The Ancient Greeks and the Supernatural.

The ancient Greeks can lay claim to the origins of the debate about the relation of the natural and the supernatural. It is here, according to some accounts, that we first find a distinction between the natural and the supernatural, and that we first find an outright rejection of the supernatural. In this paper I want to examine some aspects of the nature of this rejection, and how widespread it was. In the first part of this paper, I will look at two putative examples of this rejection. I will examine the Hippocratic's rejection of the idea that diseases are caused by the intervention of the gods and in particular their assertion that epilepsy, the 'sacred disease', has natural causes. I will also discuss some early Greek cosmogonies, the way that they reject capricious gods and the way that they use natural processes to explain the origins of the cosmos.

Matters are not quite as straightforward as they might seem at first sight, however. The Hippocratics do not reject the divine, nor do they appear to reject all of what might be considered to be magical practises. With the early cosmogonists, those who believe that there is a single cosmos also believe that there is at least some sort of 'steering' principle which guides matter into order, or that the ordering is done by some form of god. In relation to these issues, I want to raise some important questions about what we consider to be supernatural in an ancient context. The first of these is whether magic deals only with the supernatural. Can there be a natural magic ? Historically, the answer to this is a definite yes as there was a strong natural magic movement in the Renaissance. Giambattista della Porta, in his *Natural Magic*, says that:

"There are two sorts of magic; the one infamous and unhappy, because it has to do with foul spirits, and consists of enchantments and wicked curiosity, and this is called sorcery, an art which all learned and good men detest… the other magic is natural, which all excellent wise men embrace, and worship with great applause."[1]

If we allow the category of natural magic, then the Hippocratics may have practises which might be considered magical but not supernatural. The second issue I will raise is similar in nature but perhaps more contentious. Is it possible that there is something which is both divine and natural ? Modern Christian theology, where it suggests a god that is separate from nature and can overrule the laws of

nature would seem to exclude this, but I will suggest that for the ancient Greeks it was possible for there to be entities which are both divine and in an important sense natural.

In the latter half of this paper, I will look in some detail at the astrology of Claudius Ptolemy, the great astronomer of the 1st/ 2nd century AD. What I want to argue here is that Ptolemy in the *Tetrabiblos* is able to give a theoretical underpinning to astrology which is in accord with Aristotle's cosmological views. He requires no recourse to anything supernatural, magical, or mystical. In rather briefer outline, I will argue something similar in relation to alchemy, that it could be done entirely within the confines of Aristotle's theory of matter and again required nothing supernatural. If this is so, then more needs to be done than simply recognising that the Greek practised astrology and alchemy in order to show that they were committed to a belief in the supernatural. This is not to deny that many Greeks did have a belief in a supernatural astrology or alchemy, or in other phenomena that are properly considered supernatural. As Dodds showed in his pioneering '*The Greeks and the Irrational*', we can find these sorts of beliefs throughout Greek culture and throughout the lifetime of that culture.[2]

In the modern West we associate a belief in magic, gods, the divine, astrology and alchemy with a belief in the supernatural. The Greek populace, believing in a multiplicity of interventionist gods and the attendant mythology were doubtless committed to the supernatural as well. The views of the philosopher/ scientists though were more subtle and the attribution of a belief in the supernatural, on close examination, is not so easily made. The group of those who rejected the supernatural may then be somewhat broader than is recognised by those who make a straightforward attribution of a belief in the divine, magic, astrology or alchemy with a belief in the supernatural.

I

An important and well known shift from supernatural to natural explanation comes with the Hippocratic work, *On the Sacred Disease*, c400 BC. In the ancient world it was commonly believed that diseases were caused by the intervention of the gods, either on account of some caprice of the gods or because the sufferer had offended the gods in some way. The 'sacred disease', epilepsy, was seen as a clear case where the gods had caused a fit. It is interesting then that the Hippocratic author takes on what might well have been considered to be the hardest case in attempting to demonstrate that all diseases have a physical cause and none have their origin with the gods. The author bluntly denies

that the sacred disease is caused by the gods or that its nature is different from that of other diseases. The opening passage of *On the Sacred Disease* is:

"Concerning the disease which is called 'sacred', in my view it is no more divine or sacred than any other disease, but has a nature and a definite cause."[3]

One can find similar sentiments elsewhere in the Hippocratic corpus, for instance in *On Airs, Waters, Places*.[4] *On the Sacred Disease* explains the origins of the idea that epilepsy is divine by saying:

"In my opinion the first men to consider this disease to be sacred were like those we now call mages, purifiers, vagabonds and quacks."[5]

They did so, according to the Hippocratic author, in order to cover their own ignorance and failure to give proper treatment.[6] *On the Sacred Disease* also says that:

"If you cut open the head you discover that the brain is wet, full of fluid and evil smelling, and clearly, one knows from this that it is not a god harming the body, but the disease."[7]

Unable to perform human post-mortems, the Hippocratics perform post-mortems on goats who appear to suffer from a similar disease to epilepsy. The results, they believe, straightforwardly show that there is a physical basis for epilepsy. Throughout *On the Sacred Disease* one can find straightforward assertions like:

"This disease is generated by and grows due to what comes into the body and what leaves it, it is no more difficult to cure or understand than other diseases, and is no more divine than the others."[8]

On the Sacred Disease concludes on a thoroughly optimistic note by saying:

"The so-called sacred disease is produced by the same causes as other diseases… each disease has its own nature and power and none are unintelligible or untreatable… Anyone who knows how, by means of regimen, to produce in men dryness or wetness, cold or heat can cure this disease as well, without purifications or magic."[9]

A further important aspect of *On the Sacred Disease*, as Lloyd has argued, is that it makes a general attack on magic and magicians.[10] It is not just epilepsy which has a natural cause, but all diseases. It is not just that there are incompetent practitioners of magic in relation the healing, the whole practise is entirely unfounded. Although the main focus of *On the Sacred Disease* is medical, there is a parallel attack on other magical practises as well. The author is critical of those who claim to be able to

"Bring down the moon, to eclipse the sun, to make storm and good weather, rain and drought, the sea impassable and the earth barren, and all the other such things."[11]

While one can find criticism of incompetent magicians prior to this, there is not criticism of magic as a whole. This all looks very promising as an apparent rejection of magic and the supernatural.

II

Early Greek theories of how the cosmos came into existence, and of how life comes into existence also move away from explaining in terms of the supernatural in the sixth and fifth centuries BC. There are some important themes here. Firstly, there is a move away from the idea that the cosmos has been created on the whim of capricious gods. In early creation myths, it is often the sexual actions of gods which lead to the creation of the world. Secondly, the generation of the cosmos is consciously not *ex nihilo*. None of the presocratic philosopher/ scientists believe the cosmos to have come to be from nothing. There is a preceding, unordered state of matter from which the cosmos is organised. Parmenides asks a general question about change, but one that applies strongly to cosmogony in particular:

"What birth will you seek for it ? In what way, from what source did it grow ?.. What necessity would have driven it later rather than sooner, beginning from nothing, to grow ?"[12]

Thirdly, for the early Greek cosmogonists the cosmos is not formed by some supernatural process. The processes by which cosmos formation occurs are the same sorts of processes by which change occurs now in the physical world. So Simplicius tells us that:

"Anaximander, son of Praxiades of Miletus, was a follower and student of Thales. He said that the arche and element of existing things was the unlimited, being the first to give this name to the *archê*. He says this is not water, nor any of the other so-called elements, but some other unlimited nature, from which are generated all the heavens and the *kosmos* in them. The source of generation for extant things is that into which destruction occurs."[13]

Simplicius goes on to say:

"It is clear that Anaximander, observing the change of the four elements into each other, thought it proper to make no one of these the substratum, but something else besides these. He produces coming to be not through alteration of the element, but through the separating off of opposites through the eternal motion."[14]

Pseudo-Plutarch gives us some similar information about Anaximenes:

"All things are generated by a certain condensation of air, and again by its rarefaction. Motion has existed or all time. He says that when the air felts, firstly the earth is generated, entirely flat, and because of this, it rides on the air. So too sun, moon and the other stars have their origins in generation from earth."[15]

Anaximander also supposes a natural origin for life forms. Aetius tells us that:

“Anaximander said that the first animals were generated in moisture and enclosing themselves in spine like barks, as they advanced in age they moved onto the drier and shedding their bark for a short time they survived in a different form.”[16]

The earliest atomists, Leucippus and Democritus, have their own take on the origins of the cosmos:

"Leucippus holds that the whole is infinite... part of it is full, and part void... from these innumerable *kosmoi* come to be and are dissolved into these again. The *kosmoi* are generated in this manner. By a cutting off from the infinite many bodies of all shapes move into a great void, where they are crowded together and produce a single vortex, where colliding with each other and circulating in all manner of ways, they separate out like to like."[17]

Heraclitus also took radical line, simply denying that there was any cosmogony:

“This cosmos, the same for all,[18] was not made by Gods or men, but has always existed and will always exist. It is an everliving fire, kindling in measures and going out in measures.”[19]

On current, physical issues Aetius tells us that:

“On thunder, lightening, thunderbolts, whirlwinds and typhoons, Anaximander says that all these things occur as a result of wind: for whenever it is shut up in a thick cloud and then bursts out forcibly, through its fineness and lightness, then the bursting makes the noise, while the rift against the blackness of the cloud makes the flash.”[20]

These are phenomena which previously would have been explained by the interference of the gods. Democritus goes as far as to say that a belief in the gods is due to a mistaken inference from phenomena which are perceived as terrifying, such as thunder and lightening.[21] As with the Hippocratics, this all looks very promising but matters are actually somewhat more complex.

III

It would be quite incorrect to portray this reaction against the supernatural as an outright rejection of the idea of a god or of the divine. The Hippocratic author does not deny the existence of the divine, but says in relation to epilepsy that:

"Therefore there is no need to distinguish this disease from others or consider it more divine, for they are all divine and all human."[22]

Aristotle tells us that for Anaximander:

"The unlimited has no origin... However, this seems to be the origin of all other things, and it surrounds and steers (*kubernan*) all, as with all those who do not suppose other explanations, such as mind or love, beyond the unlimited. This is divine, for it is immortal and indestructible, as Anaximander and most of the physiologoi say."[23]

The steering metaphor, or something similar, is common among early Greek cosmogonies.[24] In general, those who suppose there to be many worlds (Leucippus, Democritus) explain our cosmos as the result of a multiplicity of accidents. Those who suppose there to be only one cosmos feel the need of some form of guiding principle or ordering god who brings the pre-existing state into the unique order of our cosmos.[25] It is not certain whether Anaximander *et. al.* consider this to be divine, or whether this is Aristotle's inference from it being immortal and indestructible. That the Milesians advocated some form of Pantheism though is now widely accepted.[26]

Where then does that leave the supposed rejection of the supernatural ? Some of the older literature holds that a key factor in the move from mythology to philosophy was a depersonification of the factors controlling the universe, a move from 'thou to it', to impersonal forces.[27] I have argued elsewhere that the issue is really one of invariance rather than personification.[28] One might have a depersonified force which is not invariant. One might have a God which itself behaves in a regular manner and which sees to it that the universe behaves in a perfectly regular manner. How does Greek theology develop with respect to this ? Early theology has a rather chaotic pantheon, with

unruly gods. Hesiod can be seen as attempting to bring some order to the genealogy of the gods at least,[29] but the first interesting critic is Xenophanes, who says that:

"Homer and Hesiod have ascribed to the gods all those things which are shameful and reproachful among men: theft, adultery and deceiving each other... Mortals believe that the gods are born, and that they have clothes, speech and bodies similar to their own."[30]

Rather, for Xenophanes, there is:

"One God, greatest among Gods and men, entirely dissimilar to mortals in *nous* and body."[31]

Plato is perhaps the clearest example where god will act in an invariant manner because god is entirely good. This god imposes good form and regularity on a chaotic state of matter in order to form a cosmos. To ensure regularity in the heavens, the cosmos itself has a soul and all the heavenly bodies have souls as well.[32] At *Timaeus* 47a ff. we are told that:

"God devised and gave to us vision in order that we might observe the rational revolutions of the heavens and use them against the revolutions of thought that are in us, which are like them, though those are clear and ours confused, and by learning thoroughly and partaking in calculations which are entirely correct according to nature (*logismon kata phusin orthotetos*), by imitation of the entirely unwandering (*pantos aplaneis*) revolutions of God we might stabilise the wandering (*peplanemenas*) revolutions in ourselves."[33]

If the heavens move in a perfectly regular manner, why do they do so ? In the *Laws* he puts it like this:

"Those who engaged in these matters accurately would not have been able to use such wonderfully accurate calculations if these entities did not have souls."[34]

If we have a god who behaves in a regular manner, ought we to consider it to be supernatural ? This rather depends on how we define supernatural and how we approach the question. If the supernatural

is that which is not bound by natural laws, there is a case for considering such a god to be a natural entity. The other typical definition of the supernatural is that which lies outside nature. Now Plato's god on this criterion might be considered to be supernatural, as the demiurge imposes order on nature. What of Anaximander's immortal, indestructible, steering unlimited though ? Pantheists consider god to be an aspect of nature rather than something outside it. What of Aristotle's god which thinks about thinking ? It does only what is entirely natural to it, while not actively affecting any other part of nature. Aristotle discusses what occurs according to nature (*kata phusin*) and what occurs contrary to nature (*para phusin*). [35] Aristotle has something very specific in mind here though. What occurs contrary to nature is a matter of chance. The idea that there is something outside of nature or that the supernatural can override the natural is entirely alien to Aristotle's thought.[36] Something that is true of ancient Greek theology generally is that their deities, either as part of a pantheon or single gods were not considered to be omnipotent. It is important that we do not impose the modern Christian notions that god is separate from nature, omnipotent and capable of miracles on ancient Greek thinkers. Belief in a Greek god, particularly the sort of god the philosophers have in mind does not immediately commit one to a belief in the supernatural. If we are interested in how widespread the rejection of the supernatural was, then the key question may be as follows. Did Greek philosophers, using their own conception of god and their own criteria for natural/ supernatural, to their own satisfaction show that there could be a belief in god without a belief in the supernatural ? I would say that the answer to that, in many cases, is yes.

IV

Let us now turn to a second line of thought here. Does magic in the ancient world, of necessity, need to involve the supernatural ? From a modern perspective, there is a temptation to answer yes here. We do not believe there to be any real magicians. There are excellent conjurors, there are those who are good at employing psychology and those who are good at reading or using body language and speech inflection. They produce marvelous and entertaining tricks, but we can produce scientific explanations for all of them.

Historically, as I noted in the introduction there was a strong tradition of renaissance natural magic. The Christian context required the development of the notion of natural magic. The Christian

view was that humans do not have any magical power themselves. If anything happened which was contrary to nature, then there were two possibilities. Either god had worked a miracle through someone, or that person was in league with the devil and had derived the power to go beyond nature from the devil. To claim supernatural power was then to put oneself in a very dangerous position in the era of the witch hunt. If natural magic dealt with the natural world though, how did it differ from the science of the period ? While science dealt with manifest phenomena, those that were directly observable or the causes of which were directly observable, natural magic dealt with what was hidden, with the occult. The occult here was simply what was hidden and had not accrued the modern connotations of evil or demonic. Natural magic saw more connections between things than science, hypothesising harmonies, sympathies and correspondences. Natural magic also tended to believe in matter, without being alive or having intelligence, to have more active properties. What must be emphasised here though is the commitment in the natural magic tradition to natural and law like explanation.

What is important about this ? Firstly, that there can be such a thing as natural magic. Secondly, phenomena which we might consider to be supernatural could be given natural explanations. Thirdly, phenomena which we now consider to be natural were at one stage considered magical. The prime example here is that magnetism was at one point considered to be an occult subject and part of natural magic and is now part of mainstream physics.[37] In relation to the ancient Greeks then, it is not enough simply to cite their belief in phenomena we would take to be supernatural in order to establish their belief in the supernatural. In relation to the Hippocratics, that they employ incantations or amulets does not entail that they believed in the supernatural. We need to know how they used them and what sort of explanations they gave for their effect. Due to their religious context, the Greeks had no specific category of natural magic. However, the *historian peri phusin*, the 'enquiry into nature' was extremely wide ranging. As we have seen, the Greek philosopher/ scientists produced explanations of phenomena that their fellow Greeks considered supernatural. They also accepted as real some phenomena which we would now dismiss, such as the role of amulets in healing. What else would one expect in the early days of philosophy and science ? That we believe these phenomena require magical explanation does not mean the ancient Greeks all did.

V

One criticism of the Greek break with the supernatural is that the natural explanations they then produce are poor. Anaximander's explanation of meteorological phenomena given earlier may be natural but is entirely mistaken and one can say much the same about the Hippocratics own explanation of the sacred disease.[38] Lloyd has commented that for those attempting natural explanations at the outset:

"It was a mere act of faith - we might even say bluff – to claim to be able to understand, let alone control, the phenomena in question."[39]

The first reply to this is that at least they gave the correct type of answer and that better explanations of the right type would follow. Can that justify the initial choice of natural explanations as something more than an act of faith though ? As Lloyd has argued, the path ahead for natural explanation was anything but clear, being bitterly disputed, not least between atomists and teleologists.[40] What constituted nature was also a highly contentious issue. Lloyd has argued that nature was invented rather than discovered by the Greeks. There were many competing conceptions of what constituted the natural.[41] Is it the case though that all early natural explanations were poor ? A counter example here is the natural explanation of eclipses as the moon passing in front of the sun and vice versa, which is simply correct by any standard, and one could cite many more examples. Perhaps a more interesting question to ask is by whose criteria were some of these explanations poor ? By ours, maybe, but of what relevance is that to the ancients who held these views ?

Let us try a different approach here, asking why some early Geeks rejected the notion of the supernatural. Were there no reasons to prefer natural over supernatural explanations at the outset ? Were the people to whom we attribute the origins of philosophy and science merely fortunate in choosing between two equally plausible paths ? Once the choice had been made, did they have merely faith that better explanations would be found or did they have some justified belief ? What I want to suggest here is that the motivation for the rejection of the supernatural comes from deeper philosophical concerns. I have argued extensively elsewhere that if the presocratics were committed to the principles of parsimony and invariance, then we can make very good sense of the cosmogonies

they adopted, why they adopted them and the development of cosmogony.[42] If that is so, we might ask the following two questions:

1) How well does a belief in the supernatural fit with a commitment to parsimony ? If the supernatural is that which is beyond or other than nature, then not at all well. One would only want to hypothesise a supernatural explanation, with a further ontological commitment to something beyond the natural, when all possible natural explanations had been exhausted and rejected.

2) How well does a belief in the supernatural fit with a commitment to invariance ? If the supernatural does not obey natural laws, or is capable of overriding natural laws, then not at all well. Indeed, the two beliefs would seem to be entirely incompatible.

There is the further question here of why anyone should be committed to parsimony and invariance. The problem with denying parsimony is that it gives a licence to profligacy. You may suppose as many entities as you like to explain phenomena, without being called upon to justify their existence. The problem with rejecting invariance is similar. Abandon it and there are no criteria for when, why or where any generalisations may be broken. This, one might argue, is precisely the situation with myth and with supernatural explanations. There is an endless quagmire of unjustified and unjustifiable assertions. With natural explanations there are criteria and the content of those explanations can at least be a matter for reasoning and discussion. The initial rejection of supernatural explanation then may be down to a perceived practical failures and theoretical flaws with that mode of explanation. Natural explanations offered something new, with a different and much more promising theoretical underpinning. Weak explanations could be criticised, debated and improved upon in a way that was not possible for supernatural explanations.

How much the early Greek philosophers saw of this is a matter for debate, and may not be recoverable by us on the current state of the evidence. All I will say here is that if they were in some way committed to parsimony and invariance, we can make good sense of the philosophical positions they adopt in general and of their views on cosmogony in particular. We can also make good sense of their rejection of the supernatural, as we can now understand what sort of asymmetries the early Greeks saw between natural and supernatural explanations. Arguably, the Greeks invented their

varied positive characterisations of nature rather than discovered a unitary conception of it. Perhaps they discovered something here as well though, a negative characterisation of nature, defining it by exclusion. Whatever nature is, it is not supernatural and there is nothing which is supernatural. They discovered the distinction between the natural and the supernatural and were able to employ the principles of parsimony and invariance to the investigation of nature. Lloyd has argued that it is important to recognise context of dispute for early Greek philosophy and medicine.[43] That surely has to be correct. We cannot fully understand what the Hippocratics have to say and they way they choose to express it without understanding the competitive context of ancient Greek healing practises. It is also important though to recognise the philosophical drive behind their thinking and why that rejects explanation in terms of the supernatural.

VI

I now want to do something a little more detailed and look at the way that Ptolemy deals with astrology. It is sometimes said that astrology is fundamentally grounded in the 'ancient's magical world view'.[44] Lloyd says that:

"Several of those who were prominent in the development of Greek cosmology and science combined an interest and belief in magic with their other work in the 'inquiry into nature'. To mention just the most obvious example here, it is well known that most ancient, like most medieval and Renaissance astronomers were also practising astrologers."[45]

I shall argue that Ptolemy's astrology was grounded in a perfectly reasonable extension of Aristotelian cosmology, itself entirely natural,[46] and required nothing supernatural, magical or mystical to support it.[47] The intention here is to show that a discipline which we consider to involve magic and the supernatural did not necessarily do so for all of the ancient Greeks. Ptolemy begins the *Tetrabiblos* with what for him is the fundamental principle of astrology. This is that the positions and motions of the sun, moon, the five planets and the stars affect the earth.[48] So astrology:

"Investigates the configurations themselves and the specific changes they bring about in what they surround."[49]

Ptolemy also says that:

"The sun is always in some way arranging[50] all that is on earth, not only through the changes of the seasons of the year bringing about the generation of animals, the growth of fruit bearing plants, the flowing of waters and the returning of bodies, but also through its daily cycle producing heat, moisture, dryness and cold in a regular manner."[51]

In Aristotle, there are two sets of passages, *Generation and Destruction* II/10 and II/11, and *Meteorology* I/2 and I/3 which can be interpreted as giving a foundation for a belief in astrology. *Meteorology* I/2 says that:

"The entire terrestrial realm is composed of these bodies (earth, water, air, fire), and as we have said it is the processes which affect them that concern us here. This realm is of necessity contiguous with the upper motions, which means that all of the motions here are steered by them. As the source of all motion, this latter must be accounted as the primary cause. These are eternal, unlimited with respect to place but are always complete. In distinction, all of the other bodies comprise separate regions from each other. The result of this is that fire, earth and their kindred must be accounted as the material reason for coming to be, while the ultimate reason for their motion is the motive ability of the eternally moving things."[52]

Although perhaps not immediately apparent, this marks a significant difference with modern astrology. While modern astrology is solely concerned with people, Ptolemy is concerned about the effect of the heavens on the earth in general. What does Ptolemy cite as astrological phenomena ? Among those caused by the sun he cites the cycle of the seasons, the generation of animals, the fruitfulness of plants, the flowing of waters and also effects of heating and drying. The moon too has an affect on rivers, and also on the tides of the sea and on plants and animals,[53] while the planets create hot, windy or snowy weather and other things are affected accordingly.[54] This is quite a

fascinating catalogue of alleged astrological phenomena. If we accept Ptolemy's definition of astrology, then it is quite clear that there are some real and natural astrological effects, even if we would now consider these to be astrophysical. No one would deny that the sun's annual motion is the cause of the seasons, and although we wouldn't put it quite in these Aristotelian terms, neither would anyone deny the heating and drying effect of the sun. Nor would we deny the effect that the moon has on the tides. It should also be clear that at least some Ptolemaic astrological predictions are going to be precise and testable, and indeed will be confirmed by tests.

It is important to recognise here that Ptolemy distinguishes two sorts of astrology.[55] For one type we need take into account no other cause than the motions of the heavens. Although Ptolemy does not make the distinction in precisely these terms, we might call this inanimate astrology. Here Ptolemy is very confident of his predictions. The only thing that makes this less accurate than astronomy, he says, is that because astrology deals with patterns of the heavens, and as no pattern is a repeat, we have no identical past situation to compare the present one with, only similar ones. On the other hand, there is the type of astrology which deals with things which are diverse in their nature or have wills of their own. Ptolemy also draws a parallel between astrology and medicine. We do not, he says, criticise the physician when he speaks both of the general nature of a disease, and of the idiosyncrasies of the patient.[56] This is an interesting comparison in several ways. Ptolemy has given a reasonable explanation of why competent practitioners of astrology will not always get it right. The comparison with medicine shows that with a respectable discipline too competent practitioners cannot be expected to be perfect in their prognostications, as they have to deal with individual, idiosyncratic subjects as astrology does.[57]

VII

How though did Ptolemy believe that the motions of the sun, moon and planets influenced events on earth ? Ptolemy's cosmology, while having significant differences with that of Aristotle, is a perfectly reasonable development of it.[58] Within this modified Aristotelian cosmology, there is a natural means by which the motions of the sun, moon and planets can transmit an influence to the earth and so affect events on earth (I shall call this the transmission of astrological influence). He says that:

"A certain natural power emanates from the eternal aether and affects the entire region of the earth, subjecting it all to change."[59]

Aristotle, in his *Meteorology*, says that:

"The circular motion of the primary element and the bodies which are in it, are by their motion always separating, setting on fire and making hot the contiguous bodies in the lower realm."[60]

Aristotle's astronomy follows that of Eudoxus and Calippus, [61] and involves regular circular motion around the centre of the universe. Whether Eudoxus or Calippus considered their models to be physical or merely mathematical is open to debate, but Aristotle is quite clear that his is a physical model of the heavens. Each of the spheres hypothesised by Eudoxus and Calippus are real spheres of aether, so to produce the motion of each celestial body there is a set of spheres whose motions combine together. Aristotle was concerned that the motions of one body should not interfere with those of the body below it, so for each of the spheres producing the idiosyncrasies of motion of the sun and the planets, there is a reacting sphere ensuring that these motions do not affect the motions of the rest. Aristotle assumes that no reacting spheres are required for the moon, as it is the lowest of the celestial bodies.

While concentric sphere astronomy was a major advance over its predecessors, it had several inherent drawbacks.[62] It is difficult to account for variations in apparent size, orbital velocity and the shapes of the retrograde motions of the planets. Breaking with concentric sphere astronomy allows Ptolemy the use of epicycles, eccentrics and equants which give much better models of these phenomena. There can be no doubt that this move was justified astronomically. Breaking with the system of reacting spheres not only simplifies matters considerably,[63] but also helps to solve some theoretical difficulties with Aristotelian cosmology. Aristotle sets forward a fundamental principle about change. This, quite simply, is that the movement of the sun on the ecliptic is the ultimate source of all coming to be and passing away in the terrestrial realm.[64]

"It is not the primary motion which is the cause of generation and destruction, but motion on the inclined circle."[65]

If this did not happen, the terrestrial realm would have separated into disparate regions of earth, water air and fire under the natural motion of each element long ago.[66] So the sun:

"Generates by approaching and being near while it destroys by withdrawing and being far away."[67]

Aristotle is also confident that:

"Sense perception agrees with our theory, as we see generation with the approach of the sun and destruction with its withdrawal."[68]

For Aristotle then the influence of the sun on the earth is considerable, but there are notorious theoretical difficulties concerning what that influence might consist of and how it might be transmitted. Aristotle's view is that heat and light are not emitted by the heavenly bodies themselves, but that the motion of the heavenly bodies produces heat in the air below them, and it is the subsequent ignition of the air that we see.[69] Aristotle is forced into some such account, as for him aether cannot be qualified by the hot/ cold and wet/ dry contraries and so the heavenly bodies cannot themselves be hot. This account produces considerable difficulties though.[70] Given that Aristotle conceives of the heavens as a nest of spheres, then only the sphere of the moon is in contact with the upper reaches of the terrestrial realm. Worse still, not only the sun but all the other planets have reacting spheres specifically designed to prevent the transmission of their movement to the sphere below. Two further unfortunate consequences of this theory are that (1) it has all the heavenly bodies shining by their own light and (2) we see the effects of the motions of the heavenly bodies in the upper reaches of the terrestrial realm, not the heavenly bodies themselves. These consequences will wreak complete havoc with any theory of eclipses and phases, including Aristotle's own.[71] Given the nature of the Aristotelian system, these may well be insuperable problems.

Ptolemy has no such difficulties. He straightforwardly states that the aether surrounding the earth affects fire and air which in turn affect water and earth, and so affects events on throughout the terrestrial realm.[72] As Ptolemy has disposed of the reacting spheres, there is now no hindrance to the

transmission of the influence of the sun, and indeed the other heavenly bodies, through the aether. Ptolemy does not go as far as to say that the sun is hot and dry, but does say that the sun has the ability to heat and to dry, and ascribes other combinations of the hot/ cold and wet/ dry contraries to the other celestial bodies.[73]

While this is Ptolemy's position in the *Tetrabiblos*, the later *Planetary Hypotheses* may present a slightly different picture and perhaps a revised mode of transmission of astrological influence. Ptolemy presents the 'nesting spheres' hypothesis in this work (which is absent from both the *Suntaxis* and the *Tetrabiblos*), whereby the spheres of each of the celestial bodies fit together perfectly with no overlap or void between them.[74] Ptolemy is adamant in the *Planetary Hypotheses* that there are no reacting spheres.[75] Indeed, in his new system there is no need for them, as he conceives of each of the heavenly bodies as having its own source of motion.[76] Each of the heavenly bodies moves itself without any assistance or interference from any other body.[77] This means that there is no transference of motion between spheres (Ptolemy specifically rules this out[78]) and so the motions of the outer heavenly bodies are not transferred to the inner ones. That would appear to leave us with Aristotle's problem again, of how the motion of heavenly bodies higher than the moon can affect the terrestrial realm. However, Ptolemy is very specific in stating that the aethereal spheres are entirely unhindered and uninfluenced by the beams that pass through them.[79] This provides a foundation for a theory of the transmission of astrological influence. The beams pass from the celestial bodies through the aethereal spheres and then can affect the terrestrial realm.[80]

Ptolemy is quite happy that his account of the nature and transmission of astrological influence will reproduce the required hierarchy of significance of sun, moon and planets.[81] Indeed there is such a hierarchy in Aristotle too, as he suggests that the greatest heat and light come form the sun, as it is near and swift moving, then the moon as it is near but slow moving, and then the planets, and then the stars.[82] This needs some modification for Ptolemy, as he places the sun between Venus and Mars rather than between the moon and Mercury, but that is no great difficulty and the factors he appears to be working with are size - potency - velocity - distance.[83] Obviously he is rather too sanguine about this, but in the absence of any means of quantification his scheme is at least a theoretical possibility. Certainly it solves theoretical difficulties within Aristotle's scheme and also accounts for more of the phenomena. Ptolemy then gives an account of the nature and transmission of astrological influence that is within a reasonable extension of Aristotelian cosmology,

is entirely natural, and is one that he believes generates the required hierarchy of influence of the heavenly bodies.

In his defence of astrology, Ptolemy cites many alleged astrological phenomena. Some of these, given a Ptolemaic definition of astrology we would be quite happy to accept as unproblematic, although we might prefer to place them in some other discipline. We would accept a direct causal relationship between the motion of the relevant heavenly bodies and the phenomena on earth. Examples here are the heating effect of the sun and the effect of the moon on the tides. For some of Ptolemy's astrological phenomena, we would recognise that the motions of the heavenly bodies have a part to play in their explanation, largely as the determinant of days, seasons and years, but that in these cases matters are rather more complex and there is no direct causal relationship. Examples here are some of the daily, seasonal and annual behaviour of plants and animals, including their fertility cycles.[84] Some Ptolemy's alleged astrological phenomena we would of course claim to be simply non-effects. One example here is a supposed relation between planets, stars and weather,[85] but the key one of course is astrological influence on human beings. Ptolemy presented a very seductive argument, especially in an ancient context.[86] Beginning with examples of astrological influence that under his conception of astrology no-one could deny, he moves through cases where astrological influence is more complex but still undeniable, to the case of humans. Allied to this is a sophistication argument. Even dumb animals and very ignorant men are aware of the relation between the sun and the seasons, while those more used to observing the world around them, farmers, herdsmen an sailors are aware of the relation of the heavens to the fertility and weather cycles. Throughout the *Tetrabiblos* he is insistent that we attend to 'natural causes', and that we should dismiss other superfluous nonsense, even if it is advocated by many people.[87]

VIII

Although I can only outline my position here, I would argue something very similar about ancient alchemy. It is important to recognise that ancient alchemy was not solely about the transmutation of base metals into gold, as the Leyden papyrus amply demonstrates. It was rather more about the transformation of raw materials into something more useful or valuable. For our current purposes though, we can take the generation of gold as an example. Within Aristotle's theory of matter, there is

nothing which prevents transmutation, and indeed transmutation is a commonplace phenomenon.[88] One can think of this in three ways. Physically, there is nothing which prevents the four Aristotelian elements of earth, water, air and fire from transmuting into each other, as the contraries underlying them (hot, cold, wet, dry) alter. Gold is constituted out of these elements,[89] so the transmutation into gold is at least a theoretical possibility.[90] Philosophically, gold has a certain set of qualities. All qualities are mutable for Aristotle. One might then begin with a plentiful substance that is reasonably similar to gold (e.g. lead) and seek to change the relevant qualities until one has gold.[91] Geologically, Aristotle holds that metals are formed in the ground. If so, then there is a process by which they are formed from non-metals.[92] The task of alchemy is then to discover the nature of that process in the case of gold and replicate it. One could thus seek transmutation into gold, or other transmutations of raw materials into more valuable or useful entities without recourse to anything magical, mystical or supernatural.[93]

This is by no means to argue that all astrology or all alchemy was done in this fashion. Rather, I would argue that there was a broad church for each, with a spread from those who practised astrology and alchemy with a strictly Aristotelian basis out to those who espoused openly supernatural ideas. Between the two was a large hinterland of views and it is open to discussion as to whether those involved anything supernatural or not. We might look at the neoplatonic astrological tradition which based itself on Plato's *Timaeus*, and made considerable use of the macrocosm/ microcosm analogy. We might also look at the Stoic astrological tradition which used the idea of universal sympathetic interaction. These views accept an ordered, physical cosmos, do not invoke anything supernatural.[94] One might argue that prior to the rise of the mechanical philosophy in the seventeenth century, that these were perfectly plausible alternatives for the way that the physical world might work, as indeed were the Aristotelian conceptions of matter and explanation. Indeed that is so right up to the beginning of the scientific revolution, were one can find scholasticism, Renaissance neoplatonism and ideas based on sympathetic interaction vying for supremacy. I would suggest then that astrology in the ancient world consisted of a broad spectrum of views ranging from those of Ptolemy through the Neoplatonists and Stoics to the outright mystics, whose views could certainly be characterised as supernatural. As with astrology, there are other philosophical bases for alchemy (e.g. Plato's matter theory), and that one can construct a similar spectrum of views from the rigorous Aristotelian conceptions of alchemy via some more debatable bases through to outright mysticism. What I want to

establish here is that it is not enough simply to cite to fact that the Greeks practised astrology or alchemy in order to demonstrate that they did not reject the supernatural. There were forms of astrology and forms of alchemy which were entirely natural in their orientation.

IX

Dodds' *The Greeks and the Irrational* provided an important antidote to the ideas that either Greek society as a whole was a paradigm of rationality or that Greek society as a whole displayed a tendency towards becoming more rational. Neither of these ideas is tenable and it is clear that the Greeks as a whole do not reject supernatural. Since then, the supposed Greek rejection of the supernatural has come under scrutiny, and rightly so. Perhaps though there was a small group of philosopher scientists who did make this rejection. Scholars have made inroads here too, as it has been shown that in many cases the rejection of the supernatural was not as straightforward as was previously thought. This paper has attempted to argue that there are limits to this critique. There was a small but important group of philosopher/ scientists who rejected the supernatural. They did so not as a matter of accident, or an act of faith, but for good reasons. This group may well be larger than the above critique suggests. This paper has argued that more is required to demonstrate a belief in the supernatural than to show some belief in a god, the divine or acts we would consider to be magical. So too within an ancient context belief or practise of astrology or alchemy does not of necessity entail a belief in the supernatural.

Given the current relationship between science and magic, one might try to argue that the distinctions between science and magic, between the natural and the supernatural, between the mundane and the divine and even between the rational and the irrational in relation to these issues fall in similar positions. Historiographically, it should be clear that we cannot be in the least bit confident of such an argument in other eras with different relations between magic and science. Certainly this does not apply to the natural magic of the Renaissance, nor does it apply to many beliefs and practises in the ancient world.

A final consideration. I take it that in the present day there is a reasonable and important sense in which it might be said that we have rejected the supernatural. Let us then look to our own society. It is certainly not the case that everyone accepts and works within the general rubric of

modern science. Whether we consider that to be the ‘West’ or something more global, there are a considerable number of people who believe in supernatural astrology, supernatural magic, gods who intervene in nature or that the earth is in some way alive. Nor, rather depressingly, does there appear to be any tendency for a belief in the supernatural to diminish. Do we wish to deny though that there is a significant and important group who reject the supernatural ? An absolute numerical comparison of those with such beliefs in the ancient and modern worlds would be impractical and unnecessary. All that matters is that there was a clearly identifiable group of people in ancient Greece who are interested in a rejection of the supernatural, just as there are in the modern world. They do not have to be as great in proportion as in the modern world, as we are talking of the origins of this belief, though they do have to be a significant group in relation to previous societies. One cannot thin out this core group who rejected the supernatural simply by pointing out that some of them practised astrology, had a belief in god or the divine, or in practises we would consider to be magical.

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[1] Giambatista della Porta, cf. Cornelius Agrippa *De Occulta Philosophia Libri Tres*, Marsilio Ficino *De Vita Libri Tres*, etc.

[2] Dodds (1951).

[3] *On the Sacred Disease*, I, 1-3, cf. V 1-4.

[4] See *On Airs, Waters and Places* Ch. 22.

[5] *On the Sacred Disease*, II 1-4.

[6] See *On the Sacred Disease*, II-III.

[7] *On the Sacred Disease*, XIV, 14-18.

[8] *On the Sacred Disease*, XVI 43-46.

[9] *On the Sacred Disease*, XXI, 1-26.

[10] Lloyd, 1979 pp. 19 ff.

[11] *On the Sacred Disease*, IV, 1-5.

[12] Parmenides Fr. 8, 6-10.

[13] Simplicius, *Physics* 24, 13.

[14] Simplicius, *Physics* 24, 21, cf. Aristotle *Physics* III/4 187a20.

[15] Pseudo-Plutarch, *Stromateis* 3. The last line here probably attributes a view Anaximander did not hold - see KRS p. 152.

[16] Aetius v, 19, 4.

[17] Diogenes Laertius IX, 31.

[18] Taking *ton auton hapantôn* as genuine with Guthrie, Vlastos and Kahn but against Kirk and KRS.

[19] Heraclitus Fr. 30.

[20] Aetius, 3, 16, 1.

[21] See Sextus Empiricus IX, 24.

[22] *On the Sacred Disease*, XXI, 4-7.

[23] Aristotle, *Physics* III/4, 203b7ff.

[24] See Heraclitus Fr. 41 (cf. Fr. 64, *oiakizo*), Parmenides Fr. 12, Diogenes of Apollonia Fr. 5, generally cf. Hippocratic Regimen I and how the soul steers and Plato, *Philebus* 28d. For cognates of *kratein* (*sungkratein*, *epikratein*) see Anaximenes (Aetius 1, 3, 4), Diogenes of Apollonia Fr. 5 (*kubernao*, *kratein* etc.), Derveni papyrus, Col. 19 (*epikratein*), all in relation to the role of air.

[25] See Gregory (2007) Introduction, Ch. 2 on the Milesian cosmogonies.

[26] See e.g. Gregory 2007 Ch.2 , Sedley 2007 Ch. 1.

[27] See here e.g. Frankfort (1946), Vernant (1965).

[28] See Gregory (2007) Ch. 1.

[29] See Hesiod, *Theogony*.

[30] Xenophanes, Fr. 11, 14, 15, 16.

[31] Xenophanes Fr. 23.

[32] On the regularity of the heavens in Plato, see Gregory (2001) Ch. 4 and (2000).

[33] *Timaeus* 47a ff.

[34] Plato, *Laws* 967b.

[35] See Aristotle *Physics* II/1 on nature and II/4 ff. on chance.

[36] Such issues were problematic in the Christianisation of Aristotle and featured in the various thirteenth-century condemnations of Aristotle.

[37] See e.g. the list of subjects dealt with in della Porta's *Natural Magic*.

[38] Anaximander as reported by Aetius 3, 16, 1, *On the Sacred Disease*.

[39] Lloyd, The Invention of Nature, in (1991) p. 422.

[40] Lloyd, The Invention of Nature, in (1991) p. 423.

[41] Lloyd, The Invention of Nature, in (1991) p.

[42] See Gregory (2007) Ch. 1-8.

[43] Lloyd, The Invention of Nature, in (1991) p.

[44] Bok, Kurtz and Jerome, with 186 signatories, (The American) Humanist 35, 1975, reprinted in the New Humanist 91, 1975, pp. 154-155, cf. Jerome (1975) p. 46 'astrology is false because it is a system of magic', and cf. Lloyd 1987 p. 44 who sees Greek astrology as founded on the notion of *sympatheia*, a sympathetic interaction between heaven and earth, so too Farrington in the OCD.

[45] Lloyd (1979) p. 5, cf. Lloyd (1975) p. 10, "The boundaries of the supernatural were and remained a battleground throughout ancient science" and n.50, "The chief examples outside medicine are astrology (and the whole field of the 'art' of divination) and alchemy".

[46] See earlier comments on *kata phusin* and *para phusin* in Aristotle and the nature of Aristotle's god.

[47] I agree with Taub (1993) that Ptolemy was not a straightforward Aristotelian, and there was a significant Platonic influence in his thought. In terms of cosmology though, Ptolemy does criticise and then develop Aristotelian (rather than Platonic) models, sometimes using Platonic arguments. It is also important that Ptolemy amends the possible basis for astrology that can be found in Aristotle rather than uses the possible basis that the Neoplatonists found in Plato (the macrocosm/ microcosm links of the Timaeus).

[48] See *Tetrabiblos* I/2, 4-6. References to the *Tetrabiblos* are by chapter/ chapter section and by page number to the Greek Loeb text.

[49] Ptolemy, *Tetrabiblos* I/1.

[50] The verb here, *diatithesi*, has more of a sense of ordering than a translation of 'changing' would imply.

[51] Ptolemy, *Tetrabiblos* I/2.

[52] *Meteorologica* I/2, 339a19 ff.

[53] Aristotle, *Generation and Destruction* 336b12-14 comments in relation to the effect of the heavens on the earth that "There fore the lifespan of each living thing has a number and is determined. There is an order for all things and all lifespans have a measurable period." Cf. 338b2-6 on the sun, the seasons, and seasonal changes.

[54] See *Tetrabiblos* I/2, 6-8.

[55] Note that this is not the same distinction as that between catholic and genethlialogical astrology.

[56] *Tetrabiblos* I/2, 18.

[57] Ptolemy is also vitriolic against charlatans and incompetent practitioners of astrology.

[58] Here I take it that Aristotle's cosmology is a natural one excluding anything supernatural, and that any reasonable modification of it is too. Jerome (1975) p. 47 comments that 'Aristotle's cosmology differed little from the magical world view then held; he affirmed that the cosmos is a unity linked to man's soul and that the motions of the stars determine the nature of the soul'. In relation to the first point I would argue there were highly significant differences, notably that Aristotle holds that the cosmos is an entirely natural entity which is not subject to any form of supernatural interference, that the cosmos is ordered and orderly, and that the cosmos and its processes are explicable (i.e. no mysticism). At no point does he resort to correspondences, sympathies or any other magical notion. Aristotle supports his views with reasoning and empirical evidence (we may well feel that there is too much of the former and not enough of the latter, but this is ancient rather than modern science), and does not give mythopoeic accounts. He chronicles and criticises many other cosmologies. As to the second point, I am not aware of Aristotle holding these views and would be interested to see supporting evidence. Nor can I accept Jerome's assertion ((1975) p. 47) that 'His predecessor Plato was a firm believer in astrology' Later Platonists may have found a basis for astrology in the *Timaeus*, but this is far from showing Plato to be an active believer in astrology.

[59] Ptolemy, *Tetrabiblos* I/2.

[60] *Meteorologica* I/3, 340b12

[61] Aristotle (*Metaphysics* Λ8, 1074a30 ff.) accepts Calippus's addition of one extra sphere each for Mars, Venus and Mercury to the Eudoxan model, but seems unsure whether to accept the addition of two extra spheres each for the sun and moon.

[62] Concentric sphere astronomy was certainly a major advance over Plato's models of the *Republic* and *Timaeus*, and the Pythagorean central fire model. See Gregory (2000) Ch. 5.

[63] Simplicity important to Ptolemy, and he specifically relates this to the reacting spheres: see *Suntaxis* XIII/2 on simplicity and cosmology generally, *Planetary Hypotheses* II/6 on simplicity and the reacting spheres.

[64] See e.g. *Meteorology* I/2 339a 20 ff., cf *Physics* II/7 and *On Generation and Corruption* II/10 and II/11.

[65] *Generation and Destruction* II/10, 336a33-34.

[66] See Aristotle's thought experiment at *Generation and Destruction* 337a8-16.

[67] *Generation and Destruction* 336b7-9.

[68] *Generation and Destruction* 336b16.

[69] Aristotle's simile is that a missile in flight will become heated and heat what is around it. The aether cannot become hot or cold, but may heat the air below it - see and *Meteorology* I/3.

[70] In Aristotle's defence in these passages he is more concerned to establish that the heavens are made of aether rather than fire. Another difficulty here is that fire, not air is supposedly the outermost element in the terrestrial realm.

[71] See Gregory (2000a) for more detail on this.

[72] See *Tetrabiblos* I/2, 4-6.

[73] See *Tetrabiblos* I/4, 34 ff.

[74] See *Planetary Hypotheses* I/2, Goldstein p. 8.

[75] See *Planetary Hypotheses* II/7 et passim.

[76] See *Planetary Hypotheses* II/12.

[77] See *Planetary Hypotheses* II/7.

[78] See *Planetary Hypotheses* II/7.

[79] *Planetary Hypotheses*, II/3.

[80] I agree with Taub (1993) p. 123 and Pedersen (1974) p. 393 that Ptolemy's distinction between the terrestrial and the celestial is much less sharp than that of Aristotle. Contra Taub though I doubt that Ptolemy believes that the terrestrial affects the celestial - in the *Planetary Hypotheses* he is very clear that the aether is unchanged and unhindered by anything.

[81] See *Tetrabiblos* I/2, 6-12.

[82] *Meteorologica* I/3, 341a19.

[83] Potency here may be rather ad hoc, as there can be no direct measure of it.

[84] This would include the earth's fertility cycle too; see e.g. *Tetrabiblos* I/2, 8.

[85] Though there is important modern work on the relationship of sun spots and weather cycles.

[86] Cf. Long (1982) p. 181.

[87] See e.g. *Tetrabiblos* III/3, p. 236.

[88] See e.g. *Meteorology* I/3, 339a37 ff, cf. *On the Heavens* III/6 and III/7, *On Generation and Corruption* II/4 and II/5.

[89] Gold and other metals for Aristotle are combinations of earth and water.

[90] See e.g. *Meteorology* IV/8 384b24 ff. and IV/10 388a10 ff. on the constitution of gold and other metals.

[91] Typically this was how ancient alchemists theorised their investigations. Francis Bacon later comments that "He who knows the forms of yellow, weight, ductility, fixity, fluidity solution and so on, and the methods for superinducing them, and their gradations and modes, will make it his care to

have them joined together in some body, whence may follow the transformation of that body into gold."

[92] See *Meteorology* III/6, 378a17 ff.

[93] I would argue also that alchemy was at least seen by the ancients, and indeed the medievals to be making progress.

[94] If one accepts action at a distance as an explanation for e.g. gravitation, then one must accept sympathetic interaction as an explanatory possibility too.