather and the subsequent change in the course of disease. The physicians attempted to categorise abnormal years by gathering information about how they ran and extracting a generalisation just as they did when establishing what constituted the normal weather pattern for a particular place. For example, the author(s) of the *katastaseis* attempted to categorise the 'constitutions' of the year by summing up the general

³⁵ Hippocrates, *Airs, Waters, Places*, 3-6.

³⁶ Galen, *Commentary on Epidemics I*, 1, 30.13-5.

condition of the year and fitting it into a certain schema of ‘northerly’ or ‘southerly’ weather conditions.³⁷ Thus, the physician(s) compiling the *katastaseis* in the *Epidemics* attempted to categorise what characterised abnormal years in terms of climate and the epidemic diseases that these strange weather patterns brought. Indeed, Galen, in his *Commentary on Epidemics I*, states that knowing the nature of a particular place is useful for knowledge of the diseases occurring that are not normal in that place (Galen, *Commentary on Epidemics I*, 1, 15.14-5).

Each *katastasis* represents a different combination of northerly or southerly, wet or dry constitution.³⁸ The first *katastasis* in *Epidemics I* and the *katastasis* in *Epidemics III* are both describing southerly constitutions, the former is dry and the latter is wet.³⁹ The second and third *katastaseis* of *Epidemics I* are describing northerly constitutions, the second is wet, and though the third *katastasis* has no sentence to sum up the general weather, the weather described in the opening sentence suggests that it was generally dry.⁴⁰

In some cases, weather is noted that might not necessarily fit with the general theme of the overall weather patterns summed up in the *katastasis*. For example, in the *katastasis* of *Epidemics III* the author notes ‘long after the solstice, near the equinox, wintry weather returned, and at the actual equinoctial period there were northerly winds with snow, but not for long.’ (Hippocrates, *Epidemics III*, 2.6-8, Jones trans.) However, he then goes on to say that the year was ‘southerly, wet and mild’ indicating that physicians, though they would sometimes note anomalies, aimed to generalise the weather patterns for the year within a framework of a schematised constitution.⁴¹ Thus, the physician(s) who wrote the *katastaseis* already had a dogmatic preconception about how the weather worked and they tried to fit their observations into this framework.

By taking this schematic approach to collecting and collating data, the *katastaseis* add to the physician’s knowledge base within a certain framework of dogmatism, as we saw above. They also provided a body of information that could be drawn on in the future when confronted with different types of climate in different

³⁷ Langholf, pp. 170-71.

³⁸ Langholf, p. 178.

³⁹ Hippocrates, *Epidemics I*, 1.1-8 and *III*, 2.1-15.

⁴⁰ Hippocrates, *Epidemics I*, 5.1-2 and 13.1-13.

⁴¹ Hippocrates, *Epidemics III*, 2.13-5.

years. In this way, a physician could use this information to identify the signs of what could turn out to be an abnormal year in terms of weather and disease patterns or, at least, a different year to the last. Essentially, the *katastaseis* constitute a list of general, prevailing weather conditions and diseases that happened over a given year. From this, a physician could go on to predict and prepare for different sets of disease that directly result from the change in climate:

And it is necessary to learn accurately each constitution of the seasons as well as the disease; what common element in the constitution or in the disease is good, and what common element in the disease is bad; what malady is protracted and fatal, what is protracted and likely to end in recovery. (Hippocrates, *Epidemics III*, 16.4-11, Jones trans.)

Here, the extraction of a general theme from a body of collated data is advised by the physician. From this body of information, a physician could note the signs that may indicate irregular weather patterns or the change in a constitution, which would inevitably bring on irregular and epidemic diseases.⁴²

Indeed, an abnormal year has a certain character that could be discerned by observing certain signs at certain times of year. The weather occurring around the rising of certain stars forecasts the weather for later on in the year either in the long term, when trying to predict the weather for the year, or in the short term when predicting what the nature of the next season will be like. For example, when describing how a physician might know if a year will be normal or 'healthy,' the author of *Airs, Waters, Places* states that, by observing the 'signs,' by which he means weather phenomena, at the rising and setting of the stars, one can tell whether the year will be healthy.⁴³ This suggests that the weather occurring around the period of the rising and setting of the stars indicates what the weather will be like in the coming seasons and this directly maps on to what diseases will be caused by the climate and whether a year can be deemed healthy or not. Moreover, the same author states that the weather can be predicted in the short term when he describes how the weather occurring around the rising of the Dog Star can be used to forecast the weather for autumn and whether the autumn will be healthy or not.⁴⁴

⁴² Hippocrates, *Airs, Waters, Places*, 2.9-21; Vivian Nutton, *Ancient Medicine*, 2nd edn (New York: Routledge, 2013), p. 89.

⁴³ Hippocrates, *Airs, Waters, Places*, 10.2-25.

⁴⁴ Hippocrates, *Airs, Waters, Places*, 10.25-32.

If one can read the signs indicating what type of year it will be then one can predict the cycle of weather and the correlating cycle of disease using the body of information collected and schematised in works like the *katastaseis*. This is important for our understanding of how the prediction of the weather led to the prediction of disease as the weather had a direct effect on what course disease patterns took. The weather also directly influenced whether diseases remained the same or changed completely from season to season. With this in mind, it is important to explore how both the cycle of the weather and the cycle of disease correlated in terms of their timeframes as this determines which weather pattern is causing which change in disease, as shall be discussed next.

Correlating the timeframes for weather and disease and making a prediction

As we have seen, the *katastaseis* in the *Epidemics* establish a correlation of general weather phenomena with the diseases that were prevalent during a particular, abnormal year. They all follow a similar structure whereby the nature of the weather is described over a given year, it is then categorised as 'northerly' or 'southerly,' 'wet' or 'dry' and then the diseases are described. The physician(s) writing the *katastaseis* endorse(s) the use of prognosis as part of his technē or skill and the reason for the extensive descriptions of weather and changes in disease is in order to aid his prognosis for the prevailing diseases of a given year.⁴⁵ However, the timeframes for the description of the weather and for the description of disease are very interesting as they do not seem to coincide.

The constitution of the weather is described in all of the *katastaseis* from autumn time to summer time. When one takes into consideration how the Hippocratic physicians viewed the seasons, autumn seems to be the logical time of year for a change in the year's constitution as autumn was generally seen to be a season of great change in both the Hippocratic Corpus and earlier works such as Hesiod's *Works and Days*.⁴⁶

However, when listing the diseases, the *katastaseis* vary in the time of year in which they begin and end. For example, both the second and third *katastaseis* in

⁴⁵ Hippocrates, *Epidemics I*, 1.9-13.

⁴⁶ Hippocrates, *Airs, Waters, Places*, 6.22-5; *Prognostic*, 24.15-20; Hesiod, *Works and Days*, 415-17.

Epidemics I run from winter to the winter of the next year when describing the prevailing diseases. Whereas the *katastasis* in *Epidemics III* runs from winter to autumn and the first *katastasis* in *Epidemics I* runs from spring to winter.

It is interesting that in the first *katastasis* of *Epidemics I*, though the physician still begins his description of the weather for the year in autumn, he notes that the constitution of the year changed in spring. Indeed, spring could also be seen as a prominent point of change as it is situated, like autumn, between two opposing times of the year. Some texts such as *Airs, Waters, Places* note spring as a dangerous period of time despite the general temperate character of this season.⁴⁷ For example, the author of this treatise states 'the following are the four most violent changes and the most dangerous: - both solstices, especially the summer solstice, both the equinoxes, so reckoned, especially the autumnal.' (Hippocrates, *Airs, Waters, Places*, 11.7-11, Jones trans.)

The physician writing the *katastaseis* seems to take the view that spring is a period characterised by change and is a dangerous time for patients suffering from disease.⁴⁸ Galen suggests in his *Commentary on Epidemics I* that whenever Hippocrates describes the condition of the climate he starts from when the weather is no longer in its natural state (Galen, *Commentary on Epidemics I*, 10, 48.13-15). It is interesting and significant that in other parts of the Hippocratic Corpus too, descriptions of the weather tend to start from autumn.⁴⁹

The author goes on to list the prevailing diseases for that time of year fitting the diseases into his schema for the weather. To take the *katastaseis* that begin their description of disease in winter first, it seems logical to start a description of diseases in winter after the great period of change in autumn since it was especially during autumn that the Hippocratic physicians believed that the diseases would change or take on a new form.⁵⁰ This was due to the changes in weather brought on by the nature of autumn, which, for the Hippocratic physicians, was characterised by frequent and great changes in weather throughout the season, as we saw above.⁵¹

⁴⁷ Hippocrates, *Airs, Waters, Places*, 5.22-7 and 11.7-11; cf. *Aphorisms III*, 9.1-3.

⁴⁸ Hippocrates, *Epidemics III*, 15.1-2.

⁴⁹ Langholf, p. 172; Hippocrates, *Airs, Waters, Places*, 10.6-7; *Humours*, 13.7-9.

⁵⁰ Hippocrates, *Prognostic*, 24.15-20; *Airs, Waters, Places*, 11.7-11.

⁵¹ Hippocrates, *Airs, Waters, Places*, 6.22-5; 11.7-11 ; *Aphorisms III*, 4.1-3.

Another reason for beginning the description of diseases in winter could be that, having observed autumn, it is clear (as a result of their previous observations regarding how the seasons change and what follows each change) what type of constitution the year is going to take on and one can predict the weather patterns that will follow. It is significant that many other Hippocratic texts start their description of diseases, or advice about how to combat disease, in winter, indicating that diseases are likely to be predictable in this month due to the more settled state of the weather after the period of change in the autumn.⁵²

There is a problem with this idea as the winter of the next year is included in some of the *katastaseis*, which obviously would have to run past autumn. However, when the weather for autumn is mentioned in the third *katastasis* of *Epidemics I*, it has the same weather as that described at the beginning of the text.⁵³ Thus, the autumn time mentioned here is part of the same constitution rather than the heralding of a new constitution. In *Airs, Waters, Places*, the author notes that autumn can herald a turning point in both the weather and in disease but this is not always the case. For example, the author states that if part of the summer is rainy and the Etesian winds blow, then the autumn might be healthy but if not then the distempers will continue through the autumn:

If at the rising of the Dog Star stormy rain occurs and the Etesian winds blow, there is hope that the distempers will cease and that the autumn will be healthy. Otherwise there is danger lest deaths occur among the women and children, and least of all among the old men; and lest those that get better lapse into quartans, and from quartans into dropsies. (Hippocrates, *Airs, Waters, Places*, 10.25-32, Jones trans.)

The inclusion of the next winter in the second and third *katastaseis* in *Epidemics I*, runs over the cycle of the year. However, it should be noted that the meteorological description at the beginning of each *katastasis* does not necessarily have to limit the weather's constitution to the cycle of a year, it simply describes how the weather patterns ran over the seasons. It is, therefore, normal for the description of diseases to go outside the timeframe of the yearly cycle, as the *katastaseis* do not necessarily run by a strict yearly timeframe.

⁵² Hippocrates, *Regimen III*, 68.17-20; *On the Nature of Man*, 7.1-3; *Regimen in Health*, 1.2-3.

⁵³ Hippocrates, *Epidemics I*, 13.1-13 and 14.9-11.

Though Langholf suggests that the *katastaseis* are aimed at aiding prognosis he argues that the timeframes for the weather and those for the diseases do not correlate.⁵⁴

The author(s) do(es) not seem to be primarily interested in the relationship between the weather of a certain season and the *simultaneous* diseases but rather in the relationship between the weather of one season and the diseases of another *subsequent* season. The interest seems to be prognostical: what is the future effect of given weather conditions on the occurrence of diseases, or on the health of people? (Langholf 1990: 172)

I disagree with the idea that it is only the weather in previous seasons that has led to the diseases in a current season. As we have seen, there is a significant amount of evidence to suggest that the current weather conditions had a direct effect on the current disease patterns.

There is also a significant amount of evidence to suggest that the Hippocratic physicians believed that the weather of a previous season, or seasons, would produce diseases, which would then continue into the season after.⁵⁵ Langholf goes on to say that the physicians usually predict diseases in a third season by observing the weather in the two previous seasons.⁵⁶ Indeed, by observing the weather in a season that is in a definite *katastasis* and in a season that may mark the change in *katastasis*, one can determine whether that *katastasis* for the year is continuing or changing and predict the diseases that will follow in the next season, the third season usually being summer or winter.⁵⁷

As we saw above, the first *katastasis* of *Epidemics I* starts its description of diseases from early spring. However, before the description starts properly, the physician notes that the previous constitution was opposite to the one occurring in this description:

The whole weather proved southerly, with droughts, but early in the Spring, as the previous constitution had proved northerly, a few patients suffered from ardent fevers, and these very mild, causing haemorrhage in few cases and no deaths[...] (Hippocrates, *Epidemics I*, 1.8-13, Jones trans.)

⁵⁴ Langholf, p. 172.

⁵⁵ Hippocrates, *Airs, Waters, Places*, 10.25-32; *Aphorisms III*, 11-14.

⁵⁶ Langholf, p. 173.

⁵⁷ Langholf, p. 173.

This suggests that the previous constitution is partly responsible for the diseases present in the current constitution, and because of the change in constitution in the spring, the diseases are worse than they would normally be due to the change to a completely opposite constitution. However, the season following this change is now predictable in terms of diseases and weather, as it is now part of an established constitution. The reason a physician can predict the diseases in a third season which is usually summer or winter is because the constitution has manifested properly meaning that regular weather patterns ensue.⁵⁸ This physician, in using both the observations from the end of the previous constitution and the observations from the change in constitution to predict the next constitution, can predict the next set of diseases, as they are now part of a regular pattern of weather and therefore have regular patterns themselves.

Thus, as Langholf suggests, the previous seasons are responsible for setting up the body for the diseases that attack it in a third, but I would argue that the weather in the third season also has a part to play in the change in disease. Because the weather in the third season is often not mentioned in relation to the effects on the course of disease does not mean that the simultaneous weather patterns are not affecting the disease. Indeed, in the *katastaseis* the change in weather from season to season is thought to have direct effects on the course of diseases. For example, the author of *Epidemics III* states that ‘the coming on of winter resolves the diseases of summer, and the coming on of summer removes those of winter.’ (Hippocrates, *Epidemics III*, 15.6-8, Jones trans.)

Moreover, there is substantial evidence in the Hippocratic Corpus to support the idea that it is the change in the weather and in the seasons that directly produces the diseases in a particular season.⁵⁹ Indeed, if the weather patterns deviated from the current constitution, according to Hippocratic theories, the diseases would change.

Therefore, the weather of one season in relation to diseases in a subsequent season is very important for the prediction of disease, since certain diseases that arise in one season may carry on into the next or completely change their form, as

⁵⁸ Langholf, p. 173.

⁵⁹ Hippocrates, *Humours*, 15.1-7; *On the Nature of Man*, 7.1-37; *Air, Waters, Places*, 11.1-17; *Aphorisms III*, 19-23.

we saw above. However, the Hippocratic physicians were also interested in the direct effects of the weather of the season on the diseases for that season when making their predictions because a continuation of a distinct weather pattern or its complete change had a direct effect on disease. The prognostic interest, therefore, lies in how the weather runs in a given constitution and the diseases that are a direct result of that weather.

Once a physician had established what constitution the year would take on he could predict what state the climate would be in over the coming year as it would follow the run of the constitution. This prediction would be certain at least until the next autumn or spring when the constitution may change again. From this, he could then predict the diseases that were likely to occur and the course they might follow.⁶⁰

Conclusion

To conclude, the Hippocratic physicians observed both the weather and the prevailing diseases in a specific area and built up a body of knowledge that correlated both disease and weather patterns. This information was then schematised into different types of years that were classed according to their different prevailing weather phenomena such as 'wet' or 'dry,' 'northerly' or 'southerly' weather. The sections of the *Epidemics* entitled *katastasis* attempt to build up a schematised picture of how climate and disease correlate. I believe that this schematised information aided the prediction of disease once the physician established what type of year he was facing by reading the signs and following the timeframes dictated by the stars.

The timeframes for weather and the timeframes for disease in the sections of the *Epidemics* entitled *katastasis* do not seem to correlate and this has led scholars to believe that the weather does not have a direct effect on current diseases but that diseases are the product of previous seasons. On the contrary, though the weather of previous seasons did play a part in developing the disease pattern, the direct cause of disease was the simultaneously occurring weather pattern.

Because of the correlation between weather patterns and disease patterns the physicians built on a tradition of weather prediction in order to predict disease. By

⁶⁰ Hippocrates, *Epidemics III*, 16.4-7.

observing the signs at specific times of year, usually when a change in weather was about to take place such as at a solstice or an equinox, the physicians could predict what type of weather was likely to occur over the coming year. This subsequently led to the prediction of disease for that year due to the causal link between weather patterns and disease.

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