NATURAL FRAGMENTS OF THE FIRST PHILOSOPHERS

With the fictitious sharpness of historical divisions, we can say that philosophy began in the Greek city of Miletus on the coast of Asia Minor (in what is today Turkey) around the year 600 B.C.

The first philosopher was Thales, a citizen of Miletus, as were the next two philosophers, Anaximander and Anaximenes.

It began, as both Plato and Aristotle tell us, because of wonder. Wonder is the natural desire to know for its own sake. When this desire becomes strong, one not only wants to know the way things are, but also *why* they are the way they are. The question *why* asks for the cause. And since some causes have a cause, wonder also leads us to seek the cause of the cause; and hence, eventually, the first cause. Thus out of wonder, the first philosophers sought the first cause of all things.

Since man's knowledge begins with his senses, we first equate *all* things with *sensible* things. Sensible things contain natural things and artificial things. But artificial things have something natural as their original causes. The wooden chair, for example, comes from the wood of a tree and is fashioned by the hands of the carpenter. The tree and the hands of the carpenter are by nature. Hence, natural things are the causes of artificial things. Thus, if one could find the first cause of natural things, one would have found the first cause, so it seems, of all things. The first philosophers, then, were natural philosophers, seeking the first cause or causes of natural things.

In reading the first natural philosophers, we should follow the road from reasonable guesses to reasoned out knowledge. And since they came first along this road, we should especially seek to understand what they said as a reasonable guess. But before we do this, we must understand what it means to call a guess *reasonable*.

A guess can be called reasonable because there is a reason (or a good reason) for it, or because reason is naturally inclined to it. A guess can be reasonable in one or both of these ways.

THALES

Water is the beginning of all things.

Thales, the first philosopher, made the reasonable guess that water is the beginning of all things. Since this was the first reasonable guess, we should consider fully how it was reasonable. We shall do so in six steps going from the general to the particular. We can distinguish these steps by the question to be asked about each.

Is it reasonable to look for the *beginning* of things? And if it is, is it reasonable to look for *one* beginning? And if it is, is it reasonable to look for one beginning in the sense of one *matter?* And is it reasonable to think that this one matter is *simple?* And if it is, is it reasonable to think that this one matter is something *formless* (shapeless, colorless, tasteless etc.) like water, but able to take on all kinds of forms? And is the very particular guess of *water* reasonable?

Reason is naturally inclined to try to understand things. And when we try to understand things, we look for their beginning. The man who considers something from its beginning will understand it best. If we try to understand a fight or a war, we look for how it began. When a biographer tries to understand the man, he goes back to his origin. Likewise, when the historian tries to understand a country. Alexis de Tocqueville says that we are in a better position to understand the United States than his own country of France since we can see the origin of the former while that of the latter is lost in antiquity. It is the very nature, then, of reason to look for the beginning of things when it tries to understand them. Hence, in one sense of the word, at least, it was reasonable for Thales to look for the beginning of things or of natural things.

Moreover, reason naturally seeks order when it tries to understand something. Order, however, is a before and after. But before and after are determined by, or in comparison to, some beginning. Hence, Aristotle distinguishes the senses of before and after in the fifth book of the *Metaphysics* starting from the common understanding of beginning.

Further, man naturally wonders. Wonder however is the natural desire to know for its own sake the cause. But every cause is a beginning. Hence, wonder leads men, and especially philosophers, to think about the beginning of things.

Was it reasonable to look for *one* beginning? Everyone who has considered reason knows that reason naturally looks for order. But order is based on something one, on some unity. We cannot see events in chronological order without ordering them before or after one event. The order of an army is based on one man. If a country has more than one government, there is chaos. Hence, just as reason naturally seeks order, it also naturally seeks *one* basis of this order.

Further, if something can be explained with fewer or less causes, reason is inclined to follow this explanation. Hence, in the absence of a reason for saying one beginning is not sufficient, reason naturally seeks to understand by one. For example, we naturally assume that there is one sun explaining 365 days and nights in the absence of any reason for saying the sun today is a different sun from that of yesterday.

Moreover, it is a property of one to be a beginning, as Aristotle points out in the fifth book of the *Metaphysics*. Hence, it is reasonable to think of the beginning as one.

Thales looked for one beginning of natural things in the sense of one *matter*. Was it reasonable to look for one matter rather than one mover or maker? The dependence of material things upon the matter out of which they are made is more known to us than their dependence upon a maker or mover. If one came upon the word *cat* on a board, its dependence upon the letters *c, a,* and *t* would be more undeniable than its dependence upon some maker who is unseen. If one erased the letters, the word would not exist anymore; so that it is difficult to deny the dependence of the word upon that out of which it is made. Perhaps material things depend for their existence, or coming into existence, upon something else besides their matter. But this dependence upon matter is what is most known to us and should be investigated first.

But if one looks for one matter out of which all things are made, is it reasonable to look for a *simple* matter? Simple does not mean the same as one. Thomas Aquinas explains this point:

> unum et simplex non idem significant, sed unum significat mensuram, ut in decimo ostensum est; simplex autem significat

dispositionem, secundum quam aliquid aliqualiter se habet, quia videlicet non est ex pluribus constitutum.[1]

Since everything is either simple or composed, and the composed has something before it (namely the simple from which it is put together), the first matter must be simple. Otherwise, there would be something before it which contradicts being *first*.

If it was reasonable for Thales to look for one matter, was it also reasonable for him to take a formless matter like water (not necessarily water)? Water is more or less formless (that is, shapeless, colorless, tasteless etc.) but capable of taking on any form. If there is one matter for all things, this matter cannot have any definite form; for then all things would be limited to this one form. Hence, it is reasonable to think that the first matter, if not water, is like water in being formless.[2]

At last, was it reasonable in particular to take water as the one formless matter out of which all natural things are made? Aristotle, in discussing the position of Thales, states that Thales was influenced by living bodies. The grass grows when it is watered and even today the biologist would say that we are mostly water. The seeds of things do not give origin to anything unless they are moist. And as far as the non-living or physical world is concerned, everything there is either a gas or a liquid or a solid. And water is the only thing in our ordinary experience that becomes a gas, a liquid and a solid. Hence, it seems to be the only thing capable of becoming all things. Someone might wonder whether rocks can come out of water. But anyone who has seen rocks from the petrified forest can trace rocks through trees back to water.

The modern scientist would not think that water is the first matter, but it is close to hydrogen the simplest element. That there is something before

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[1] *In XII Metaphysicorum*, Lectio VII, n. 2525

[2] Shakespeare, *Othello*, Act V, Sc. 2, the mistaken Othello about Desdemona:

She was false as water.

Compare this remark with the name and character of Proteus in *The Two Gentlemen of Verona*.

water, such as hydrogen or oxygen, can only be known by ingenious experiments. To our senses water appears simple and homogenous.

The theologian says that God, not water, is the beginning of all things. But God is sometimes called water *metaphorically* for a reason similar to that which moved Thales. God is the source of life and thus in the Psalms, the soul is said to thirst for God, seeking fuller life in God. This is also a reason why baptism has water as a sign in communicating a new life to the soul.

ANAXIMANDER

> The unlimited is the beginning of existing things. That from which existing things come to be is also that into which they are corrupted by necessity. For they render justice and give up injustice to one another according to the order of time. (Anaximander, DK 1)
>
> The nature of the unlimited is everlasting and does not grow old. (Anaximander, DK 2)
>
> The unlimited is immortal and indestructible. (Anaximander, DK 3)

The second philosopher, Anaximander, was influenced by Thales. Like a good student, he listened to what Thales said and developed it. But he also had the good sense to know how far to follow Thales. Anaximander is reported to have made the statement that water animals come before land animals. This is a reasonable conclusion to be drawn by someone who has had impressed on his mind (by Thales) that water is the beginning, especially, of living things. Anaximander is also said to have confirmed this deduction or given a sign confirming it. The frog begins its life as a newt, swimming around like a fish. It then becomes something of a land animal. But Anaximander did not say that water is the beginning of all things. Rather he said that the unlimited is the beginning of all things.

The first question that arises about the position of Anaximander is whether he is following the natural road from the senses into reason. The unlimited is not something we can see, hear, smell, taste or touch.

But does following the road from the senses into reason mean that we can only talk about what we can sense? Are we prevented from reasoning along this road? Surely, if we reason from what we can sense, we are still following the road, even if we reason to the existence of something we cannot sense. The road from the senses into reason does not stop at the senses.

But is there anything in our sense-experience which could lead our reason to think that the beginning of all natural things is something unlimited? Every spring and also at other times of the year, new and diverse things come into existence. Year after year this happens and there seems to be no end to it. Hence the beginning or source of things must be unlimited or endless in some quantitative sense.

And Thales had already begun to think of the beginning of things as unlimited in a qualitative sense. Water is more or less formless and without qualities. But water is not entirely so. In its natural environment, water is wet and cold. Thales was on the right track, Anaximander might have thought, but he has not gone all the way. If the beginning or source of all things is definitely wet and cold, it could not be the beginning of the hot or the dry. Like a good student, then, Anaximander developed the insight of Thales that the first matter is formless. But he had the good sense to see that water is not entirely unlimited in its qualities. Hence, he reasonably concluded that the first matter is unlimited in a qualitative sense as well as in a quantitative sense.

Anaximander also saw that the beginning of things must be their end. This is reasonable. If a child makes something out of wooden blocks and then knocks it down or apart, he should not expect to find a (plastic) Lego set, but rather what he began with (wooden blocks). If the child makes something out of a plastic Lego set, he should not expect when he takes it apart , to find a (metal) erector set or a set of wooden blocks. If the beginning of all things is still found at their end, then the beginning of all things is eternal and unchanging. Hence, Anaximander attributes eternity and not growing old and not perishing to the unlimited. Indeed, all the first philosophers seem to have thought that the beginning of things is imperishable and eternal. The first matter could not be broken down into nothing or something. If it could be cut up into nothing, then it would have been made out of nothing (for a thing is cut up into what it is made up of). But this is impossible. It would have been nothing. Nor can the first matter be broken down into something else, because this something else would then be the matter of the first matter. Hence, there would be something

before the first which is absurd. Or this something else would be the first matter. So whatever is the first matter is not from anything else.

Anaximander also spoke of justice and injustice in the natural world. We follow him in speaking of laws, obedience and debts in natural things. Since man is by nature a political animal, he must communicate about the city. Hence, he has names for what is found in the city. But when we turn from the city to nature, we do not have names for like things. But rather than invent new names for what we find in the natural world, we carry over old names from the city by the likeness of natural things to them. But when we speak of natural things as obeying laws, a new meaning is given to *law* and *obedience*, but these new meanings have some likeness to the first meanings. In this way, our reason is led from the more known to the less known in naming and understanding names.

Aristotle in the third book of *Natural Hearing* (the *Physics*) states that all the first thinkers thought that the infinite was the beginning or that the beginning was infinite.[3]

Thomas Aquinas, the Commentator, writes thus upon the words of the Philosopher there:

> Deinde...ponit quatuor, in quibus antiqui philosophi concordabant circa infinitum.
>
> Quorum primum est, quod omnes posuerunt infinitum esse principium; et hoc rationabiliter, idest per probabilem rationem. Non enim possibile est, si infinitum est, quod sit frustra, idest quod non habeat aliquem determinatum gradum in entibus. Nec potest habere aliam virtutem nisi principii: quia omnia quae sunt in mundo, vel sunt principia vel ex principiis; infinito autem non competit habere principium, quia quod habet principium, habet finem. Unde relinquitur quod infinitum sit principium.
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> Sed attendendum est quod in hac ratione utuntur aequivoce *principio* et *fine:* nam quod est ex principio, habet principium

[3] 203b 4-15

originis; infinito autem repugnat principium et finis *quantitatis* vel magnitudinis.

Secundum autem quod attribuebant infinito est, quod sit ingenitum et incorruptibile. Et hoc sequitur ex eo quod est principium. Omne enim quod fit, necesse est quod accipiat finem, sicut et habet principium; et etiam cuiuslibet corruptionis est aliquis finis: finis autem repugnat infinito; unde esse generabile et corruptibile repugnat infinito. Et sic patet quod non est aliquod principium infiniti, sed magis infinitum est principium aliorum.

Et in hoc etiam aequivoce sumebant *principium* et *finem*, sicut et supra.

Tertium autem quod attribuebant infinito erat, quod contineret et gubernaret omnia: hoc enim videtur esse primi principii.

Et hoc dixerunt quicumque non posuerunt praeter materiam, quam dicebant infinitam, alias causas, scilicet agentes, ut intellectum posuit Anaxagoras et concordiam Empedocles. Continere enim et gubernare magis pertinet ad principium agens, quam ad materiam.

Quartum autem quod infinito attribuebant est, quod est quoddam divinum: omne enim quod est immortale aut incorruptibile, divinum appellabant: et hoc posuit Anaximander et plures antiquorum philosophorum naturalium.[4]

In the chapter on God being infinite or unlimited in the *Summa Contra Gentiles* (Book One, Chapter 43), Thomas looks back to the anticipation of this in the first philosophers:

Huic etiam veritati attestantur antiquissimorum philosophorum dicta, qui omnes infinitum posuerunt primum rerum principium, quasi ab ipsa veritate coacti.

Propriam enim vocem ignorabant, aestimantes, infinitatem primi principii ad modum quantitatis discretae, secundum Democritum, qui posuit atomos infinitos rerum principia, et secundum

[4] *In III Physicorum*, Lectio VI, n. 335

> Anaxagoram, qui posuit infinitas partes consimiles principia rerum; vel ad modum quantitatis continuae, secundum illos qui posuerunt aliquod elementum, vel confusum aliquod infinitum corpus, esse primum omnium principium.
>
> Sed cum ostensum sit per sequentium philosophorum studium quod non est aliquod corpus infinitum; et huic coniungatur quod oportet esse primum principium aliquo modo infinitum: concluditur quod neque est corpus neque virtus in corpore infinitum quod est primum principium.[5]

But in the *Summa Theologiae,* Thomas attributes their thinking to a reason for thinking it.

> ...omnes antiqui philosophi attribuunt infinitum primo principio, ut dicitur in III *Physicorum:* et hoc rationabiliter, considerantes res effluere a primo principio in infinitum.[6]

We have thus seen Thomas sometimes attributes their thinking the same to a reason and to being coerced by truth itself. But to be coerced by truth itself is the same or like following the natural inclination of reason. Thomas explains this phrase of Aristotle in the first book of *Natural Hearing*.

> Dicit ergo primo quod, sicut supra dictum est, multi philosophorum secuti sunt veritatem usque ad hoc, quod ponerent principia esse contraria. Quod quidem licet vere ponerent, non tamen quasi ab aliqua ratione moti hoc ponebant, sed sicut ab ipsa veritate coacti.
>
> Verum enim est bonum intellectus, ad quod naturaliter ordinatur: unde sicut res cognitione carentes moventur ad suos fines absque ratione, ita interdum intellectus hominis quadam naturali inclinatione tendit in veritatem, licet rationem veritatis non percipiat.[7]

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[5] *Summa Contra Gentiles*, Book One, Chapter 43
[6] *Summa Theologiae,* Prima Pars, Q, 7, Art. 1, c.
[7] *In I Physicorum*, Lectio X, n. 79

ANAXIMENES

> Just as our soul, being air, holds us together, so do breath and air surround the whole world. (Anaximenes, DK 2)

Anaximenes, the third philosopher and Milesian (or citizen of Miletus), said that air was the beginning of all things. Like Thales, he also was influenced by living things. Those most familiar to us need to breathe in order to live and when they stop breathing, they die. Indeed, some of the early Greek philosophers, like the poets and the popular imagination, thought of the soul as air. The Greek word for soul means first of all air or breath. Homer describes a man badly injured in battle. His soul is starting to leave his body, but a strong wind comes up and forces his soul back into his body and he survives.

Was it more reasonable to guess air than water or the unlimited as the beginning of things? Anaximenes could have been led by Anaximander's thought to say air rather than water. If the beginning of things must be unlimited in both a quantitative and a qualitative sense, we have two reasons why air is a better guess than water as the beginning of all things. For there is more air than water around. There is air over all the earth, even over the desert which is lacking water. And air seems to go up and up above us, perhaps forever.

Air is not more unlimited than the unlimited, but it is easier for our mind because air is somewhat sensible.

Another reason why air is a better guess than water can be seen if we compare these guesses with the statement of the poet Hesiod before them. Hesiod, like other poets, emphasizes mother earth as the beginning of things. Shakespeare, in his play Timon of Athens, has Timon address the earth: "Common mother, thou, whose womb immeasurable and infinite breast, teems and feeds all." Mother earth is spoken of as the beginning of all things and also as infinite. The order of the three guesses is interesting: mother earth, water, and then air. Mother earth is the most sensible, and air, the least sensible, being invisible. When there is only air in a room, we often say it is empty or that there is nothing in that room. Water is, of course, in-between. It is visible although to some extent transparent. Earth seems to be the thickest of the three and air the thinnest. (Hence, Shakespeare says, "Strike flat, the thick rotundity of the earth" and "they are vanished into air, into thin air") Now the thick cannot be

the matter of the thin. We cannot make something thin out of something thick; the thin cannot be composed of the thick. But many layers of the thin can make up something thick; as, for example, a thick book is made out of many thin pages. Moreover, matter is like parts (and form like the whole) and the part is smaller than the whole. Hence, the first matter should have the thinnest and smallest pieces. In this way, water is a better guess than earth; and air, than water.

As Aristotle points out in the first book of *Natural Hearing* (the *Physics*), those who said there was one first matter generated other things out of it by rarefaction and condensation. Erwin Schrödinger comments on this:

> [Anaximenes] "from a careful consideration of everyday experience...abstracted the thesis that every piece of matter can take on the solid, the liquid, the gaseous and "fiery" state; that the changes between these states do not imply a change of nature, but are brought about geometrically, as it were, by the spreading of the same amount of matter over a larger and larger volume (rarefaction) or - in the opposite transitions - by its being reduced or compressed into a smaller and smaller volume. This idea is so absolutely to the point that a modern introduction into physical science could take it over without any relevant change. Moreover, it is certainly not an unfounded guess, but the outcome of careful observation.[8]

PYTHAGORAS

The harmony of the octave comes from the ratio of two to one.

Pythagoras came from the island of Samos, off the coast of Asia Minor. But he emigrated to southern Italy which became a center of Pythagorean studies. Pythagoras comes into natural philosophy from mathematics. Pythagoras has left his name on a famous theorem in geometry, but this is only part of his work in pure mathematics. To Pythagoras is also attributed the discovery that

[8] *Science and Humanism,* p. 56

harmonious sounds in music are produced by objects in simple numerical ratios. The octave, for example, is produced by objects in the ratio of two to one. This inspired him and his followers to look for simple numbers and ratios under all natural phenomena. In this way, Pythagoras is regarded as the founder of the mathematical science of natural things.

Although Pythagoras may have spoken as if natural things were made out of numbers, he is really talking about a different kind of cause from that investigated by the first three philosophers. There is no matter in pure mathematics, and the mathematician talks about another kind of cause. This kind of cause could be called form. By form, we mean not only shape, but also order and ratio. The words *cat* and *act* have the same matter or letters, but they are different words because of the order of these letters. Likewise, different things can be made out of the same matter (for example, wood) by giving this matter a different shape. The importance of ratio is seen in the difference between carbon monoxide and carbon dioxide. The ratio of two to one is harmless, but the ratio of one to one will kill you. But both are made out of carbon and oxygen. We thus have a second kind of cause. Besides matter, there is the shape, or order, or ratio of the matter. Being accustomed to this kind of cause in pure mathematics, it is not surprising that Pythagoras should have been the first to recognize it in the natural world.

HERACLITUS

We have many more fragments from the next philosopher, Heraclitus, than from the philosophers before him. Heraclitus is from Ephesus, also on the coast of Asia Minor (or present-day Turkey). Heraclitus is perhaps the most central thinker in human history. One of his followers, Cratylus, was a teacher of Plato; and even in old age, Plato still held on to things he had learned from the Heracliteans. Aristotle gave full development to many of the seeds or guiding thoughts of Heraclitus. In modern times, Hegel and the Marxists have taken off from Heraclitus in another direction. Heisenberg says that if we substitute the word energy for fire in one of the fragments of Heraclitus, we have what modern science is saying.

Nature loves to hide. (Heraclitus, DK 123)

Nature is a cause within of motion or change in that in which it is. What is within is hidden from us whose knowledge begins with the senses. The senses know the outside of things. Hence, *outward* in English is almost a synonym for *sensible*. But the natures of things become known to us through their different motions or changes in the same outward circumstances. If the tree grows and the stone does not grow in the same soil with the same rain and sunlight, we can guess that the nature of the tree is different from the nature of the stone. If the outside is the same, the difference must be due to what is within.

It is not possible to step twice into the same river. (Heraclitus, DK 91)

Heraclitus is famous for insisting on the change in the world around us. Heraclitus is supposed to have said that *all things flow, nothing abides*. He used the flowing river as an image of the world. It is impossible to step twice into the same river for other waters are there when one returns. One of his followers said that it is impossible to step even once into the same river. For as one's foot descends, there are other and other waters. Max Born, who stands at the center of modern physics, wrote a famous book with the title *The Restless Universe*, in which he stated that it is strange that we have a word, *rest*, for what does not exist. This thought produced a kind of crisis in Plato who wanted to understand things. It is impossible to *understand* things that do not stand still. Some of Heraclitus' extreme followers said that you cannot say anything about the world that is true because, before you have finished your statement, the world will have changed. All one can do is point to the moving object.

Whatever one might think about the universality of change in the world, there can be little question that Heraclitus is forcing our attention on what is most striking to our senses. As Shakespeare says, "things in motion sooner catch the eye than what not stirs". And since our knowledge begins with our senses, change or changing things are what we first think about. If we do not understand change, we do not understand changing things. And if we do not understand changing things, we do not understand unchanging things. For the unchanging is known by the negation of the changing. And if we do not know changing or unchanging things, we do not know anything. Hence, if we do not understand change, we do not understand anything. Heraclitus is calling our attention to what we must first understand. And as we shall see, he also helps us to understand change.

> We step and do not step into the same rivers; we are and we are not. (Heraclitus, DK 49a)
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> The sun is new every day. (Heraclitus, DK 6)
>
> Cold things become warm and the warm becomes cold; the wet dries, and the dry becomes wet. (Heraclitus, DK 126)
>
> The same in us is the living and the dead, the awake and the asleep, the young and the old. For the former having changed are the latter, and again, these having changed are the former. (Heraclitus, DK 88)
>
> Hesiod is the teacher of most men. They believe he knew very many things who did not know day and night. For they are one. (Heraclitus, DK 57)
>
> Changing, it rests. (Heraclitus, DK 84a)

Heraclitus emphasizes not only change, but also the opposites in change. Change is between opposites. Indeed we all say that this becomes its opposite. The cold becomes hot and the hot becomes cold. The dry becomes wet and the wet becomes dry. Since *becomes* means *comes to be*, we are saying that one opposite has come to be the other. And if one has come to be the other, then one is the other. Heraclitus thus points out what seems to be a contradiction in change. He tells us that day and night are the same and that the sleeping are awake and that the living are dead. If you say that the cold does not really come to be hot, then the cold remains forever cold. And the same is true of any other opposite. Hence, to deny that one opposite becomes the other is to deny the fact of change. On the other hand, to admit that one opposite really becomes the other is to admit a contradiction. But this is impossible as Parmenides pointed out. It is impossible to both be and not be at the same time. Hence one opposite cannot be the other. Should one follow Heraclitus' insistence on change and admit a contradiction? Or should one follow Parmenides' insistence on the impossibility of a contradiction in things and reject change as an illusion? Heraclitus has more followers, but Zeno tried to defend Parmenides.

Would it be more reasonable to follow Heraclitus or Parmenides? More follow Heraclitus because our knowledge begins in our senses and nothing is more

striking to our senses than change. But if it is reasonable to resolve differences of opinion by going back to a common basis among those disagreeing (as Heraclitus himself so forcefully insisted), we must find the common basis between Heraclitus and Parmenides. They agree that it is necessary to choose between change and the statement about the impossibility of contradiction. But why is this necessary? Because they are incompatible if change involves a real contradiction. The statement *Change exists* would then contradict the statement about the impossibility of a contradiction. Thus, in agreeing that one cannot reconcile change with the statement about contradiction, they are both basing themselves upon the statement about contradiction. Thus Heraclitus would be in the ridiculous position of denying the statement about contradiction because something contradicts it. He would be denying it because he accepts it.

Moreover, it is absurd to try to save change by admitting that one opposite is the other. If hot and cold, day and night, and so on were the same, not only would one deny the statement about contradiction, but also one would also not save change. For if one opposite were the other, there could be no change from one to the other. There could not be, for example, a change from hot to cold if the same was both hot and cold. We could not wake up from out sleep if we were both awake and asleep. If day was night and night, day, there could be no change from day to night or the reverse.

Parmenides is right in saying that the statement about contradiction is most known, even more known and more sure than the statement *change exists*. But since it is also clear from our senses that change exists, it is also absurd to deny that change exists because of what seems to be a contradiction in it. There must be a way of understanding change that does not involve something impossible, a real contradiction. We must understand how change is possible between opposites without one becoming the other and why we say that one becomes the other although it is impossible for one to be the other and hence to come to be the other. Plato in the *Phaedo* and Aristotle more fully in the first book of *Natural Hearing* (usually called the *Physics*) show how this is possible and why we speak as if one opposite becomes the other. (If we do not admit that the cold can become hot and the hard, soft and so on, it seems that we must say that the cold remains cold forever and the hard, hard forever and so on so that no change ever takes place.)

> The hidden harmony is better than the apparent. (Heraclitus, DK 54)

> They do not understand how that which is opposed agrees with itself. There is a harmony of opposites, as in the case of the bow and the lyre. (Heraclitus, DK 51)

Did Heraclitus really think that day and night are the same, the sleeping and the awake, the same and so on? How could he think thus? Or did he speak thus to stimulate our thinking? He says in another fragment that "we should not act and speak like those asleep." Perhaps he wanted to wake us up by calling our attention to the apparent contradictions in things and our thinking.

If harmony is the opposite of contradiction, Heraclitus may be pointing out something very subtle here. Most men do not realize that in what they see, there is an apparent contradiction; and that in what they think about it, there is a contradiction. They are in a state of apparent harmony. But when Heraclitus or Socrates or some other philosopher points out this apparent contradiction in things or this contradiction in their thinking, they are led to confront the contradiction. But perhaps under this contradiction, there is a hidden a real harmony which we will be led to discover after seeing the contradiction and trying to untie or unravel it or break it down. This hidden harmony is better than the apparent harmony in our thoughts which contradict each other. It is also the real harmony in the thing.

And in DK 51, Heraclitus points out that things which seem to be opposed are sometimes working together. Thus, when one shoots an arrow from a bow, one's hands are pulling in opposite directions. But they are not working to cross-purposes. Rather this is what enables the arrow to go faster and surer to its target.

> The opposite [is] useful, and from those differing [comes the] most beautiful harmony and all things come to be by strife. (Heraclitus, DK 8)

The American political, economic and legal systems are all based on the beginning here: *The opposite is useful*. We think it almost a definition of tyranny to have a one-party system. The opposite party is useful to expose the faults of the other and restrain its excesses. In the economy, we think that competition is useful to develop products, maintain their quality, and keep them reasonably priced. We think it is necessary in the courtroom to have one lawyer trying to prove he is guilty and the other, that he is not guilty, so the jury will better be able to judge. We also think debate a help in investigating and judging a

question or problem. And love and character develop where there is some opposition.

And that the most beautiful harmony comes from those differing is seen in the stars against the black sky and the beauty of the sun at sunrise and sunset and a diamond against a black background and the alternation of light and dark in a Rembrandt painting.

But the third thing said here is said more fully in the next two fragments where we may consider it.

> War is the father of all things, the king of all things, and these he has shown gods but those men, these he has made slaves and those free. (Heraclitus, DK 53)
>
> We must know that war is common and strife is justice, and that all things come into being by strife and fate [necessity]. (Heraclitus, DK 80)

The natural philosophers before Heraclitus had spoken mainly of the cause called matter. But DK 53 and 80 introduce another kind of cause, the mover or maker. In calling war the father and king of all things, Heraclitus is speaking of the mover, not the matter of all things. Perhaps the oldest opinion about the matter of all things is that it is mother earth. We find this in the poets. Shakespeare puts this opinion in the mouth of Timon of Athens as he digs in he earth to find roots. And indeed the Latin word for matter, *materia*, would seem to be derived from the word for mother, *mater*. Hence, when Heraclitus calls war the *father*, he is clearly distinguishing another kind of cause from matter. Mother and father also clearly indicate the order in our knowledge for as Homer and Shakespeare love to remind us, we know more who is our mother than our father. Homer In the *Odyssey* (Book One, lines 207-216), Athena (in disguise) asks Telemachos if he is the son of Odysseus:

> Are you, big as you are, the very child of Odysseus?...
>
> Then the thoughtful Telemachos said to her in answer:
> "See, I will accurately answer all that you ask me.
> My mother says indeed I am his. I for my part
> do not know. Nobody really knows his own father.

Father and *king* are also significant when speaking of the mover. There are two kinds of movers, nature and reason, and father is an example of a mover or maker by nature and the king by reason. After Aristotle defines this kind of cause in the second book of *Natural Hearing* (the *Physics*),[9] he also gives an example of a mover by reason and one by nature: the advisor and the father. Later after the corollaries following upon the four kinds of cause, he returns to the four kinds of cause and when he comes to the mover he again exemplifies (in the reverse order), first the seed (a natural cause) and then the doctor (by art which is right reason about making) and last the advisor (by foresight which is right reason about doing). Art is more like nature than foresight. Hence, Aristotle's order.

Heraclitus tells us what war is responsible for. It is responsible for seeing or making the distinction of things into or by opposites. Men and gods are opposites as can be seen especially in those Homeric synonyms for gods and men, the immortals and the mortals. And the slaves and the free are also opposites.

Since war itself is between opposites, we can see that Heraclitus' thought involves that reasonable statement that *opposite effects have opposite causes* which the great Empedocles follows more explicitly.

Not only are gods and men opposites, and slaves and the free, but they are also unequal. The gods are clearly better than men and the free are better than slaves.

Not only are they opposites and unequal, but also one rules the other. The gods rule over men; and the free, over the slaves.

We cannot pursue all the truth which may be in Heraclitus' fragment here. If there is more truth in it than we see which is not surprising, we must see a part before the whole. And if Heraclitus has seen a part of the truth but boasts of having seen the whole (as Empedocles warns us about), it is not good to follow him in this way. We must be humble and teachable enough to learn from Heraclitus what can be learned from him. But we should not blindly follow him. Hegel and Marx and Darwin may have followed the thought of Heraclitus without enough discretion.

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[9] 194b 29-32

> It is wise, listening not to me but to reason, to agree that all things are one. (Heraclitus, DK 50)

In this fragment, Heraclitus indicates that reason is naturally inclined to seek unity. And like Thales and Anaximenes, Heraclitus looks for one matter. But instead of water or air (or mother earth), he guesses that fire is this one matter as can be seen in the following fragment

> All things are exchanged for fire and fire, for all things; just as goods for gold and gold for goods. (Heraclitus, DK 90)

One could ask whether fire is a better guess than air or water. Perhaps it is finer or thinner than they are as seen by its ability to cut and pierce things. But it seems more limited than water and, *a fortiori*, than air, both in quality and quantity. But perhaps he guesses fire because he is also thinking about the need for a mover. Fire is a better mover than either water or air. Water and air are moved by the heat of fire. But what makes fire a good mover, its being hot, makes it a bad guess in one way as the first matter which must be unlimited in qualities. Perhaps this is a sign of the need to separate the matter and the mover. And we shall see in the Empedocles and even more so in Anaxagoras the separation of these two kinds of cause. Fire then represents an advance in thinking in a mixed way. As the first matter, it is in one way superior to water and air (in fineness), but in other ways (as far as being unlimited) it is inferior. But it also represents an advance insofar as it involves a recognition of the need for another kind of cause, the mover. One might also note that the confusion of matter and mover in also found somewhat in modern science when it makes energy the beginning of all. Hence, Heisenberg compares energy in modern science with fire in Heraclitus. But energy is much more abstract and mathematical than the fire of Heraclitus. And in mathematics, there is neither matter nor motion in the strict sense. Energy appears in the universal equations of modern science and, hence, it is more like the premisses of a syllogism than like the fire of Heraclitus. The premisses of a syllogism are also in one way like the matter and in another way like the mover of maker of the conclusion But these aspects are more separated in the premisses of a syllogism. For the middle term brings together the extreme terms, but the former is not a part of the conclusion as they are.

God is many times called *fire* metaphorically in the *Bible*. The likeness is three fold. The light of fire represents the light of God's understanding, the warmth of

the fire the intensity of the divine love, and the moving power of the fire, the divine power which moves the universe. Sometimes fire is used as a metaphor for the Trinity. Here the substance of the fire represents God the Father and the light which proceeds from the Father, the procession of the Word who proceeds by way of understanding and the procession of the warmth, the procession of the Holy Spirit who proceeds by way of love. Sometimes God is compared to fire or the sun in his action upon us. As the fire or sun enlightens the world before warming it, so too God enlightens our reason by faith before he moves our will to love.[10]

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[10] A Theological Footnote on Sacred Scripture's Use of earth, water, air and fire in talking about matter:

Thomas Aquinas, *Summa Theologiae*, Prima Pars, Q. 66, Art. 1, Ad 1:

> Habet (prima materia) tamen similitudinem cum terra, inquantum subsidet formis; et cum aqua, inquantum est apta formari diversis formis.

Thomas Aquinas, *Summa Theologiae*, Prima Pars, Q. 66, Art. 1, Ad 2:

> Aerem autem et ignem non nominat, quia non est ita manifestum rudibus, quibus Moyses loquebatur, huiusmodi esse corpora, sicut manifestum est de terra et aqua.

Thomas Aquinas, *De Potentia,* Q. 4, Art. 1, Ad 2 in first objections:

> per corpora extrema quae posuit, debet intelligere media; et praecipue quia aquam et terram sensui manifestum est corpora esse, aer vero et ignis non ita sunt simplicibus manifesta, quibus etiam instruendis Scriptura tradebatur.
>
> Secundum vero Augustinum [in dial. LXV, quaest. 21], per nomina *terrae* et *aquae*, quae commemorantur ante luci formationem, non intelliguntur elementa sui formis formata, sed ipsa materia informis omni specie carens.
>
> Ideo autem potius per haec duo materiae informitas exprimitur quam per alia elementa, quia sunt propinquiora informitati, utpote plus de materia habentia, et minus de forma;

> Beginning and end are common in the circumference of the circle. (Heraclitus, DK 103)

The world is more like a circle than a straight line if the beginning of things is also their end as we saw above in the words of Anaximander. If the first matter out of which things are made is also that into which they are broken down, the beginning and end of things is the same. As it is said on Ash Wednesday, "Dust thou art and to dust thou shalt return." Modern science also has this thought with the conservation laws. But in the Bible, God is the beginning and the end of all things in another way. He is their beginning as their maker and their end as their purpose. (not their destruction as when things are broken down into the original matter they came to be from).

> The way up and down is one and the same. (Heraclitus, DK 60)

> The death of earth is water coming to be and the death of water is air coming to be and of air, fire and the reverse. The death of fire is coming to be for air, and the death of air is coming to be for water. (Heraclitus, DK 76)

> It is death to souls to become water, and death to water to become earth; water comes to be from earth and the soul from water. (Heraclitus, DK 36)

In the universe, the earth appears to be in the middle and above the earth is water and above the water is air up to the sun and moon and stars which seem to be fire. Heraclitus sees a movement up and down. If a solid melts and becomes water or a liquid and this evaporates into air and air ignites into fire; and then there is the reverse process following the same road in the opposite direction.

> et qui etiam nobis magis sunt nota, et manifestius nobis materiam aliorum ostendunt.

> This universe, which is the same for all, no god or man has made, but it always was, is and will be an everlasting fire, kindled in measures and extinguished in measures. (Heraclitus, DK 30)

Like the other natural philosophers before him, Heraclitus sees the first matter as eternal (although it is hard to see how fire can be both "everlasting" and "extinguished in measures"). They do not see matter as something which was or could have been created.

> The most beautiful universe is a heap piled up at random. (Heraclitus, DK 124)

If a mindless matter is the beginning of all things, it seems that the universe would be a heap piled up at random. The Latin word for universe means *turned into one* and the Greek word, cosmos, has in its meaning order. We have seen before the connection between order and unity and these two names are a supreme sign of this connection. But if reason naturally inclines us, as Heraclitus said above, to think that all things are one, it also leads us to think of the universe as ordered. But this fragment seems to contradict the other part of Heraclitus' thought. Could it be that Heraclitus saw a certain difficulty in those who say that a mindless matter is the beginning of all things?

> One could not find in going the ends of the soul, having traveled every road - so deep is the reason it has. (Heraclitus, DK 45)

Heraclitus sees the soul or its reason as being unlimited. We shall meet this thought again in the great fragment of Anaxagoras on the mind. This is also in harmony with the first parts of the definition of reason by Shakespeare as the *ability for large discourse*

It is fitting to pause at this point because there is a break in the history of natural philosophy after Heraclitus. The philosophers up to this point insist that there is *one* first beginning or matter. Empedocles and those coming after will look for more than one beginning and matter. We shall examine the reasons why they guessed that there is more than one beginning or more than one first matter. But the philosophers up to this point are especially moved by the inclination of reason towards something one, simple, unchanging and unlimited. This same tendency is found in modern physicists from Galileo to Einstein and beyond. It is also important to consider that in theology, four of the five basic attributes of the divine substance are simple, unlimited, unchanging, and one. In

the *Summa Theologiae*, after showing the existence of God as the first cause, Thomas considers the substance of God in five parts: he is simple, perfect, unlimited, unchanging and one. These words, of course, do not mean the same in theology as in the philosophy of nature. But there is a certain distant likeness. But perfect is not in any way an attribute of matter.

EMPEDOCLES

Empedocles was in what is today Sicily.

> Hear first the four roots of all things: bright Zeus, life-giving Hera, and Hades and Nestis who moistens with tears the springs of mortals. (Empedocles, DK 6)
>
> Come now. I will tell you first...from what comes to be visible all the things we now see: the earth and the sea swelling with many waves and the moist lower air and the Titan upper air which binds tight all these things around in a circle. (Empedocles, DK 38)

In these fragments and especially in DK 6, Empedocles guesses that there are *four* first matters: earth, air, fire and water. Empedocles wrote his philosophy in verse and used the names of gods and goddesses as the poets did. But he is not a poet. Because of the prestige of the poets, some who were not poets would take on an outward appearance of the poets. This is similar to how in our day everyone wants to take on the aura of being scientific because of the prestige of the experimental sciences in our day. It is not too hard to see in DK 6 how the four elements are named. Nestis is of course water, bright Zeus, fire; life-giving Hera, air; and Hades, the god of the underworld, earth.

Was it reasonable for Empedocles to guess that there are four first matters? Since this is the first philosopher to guess that there are many first matters, we had better consider this going from the general to the particular. Was it reasonable to guess that there is more than one first matter? And if so, was it reasonable to distinguish these first matters by opposites? And if so, was it reasonable to distinguish them by the opposites of hot and cold, dry and moist,

rather than hard and soft, or black and white or sweet and bitter or some other pair(s) of opposites?

As regards the first question, we would look for this guess to be reasonable, not in the sense that reason is naturally inclined towards it (reason is more naturally inclined to unity), but in the sense that there is a good reason for it. Perhaps the reason can best be stated in the form of an either-or argument eliminating every possibility. If there is one first matter, either it has definite qualities or it does not. There is no other possibility. But there is a difficulty in either alternative. Let us see how this is so.

The first philosophers, especially Thales, Anaximander and Anaximenes, seemed to think that the first matter must be formless without definite qualities. And the reason for this is that, if the one matter out of which all things were made had any definite quality, everything made out of it would have to have that quality. Hence, the contrary or opposite quality would not exist. If water is wet and cold and everything is made out of water, then everything must be wet and cold. But we live in a world of contraries,. Some things are wet and some are dry, some are hot and some are cold. If fire were the matter of all things, all things would be dry and hot. If sugar were the beginning of all things, all things would be sweet. And so on. Hence, there is a tendency in the first philosophers as they move from mother earth to water and then to air to go in the direction of a first matter without any qualities.

But if we say that the one first matter has no qualities to avoid this difficulty, we fall into another difficulty. These later thinkers, as we will see especially in Empedocles and Anaxagoras, had very much in mind that something cannot be gotten out of nothing. Now if the one first matter had *no* qualities, how would you have any qualities in the universe? If water has no color and one adds water to water, you will still have no color. This difficulty is in some way even greater for it eliminates not only contrary qualities from the universe, but all qualities. One could perhaps get new qualities by combining different qualities, but you cannot get quality out of what has no qualities.

Hence, since all possibilities for the first matter have been eliminated, it is reasonable to guess that there is more than one first matter. But how should these be distinguished? Is it reasonable to distinguish them by opposites?

A little reflection will reveal how reasonable this is. When we distinguish human beings, for example, we do so by opposites. We might distinguish human beings

into good and bad, or into young and old, or into male and female. But it would not make sense to divide human beings into young and female. For the same human being could be both young and female. Nor would it make sense to divide them into young and bad for likewise the same person could be both. One needs to divide by what cannot be found in the same person and these are opposites. Hence, we divide by opposites: good and bad, male and female, young and old, healthy and sick, wealthy and poor, and so on. Thus it is most reasonable to divide by opposites.

But the four elements of Empedocles are distinguished by opposites. Fire and water have opposite qualities: fire is hot and dry while water is wet and cold (in the natural environment). If we think of air as something like steam, it is wet and hot while the earth is cold and dry (it is cool when you dig a cellar and if you take the water out of the earth, it is dry as dust). Every element has at least one opposite that separates it from another, if not two. If steam is hot like fire, unlike fire it is wet. If earth is cold like water, unlike water it is dry (by itself without water).

But is it reasonable to distinguish the first matters in particular by the opposites of hot & cold and wet & dry rather than hard and soft, or black and white, or sweet and bitter, etc.?

Since we are looking for the opposites that distinguish the first matters which are first causes, and one pair of opposites is before another and causes of change in the other, we should distinguish the first matters by opposites that are causes rather than effects of changes in other opposites. Hot and cold are causes of the change in colors. The white paper or bread goes toward black under the influence of heat. The black metal becomes red hot and eventually white hot under the effect of heat. The butter goes from soft to hard by cold and from hard to soft by the hot. The taste and smell of food is changed by heat. The sponge goes from hard to soft by the wet. The bread becomes hard as it dries out. Thus hot & cold and wet & dry are causes of changes in other pairs of contraries. Hence, it is reasonable to distinguish the first causes or first matters which are first causes by contraries that are causes rather than effects.

Empedocles was undoubtedly also influenced in guessing these four by the fact that each of them had been guessed individually by someone before him. As he says in another fragment, men see a part and boast of having seen the whole. He may have thought that each of those who guessed one of these four (Hesiod, or some other poet, guessing earth; Thales, water; Anaximenes, air;

and Heraclitus, fire.) had seen a part of the truth and thought it was the whole truth.

The theory that these are the four elements lasted around two thousand years, from Empedocles around 500 B. C. down to and beyond Shakespeare. We can see why it did. It is so strongly rooted in our sense experience. If we have to come to know the first matters by our senses, and by contraries known by the senses, and these are the *first* contraries known by the senses, it seems impossible to go beyond Empedocles' thought. There is no direct or easy way of doing it.

> But the pleasing earth in its broad melting pots received two of the eight parts of glittering Nestis and four of Hephaistos. And these became white bones begotten divinely by the gluing of harmony. (Empedocles, DK 96)

> The earth, anchored in the harbors of Cypris came together with these in about equal measure, with Hephaistos, water and the all-shining upper air either a little more or less than their greater share. And from these came blood and the forms of other flesh. (Empedocles, DK 98)

In these two fragments, we see Empedocles as the father of the chemical thought we still follow. Empedocles now combines the thought of Pythagoras that there are ratios underlying natural things with the thought that there are four elements. These elements combine in different numerical ratios to become various compounds. Empedocles even tries to explain the qualities of these compounds by the particular ratio of elements in them. As we can see in these fragments, the ratio of dry elements to wet elements in greater in bone than in blood and even than in flesh. As far as the fragment DK 96 takes us, there are only two parts of water to four parts of fire (Hephaistos was the god of fire) in bone. But the ratio is more even in blood and flesh, as can be seen in DK 98.

> And I will tell you another thing. There is no birth of any mortal thing, nor end in destructive death, but there is only a mixing and an exchange of what has been mixed; birth, however, is a name given to these by men (Empedocles, DK 8)

> But they, when these have been mixed in a way suited to men or to the race of wild beasts or to bushes or birds of prey, say then that

> this has been born; and when these have been separated, they call it wretched death. They do not name these things rightly, but I also follow the custom. (Empedocles, DK 9)
>
> Fools. For they have no far reaching minds who think that what before was not comes to be or that anything dies and is destroyed utterly in every way. (Empedocles, DK 11)
>
> For it is impossible that anything comes to be from what in no way is, and that what-is should perish completely is not accomplished or heard of. For it will always be there where anyone ever puts it. (Empedocles, DK 12)
>
> For a wise man would not guess such things in his mind as that as long as they live what they call life, so long they are, and experience wretched things and good things; but that before mortals were fastened together and after they are unfastened, they are then nothing. (Empedocles, DK 15)

In these extremely important fragments, we can see that Empedocles (like perhaps all the first philosophers) thinks that the only change in the world is change of place. We will see this also explicitly in the fragments of Anaxagoras. The reason why they thought there was only change of place is that any other inward change is impossible unless something comes into existence that did not exist before or something in existence was to go out of existence. But if something really came into existence, it was nothing before. But one cannot get something out of nothing. Nor can something be broken down into nothing. One cannot cut something into nothing. We cut a thing up into what it is made out of. So if one could cut something up into nothing, it would have been made out of nothing. But this is impossible. Hence nothing really comes into existence or goes out of existence. Therefore, all that can be done is to move around in place things that always were and always will be.

Modern physics in 17th century began with a study of change of place. And there is also an attempt until quantum theory, at least, to explain every apparently different kind of change as merely a disguised form of change of place. Thus the change from cold to hot is not a change of inward quality in the water, but the gross appearance of many small changes of place of tiny particles.

Before one can understand the possibility of inward change in things, it is necessary to understand ability. And this is most difficult. It is especially difficult to understand the ability of matter or rather the ability which is matter. It is not until Aristotle that ability was understood. In modern physics, it is not until quantum theory in the twentieth century that the physicists came to think that there may be some change other than change of place. But according to Heisenberg, quantum theory introduced a quantitative version of the potency or ability which Aristotle had understood. Ability is hard to understand since it cannot be sensed or imagined and in particular the ability which is matter since that hardly is and something is knowable only insofar as it is in act. Ability can only be known through act and it is reason, not the senses or imagination that knows one thing through another.

> Nor does anything of the whole become empty or overfull. (Empedocles, DK 13)

> Nothing of the whole is empty; so whence could anything additional come? (Empedocles, DK 14)

Empedocles says that the empty does not exist while Democritus, as we will see, asserts that only atoms and the empty exist. The reason why Empedocles denied the existence of the empty would seem to be because it is nothing and nothing cannot exist. If there is something there, it is not empty. And nothing cannot be there. Nothing cannot be. That would be a contradiction. Nothing would be something.

> I shall tell something double: at one time it grew from the many to be only one; at another time, on the other hand, it grew apart from the one to be many. There is a double birth of mortals and a double death. The coming together of all things gives birth to and destroys one; the other, on the contrary, nourished as things grow apart, flies in all directions. And in no place do these things stop taking turns forever: at one time, all things come together by love; at another time again, everything is carried away by the hate of strife. Thus, insofar as the one is accustomed to grow from the many and again the many spring from the one breaking up; in this way, they come to be and there is no lasting life for them; but insofar as they never stop taking turns forever, in this way they are always immovable throughout the cycle.

But come listen to my words for truly learning causes the mind to grow. For as I said before, making known the ends of my words. I shall tell about something twofold. For at one time there grew to be only one out of the many; at another time again, the many grew apart from the one - fire and water and earth and the immense height of air and destructive strife apart from these equal in weight everywhere, and love amidst them, equal in length and width. But look at her with your mind, and do not sit with your eyes in amazement. It is she who is recognized to be inborn in the limbs of mortals by whom they think friendly things and achieve concord calling her by the name of Joy or Aphrodite. No mortal man has found her out, going to and fro among them, but you listen to the undeceiving course of my words.

All these are equal and are of the same generation. Each one cares for its own position by means of the character belonging to it. And they hold sway in turn as time revolves. And besides these, nothing comes into being nor ceases to be. If they had been perishing continually, they would be no longer. And what could increase the whole? And where could it come from? And where could it perish, since no place is empty of these things? But only these things are, and running through one another, they become different things at different times and are ever continuously alike." (Empedocles, DK 17)

But come, behold the witness of my former words, if anything was lacking in their form: the sun bright to see and everywhere warm, and all the immortals steeped in heat and bright light, the rain everywhere dark and cold, and from the earth flow forth things solid and based on the soil. In hate they become endued with form and separated; in love, they come together and are desired by each other. From these come forth all the things that were and are and will be, trees and men and women, beasts and birds of prey and fishes nurtured and living in the water, and the long-lived gods highest in honor. These alone are, but running through one another, they become different; so much are they changed through mixing. (Empedocles, DK 21)

As when painters decorate temple-offerings, men will taught about art by wisdom, these, when they have taken many-colored dyes

> with their hands, mix some more and some less in harmony and from these makes forms resembling all things, making trees and men and women, beasts and birds of prey and fish nurtured and living in water and the long-lived gods highest in honor; thus, let not deception overcome your mind that there is any other source of mortal things as appear in unspeakably great numbers; but know these things clearly for you have heard this account from a goddess (the Muse). (Empedocles, DK 23)

In these fragments, Empedocles guesses that the four elements are brought together by love in various combinations and separated by hate. And this in a cycle. This is reasonable. In general, contrary effects have contrary causes. If the butter sometimes becomes hard and then it becomes soft, we would not guess that there is the same cause of these two effects, becoming hard and becoming soft. Since these two effects are contrary, we would guess that there are contrary causes of them. And indeed we think of the hot as the cause of the butter becoming soft and the cold as the cause of the butter becoming hard. Contrary effects (hard and soft) have contrary causes (cold and hot). Hence, when Empedocles sees contrary effects in the four elements (they come together in one and they are separated into many), he reasonably guesses that they have contrary causes. And since love brings men together and hate separates them, there must be two causes proportional to these in the natural world. For like effects have like causes.

Love and hate are similar to the force of attraction and the force of repulsion by which the nineteenth century physicists tried to explain everything.

> On it, many sides of foreheads without necks burst forth, and bare arms wandered, bereft of shoulders, and eyes wandered in need of foreheads. (Empedocles, DK 57)

> But yet, when god was more mixed with god, these things fell together in whatever way everyone happened to meet; and many other things besides them continually came to be. (Empedocles, DK 59)

> Many things were born with two faces and two breasts, offspring of cattle with faces of men, others the reverse, born of men with the heads of oxen, mixed in part from men and in part female by nature, adorned with dark limbs. (Empedocles, DK 61)

These three fragments are part of the explanation of good in the natural world by Empedocles as Aristotle recounts it in the second book of *Natural Hearing* (the *Physics*). The good order we see in the parts of animals and plants needs to be explained. Anaxagoras, as we shall see, attributed this to ordering by a greater mind, but Empedocles attributes it to chance. Since a mindless love keeps on bringing together what hate has separated, these things come together in just any way, usually a non-viable way as in these fragments. But eventually, love happens to bring them together in a good way. These good combinations survive and the far more numerous bad ones perish. Hence, we see good everywhere, not because someone aimed at it, but because the good combination that happened rarely survived, and the countless bad ones perished. This is also the way many modern biologists try to explain the good order in animals and plants.

> By earth, we see earth; by water, water; godlike air by air; destroying fire by fire; love by love; and hate by hate. (Empedocles, DK 109)

Empedocles thinks that knowing is a result of the thing known being in the knower. There is truth in this statement. You have the shape and color of everyone you know in your memory. But how is the thing known in the knower? Is it in there is a material way? If so, David would have helped Goliath to know stones when he propelled one into his head. The wooden chair would know what wood is since it has wood within it. Is there a piece of bone or flesh chiseled out into the shape of every person you know? If we cut open your head, would we find a little statue of everyone you know. Perhaps the thing known is in the knower, not in a material way as Empedocles seems to think, but in an immaterial way.

> Nourished in the sea of blood which goes in two directions, here especially is what men call thought, for the blood around the heart in men is thought. (Empedocles, DK 105)

Like most modern scientists, Empedocles thinks of thought as being something material. But of the main ingredients he knows in the body (bones, flesh, and blood), he attributes thought to the most subtle and the most mobile matter which is blood. We think that thinking and reasoning are a motion and that thought can penetrate things and is therefore finer than other things. In the

same way of thinking, some moderns think of thinking as electrical impulses in the brain, because they are so subtle and so mobile.

ANAXAGORAS

Anaxagoras of Clazomenae was in his prime about 460 B. C. He became the friend of Pericles and thus brings philosophy to Athens. Socrates read Anaxagoras' works as a young man (as he recounts in the *Phaedo*).

> How could hair come from what is not hair, and flesh from what is not flesh? (Anaxagoras, DK 10)

This is one of the premisses by which Anaxagoras arrived at his position on matter, as Aristotle recounts that reasoning in the first book of *Natural Hearing* (the *Physics*). Anaxagoras saw by induction that everything in the natural world eventually comes from everything else. From grass, for example, we can get more cow and from the cow more man and from the man, worms and from the worms, more bird and from the bird, cat, and if the cat dies and pushes up daisies, even flowers. But one cannot get something out of nothing or putting it more particularly "How could hair come from what is not hair, and flesh from what is not flesh?" Hence, everything must be inside of everything.

And since everything comes to be from everything without end, there must be an infinity of pieces of everything inside of everything. But how can a blade of grass have in it an infinity or unlimited multitude of things. Only if they are infinitely small. Hence, there is an infinity of infinitely small pieces of everything inside of everything.

> All things were together, unlimited in number and smallness. For the small was also unlimited. And all things being together, nothing was clear because of smallness. Air and aether, both being unlimited, encompassed all things for these are the greatest in number and size among all things. (Anaxagoras, DK 1)

> These things being so, it is necessary to think that there are many things of all kinds in all compounds and the seeds of all things having all kinds of shapes and colors and flavors. And men too were fitted together, and all other creatures which have soul. And the

> men possessed both inhabited cities and artificial works just like ourselves, and they had sun and moon and the rest, just as we have, and the earth produced for them many and diverse things, of which they collected the most useful, and now use them for their dwellings. This I say concerning separation, that it must have taken place not only with us, but elsewhere.
>
> Before these things were separated, all things were together, and no color was clear. For the mixture of all things prevented this - of the moist and the dry, and of the hot and the cold, and of the bright and the dark, and of much earth in it, and of seeds infinite in multitude and nothing like each other. For none of the others are similar one to the other. These things being so, it is necessary to think that all things exist in the whole together. (Anaxagoras, DK 4)

Here we have Anaxagoras' grand conclusion about what matter is. There is an infinite or unlimited multitude of things unlimited in size or infinitely small. And because they are so small, they cannot be distinguished.

> Nor is there a smallest of the small, but there is always a smaller for what-is cannot cease to be [by being cut]. But there is also something greater than the great, and it is equal to the small in number, but each thing to itself is both great and small. (Anaxagoras, DK 3)

Anaxagoras has here an understanding of the continuous. If we consider a line or a surface or a body just in its one or two or three dimensions, it in divisible forever, as Aristotle shows in the sixth book of *Natural Hearing* (the *Physics*). There is never a smallest or shortest line. A line can always be bisected into two shorter lines. So long as a line is divided into what has length and length can always be divided, a line can be divided forever. The only way a line could cease to be divisible would be if it were divided into two points. But a line cannot be composed of points. If one puts together points to form a line, they must touch. And if points touch (since they have no parts or edge with an interior), they can only coincide. And if they coincide, they have no more length than one point which is no length at all. Hence, a line is never composed of points, but always of smaller lines. Hence, there is no smallest of the small.

But Anaxagoras also says that there is always a greater than the great and this corresponds somehow to the fact there is no smallest of the small. As one

divides the line, the lines become smaller and smaller. But the number of lines becomes greater and greater. If the continuous is divisible forever, then numbers can increase forever. If number arises from the division of the continuous, and the continuous is divisible forever, then number can get larger without end. Hence, as there is no smallest of the small, so likewise there is not greatest of the great.

> And since the parts of the large and the small are equal in number, thus all things must be in everything. Nor is it possible to exist apart from other things, but all things have a share of everything. Since a smallest cannot be, it is not able to be separated, or to come to be by itself, but just as in the beginning, so now they are all together. Many things are in all things, and the things separated into the greater and the smaller are equal in number (Anaxagoras, DK 6)

> The things in the one world are not separated from each other, nor cut off with an axe, neither the warm from the cold, nor the cold from the warm. (Anaxagoras, DK 8)

Because everything is inside of everything, nothing in this material world is really cut off sharply from anything else. Anaxagoras will say later that we call a thing, or name it, by what it has most of.

> So the multitude of things separated cannot be known in word or in deed. (Anaxagoras, DK 7)

Since an infinity of things cannot be known by us, Anaxagoras' position on matter makes it impossible to know matter. If a word had an infinity of letters, we could never know that word or how to spell it.

> These things thus revolve and are separated by force and speed. and the speed makes the force. The speed of these things is not like the speed in any of the things that are now among men, but altogether many times as fast (Anaxagoras, DK 9)

> The thick and the moist and the cold and the dark came together where now is the earth, and the thin and the warm and the dry went outward to the further part of the aether. (Anaxagoras, DK 15)

> From these things as they separated off, the earth was solidified, from the clouds, water was separated, and from the water, earth, and from the earth, stones were solidified by the cold, and these things rush outward more than water. (Anaxagoras, DK 16)

The mixture of all things was in the beginning. But by a circular motion (begun by a greater mind as we shall see in later fragments), these things have begun to be separated. We can still see something of this circular motion in the revolution of the sky around us. The result of this is that the heavy things like the earth are left in the middle and the lighter things like fire and air are driven off to the circumference.

> The Greeks do not rightly take coming into being and perishing. Nothing comes to be or perishes, but is mixed and separated from existing things. And thus they would be right to call coming to be, mixing, and perishing, separating. (Anaxagoras, DK 17)

Like Empedocles, Anaxagoras sees no real coming to be or perishing of things. There is only a change of place, a mixture and a separation of things. As he said above, how could flesh comes from what is not flesh?

> These things having been thus separated, it is necessary to know that all things are neither more nor less; for it is not possible for more than all to be, but all things are forever equal. (Anaxagoras, DK 5)

If nothing comes into being or goes out of being, then things are never more nor less. Since *equal* means neither more nor less (in the same genus), Anaxagoras can also say that *all things are forever equal*. The whole of modern mathematical science is based upon this statement. Insofar as modern mathematical science expresses what it knows about the world in equations, and as the word *equation* indicates, this assumes that all things are forever equal. And in particular, the conservation laws are the most basic in modern science. And they state that what is most basic is never more nor less. This is connected with the thought that change of place in the only kind of change. In an algebraic equation one can combine and separate, but never have more nor less. (For example, $2(x + y) = 2x + 2y$; nothing has be gained or lost, but mixed in one way and separated and mixed in another way)

> And when the mind began to move things, it was separated from everything; and as much as the mind moved, all this was separated. As things were being moved and separated, the revolution made them separate even more (Anaxagoras, DK 13)
>
> In everything there is a part of everything except mind, and there are also other things in which there is mind. (Anaxagoras, DK 11)

In DK 13, Anaxagoras attributes the revolution that separated (to some extent) things to a mind (one greater than ours). Our reason also uses circular motion to separate things, as in a cyclotron, or more simply by getting force in swinging a rock at the end of a string or rope before sending it through your window. But more generally, it is reason or mind that most separates or distinguishes things.

Anaxagoras also attributes to this mind (the greater mind which began the revolution and separation of things) separation from other things and exempts it from the mixture of all things (although the lesser mind, such as our own, may be with other things.). A reason for this will be found in the great fragment about the mind (DK 12) below.

> The mind, which always is, is indeed now where all other things are, in the whole surrounding mass, and in the things joined to it and in the things separated from it. (Anaxagoras, DK 14)

This greater mind is where it operates, but it is not mixed with things.

> Other things have a part of everything, but mind is unlimited and self-ruling and is mixed with nothing, but is itself alone by itself. For if it were not by itself, but were mixed with something other, it would have a share of all things if it were mixed with any; for there is a part of everything in everything, as has been said by me in what goes before. And the things mixed with it would hinder it, so that it would rule over nothing like it does being alone by itself. For it is the thinnest of all things and the purest, and it has all knowledge about everything and has the greatest power. And mind rules all things which have life, both the greater and the lesser. And mind ruled over the whole revolution, so that it began to revolve in the beginning. And first it began to revolve from something small, but now it revolves over a greater distance, and it will revolve over

> more. And mind knows all the things mixed together and those separated off, and those divided. And mind set in order all things that were to be, and all things that were but now are not, and whatever is now and whatever things will be, and this revolution in which the stars and the sun and the moon and the air and the aether go round, having been separated off. This revolution has caused them to be separated. The thick is separated from the thin, and the warm from the cold, and the bright from the dark, and the dry from the moist. There are many parts of many things. Nothing is separated off nor divided entirely the one from the other, except mind. Every mind is similar, both the greater and the lesser. Nothing else is like anything else, but each thing is and was most clearly those things of which it has the most. (Anaxagoras, DK 12)

This is the great fragment on mind. Anaxagoras is without doubt one of the greatest thinkers before Plato and Aristotle - indeed, one of the greatest thinkers of all time. Nowhere is this more true than in his words about the mind, words that called forth the famous remark of Aristotle that Anaxagoras seemed like a sober man among drunk men when he spoke of the mind.

Towards the end of this fragment, Anaxagoras say that every mind is similar, both the greater and the lesser. This does not exclude differences between the minds. What is said of one mind may apply either more or less to another mind. But also something may belong to one mind that does not belong to another mind, or something may belong to one mind in a different way than it does to another mind. This will be seen in our commentary on the fragment. But the likeness of minds is one reason why we may know a greater mind to some extent by our lesser mind.

The first statement Anaxagoras makes about the mind is that it is *unlimited*. We have seen Heraclitus say something similar. What does it mean to say that the mind is unlimited? And is it true?

The words *limited* and *unlimited*, and the word contained in them (*limit*) are first used in quantity. Thus Euclid teaches us that the limits of a line are points, and the limits of a plane are lines, and the limits of a solid or body are surfaces. And a multitude that can be counted or numbered is limited by the last unit. But if a line lacked end-points and went on forever, it would be unlimited. Likewise, for a surface that was not bound by any lines or a body that went on in all

directions and had no surface or surfaces. And a multitude that could not be counted or numbered, like the multitude of all numbers, would be unlimited.

But is the mind unlimited in the way that quantity is unlimited? Are we to think that the mind is a body that goes on endlessly in all directions without any surface or that it is an unlimited multitude? Some have spoken in these ways. Even Heraclitus, we have seen, speaks in this way as if traveling in every direction, one would not come to the end of the soul or its reason. And for those like Hume who have difficulty in distinguishing between the mind and its thinking and thoughts, I suppose one could end up saying the mind is an infinite or unlimited multitude of thoughts.

But Anaxagoras speaks of the greater mind later in this fragment as one, not a multitude. And when he says later that the mind is the *thinnest* of all things, this does not agree or fit with thinking that the mind is a body that goes on in all directions without any surface.

The mind is unlimited, not in its size, but in its ability. We can come to see this by a consideration of our own mind or reason. Mind or reason is a power or an ability we have for some act. And we know every ability or power we have - by its act and ultimately by the object of that act. We must begin then with the object of our mind or reason.

The first object of our mind or reason is the what-it-is of a thing sensed or imagined. For example, we sense a man or imagine a triangle, but our mind tries to understand what a man is and what a triangle is. But what a man is is common to all men and what a triangle is is common to all triangles. Hence, the first object of our mind is something universal. Hence, it has been well said that a thing is singular when sensed or imagined and universal when understood.

But the universal can be said of an unlimited multitude of singulars or particulars. The universal man, for example, can always be said of another man. It is not limited to any number of men. It contains in ability an unlimited multitude of men. Likewise, the universal triangle is not limited to any number of triangles. and the universal number can be said of two, three, four and so on - of that unlimited multitude of numbers. Number contains an infinity of species of number in ability.

Our mind can be said to be unlimited in that its object, the universal, is unlimited. Some greater mind might know an unlimited multitude in a more

distinct way than we do by knowing the universal, but even our mind knows the unlimited in some way by knowing the universal. And since the knower becomes in some way what he knows through his ability to know, our mind must itself be unlimited in some way just as its object is unlimited.

Because our mind knows the universal and can also go from the general to the particular, we can always learn something more. In this way too our mind is also said to be unlimited.

An outward sign that our mind is unlimited is the hand. Anaxagoras said that man is the wisest of the animals because he has a hand. But Aristotle reversed it saying that he has a hand because he is the wisest of the animals.[11] Because man has an unlimited knowing power, his mind or reason, he needs a hand whereby he can make and use countless tools to make endless kinds of things.

That man has words as well as naturally signifying sounds (such as groans, screams etc.) is also a sign of his need to express an unlimited multitude of things.

When we say that the universal is unlimited and, consequently, the mind is unlimited, we should realize that the negative prefix means a negation while in the case of quantity it means a lack or privation. A line is able to have end-points and a surface, lines that bound it and a solid or body, surfaces that limit it. But the universal is not able to be limited to containing in potency only a limited multitude. It must be able to be said at least of an unlimited multitude of individuals. And some universals, like number, for example, can be said of an unlimited multitude of species. To say then that the universal is unlimited is to express a negation, but not a privation or lack. Quantity without limit is like matter without a form, something imperfect. But to call the ability of the mind unlimited is to speak of its perfection.

Many things follow from the mind being infinite or unlimited which we cannot go into now. In the second book of the *Summa Contra Gentiles*, Thomas argues from the infinity of our mind to its not being a body.[12] And in the third book of the same,[13] he reasons that our mind can never be satisfied unless it

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[11] *Parts of Animals*, Bk. IV. 687a 8-23
[12] Chapter 49, arg. 5
[13] Chapter 50, arg. 4

understands God who is simply unlimited. And in the first book,[14] he reasons from the infinity of our mind to the existence of a substance simply or without qualification, infinite which is God.

Further since the Greeks all thought that the unlimited or infinite could not have a beginning, but must be the beginning of things (as Aristotle notes in the third book of the *Natural Hearing* (the *Physics*);[15] if the mind is unlimited, it would seem to be a beginning of things, a cause of things. And we shall see that Anaxagoras does hold to the existence of a greater mind that is responsible for the distinction and separation of things. (Since matter seems to be unlimited and movers like mind and also love seem to be unlimited, there is a connection between the early philosophers thinking mainly of matter and the mover rather than form and end and their thought that the beginning of things is unlimited. Form and end seem to be limits.)

But before I pass to the next part of the fragment, I must warn about the difficulty of this first statement, and its danger. Aristotle pointed out in his book *On Sophistical Refutations* that there are many kinds of sophistical or fallacious arguments and that the most common of them is the fallacy of equivocation due to one word having more than one meaning and the mind being deceived when it is unable to distinguish these meanings. Now in the history of human thought, the word *unlimited* or *infinite* has been most notorious. From Melissus, the early Greek philosopher (whom Aristotle showed was deceived by the equivocation of the word)[16] to Feuerbach and the Marxists who made use of the equivocation to conclude that man's mind is God, this word *infinite* or *unlimited* has been a pitfall for all but the most wary. If you don't limit the senses of the word *unlimited*, you are going to be in unlimited trouble. Feuerbach "syllogized" thus: Man's mind is infinite, the infinite is God. Therefore man's mind is God. My sister-in-law told me of a little boy who heard in mathematics class that "numbers are infinite" and in theology class that "the infinite is God." And he asked, "Are numbers then God?" In these mistakes, there is also the fallacy of simply and in some respect. Only God is simply or without qualification infinite. The creature is only in some qualified way infinite.

One can begin to break open the equivocation of the word *unlimited* in two ways. First the word *limit* which is negated has more than one meaning. In the

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[14] Chapter 43, arg. 7
[15] 203b 4-7
[16] *Natural Hearing* (*Physics*), Bk. One, Chapter 3

fifth book of the *Metaphysics*, Aristotle distinguishes in order the four central senses of the word *limit*. In some of these senses, man's mind is not unlimited. Second, the negative prefix *un* can be understood either as a simple negation or a privation and lack. When God is said to be infinite, the negative prefix is said as a mere negation. Before one could determine this in the case of man's mind, one would first have to determine the sense of *limit* one has in mind. There are many other distinctions to be made, but this is enough see that the understanding of the first statement of Anaxagoras about the mind is extremely difficult and important.

Thomas Aquinas gives us the basic distinction:

> infinitum dicitur dupliciter. Uno modo privative; et sic dicitur infinitum quod natum est habere finem et non habet: tale autem infinitum non invenitur nisi in quantitatibus. Alio modo dicitur infinitum negative, id est quod non habet finem. Infinitum primo modo acceptum Deo convenire non potest, tum quia Deus est absque quantitate, tum quia omnis privatio imperfectione designat, quae longe a Deo est. Infinitum autem dictum negative convenit Deo quantum ad omnia quae in ipso sunt...
>
> quamvis potentia habeat infinitatem ex essentia, tamen ex hoc ipso quod comparatur ad ea quorum est principium, recipit quemdam modum infinitatis quam essentia non habet. Nam in obiectis potentiae, quaedam multitudo invenitur; in actione etiam invenitur quaedam intensio secundum efficiaciam agendi, et sic potest potentiae activae attribui quaedam infinitas secundum conformitatem ad infinitatem quantitatis et continuae et discretae. Discretae quidem secundum quod quantitas potentiae attenditur secundum multa vel pauca obiecta; et haec vocatur quantitas extensiva: continuae vero, secundum quod quantitas potentiae atttenditur in hoc quod remisse vel intense agit; et haec vocatur quantitas intensiva. Prima autem quantitas convenit potentiae respectu obiectorum, secunda vero respectu actionis. Istorum enim duorum activa potentia est principium.][17]

The second statement of Anaxagoras about the mind, that mind is self-ruling, can be understood affirmatively or negatively. It can mean that the mind does

[17] *De Potentia,* Q. 1, Art. 2

indeed rule itself or direct itself (which is true of our own reason after it has acquired logic) or it could mean by self-ruling that it is not ruled by anything else (which would be true of the divine mind). We find many examples in philosophy where a grammatically affirmative phrase is to be understood in a negative sense. Thus philosophers sometimes say that substance exists in itself, meaning not in another, as does accident. Again, we say that some statements are known through themselves; that is, not known through other statements.

We can make a transition from the first statement to the second in two ways corresponding to the two meanings of self-ruling. I will take the statement in an affirmative sense first.

If the object of reason is unlimited, then reason cannot only know other things, but also itself. The first statement is also an example of mind knowing itself for it is the mind that knows that it is in some way infinite. But if the mind can direct the hand or the foot because it knows them, it can also direct itself because it knows itself. The mistakes our mind makes is also a sign that it is in need of direction. Involved in this is also what many have said and what Anaxagoras will say later in the fragment, that mind orders things. The statement that mind is self-ruling suggests the possibility of an art or science whereby the mind directs itself. And the existence of such an art or science, called logic, is also a sign of the truth of Anaxagoras' statement that mind is self-ruling, understood in the affirmative sense about our mind. We do not know that Anaxagoras developed such an art or science. But Socrates may well have been stimulated to begin such an art by this seed planted by Anaxagoras. It is in the same dialogue that Plato has Socrates speak of his youthful enthusiasm for Anaxagoras' words about the mind and of the need for an art about arguments. It belongs to a good student to develop the seed of his master and Aristotle attributes to Socrates the beginning of logic. Socrates is also known for turning the attention of philosophers more to ethics than to the natural world. And the key beginning in ethics, that reason should rule the will and emotions and the rest of man, follows from this statement that reason is self-ruling if we add that reason is *alone* self-ruling (since it is *alone* self-knowing). And one is not fit to rule others if one cannot rule oneself.

If we look before and after this statement of Anaxagoras that mind is self-ruling, we can see a connection between the three parts of philosophy. For it is in looking philosophy (natural philosophy which includes the study if the soul and metaphysics or wisdom) that mind knows itself. And it is because our

reason knows itself, that it can direct itself; and this is studied in logic. And it is because our mind can rule itself that it is the only part of man that is fit to rule the other parts. And this, that reason should rule man, is a beginning of ethics. It is not by chance then that Socrates was impressed with the words of Anaxagoras on mind and that Socrates did so much to begin logic and ethics. Anaxagoras will go on to speak of the mind as ruling other things after he has said that it is self-ruling.

If we understand mind is self-ruling in a negative sense, the transition from the first statement can be made in another way. As Aristotle points out in the section on the infinite in the third book of *Natural Hearing* (the *Physics*), all the early Greeks attributed infinity to the first beginning or cause. If mind then is infinite or unlimited, it is like a beginning or cause. Besides how could the unlimited be ruled by another?

The next statement of Anaxagoras is not the immediate one that the mind rules other things because it is self-ruling, but rather a further conclusion from the mind ruling other things. This further conclusion is that the mind (or the greater mind) is not mixed with other things, that is, material things. For this would prevent its ruling over these other things. Later in the fragment we can see why Anaxagoras or any reasonable man could think that some mind rules over natural things. Anaxagoras will speak of the mind as separating and ordering things and especially living things. We know that the separation and ordering of human things is an effect of our own mind. And like effects should have like causes. Hence, when we see the separation and order of natural things, we naturally think of a greater mind that is responsible for the separation and order that we see in them. But let us return at this point to the reason given by Anaxagoras for saying that the mind, or the greater mind, is not mixed with the things over which it rules. He says that being mixed with them would prevent it from ruling over them. The ruler must be distinct from those he rules.

Anaxagoras' reason can be seen in the army, in government, in a large corporation, in the Church, even in the family and in an individual with his reason and his emotions, and in a man on a chair trying to place that chair.

A brief comparison between Anaxagoras and Einstein is in order here. Like Anaxagoras, Einstein was led to a belief in a mind greater than ours from the order in natural things rather than from religion. But unlike Anaxagoras, he does not say that this mind is separate from things, but rather mixed with them. Here is one place where Einstein speaks of this greater mind:

> Certain it is that a conviction, akin to religious feeling, of the rationality or intelligibility of the world lies behind all scientific work of a higher order. This firm belief...in a superior mind that reveals itself in the world of experience, represents my conception of God. In common parlance, this may be described as "pantheistic"(Spinoza). Denominational traditions I can only consider historically and psychologically; they have no other significance for me.[18]

But while Anaxagoras gives a good reason for saying this greater mind is not mixed with matter, Einstein does not seem to give any reason for thinking it is mixed with things. I suspect that, like so many thinkers in this and the last century, he is lead to this pantheistic notion from democratic customs. Alexis de Tocqueville devotes the seventh chapter of his discussion of the influence of democratic customs on the mind to "What Causes Democratic Nations to Incline to Pantheism". He says there, quoting his conclusion, the following:

> All their habits of thought prepare them to conceive it (pantheism) and predispose them to adopt it. It naturally attracts and fixes their imagination; it fosters their pride while it soothes the indolence of their minds. Among the different systems by whose aid philosophy endeavours to explain the universe I believe pantheism to be one of those most fitted to seduce the human mind in democratic times.[19]

Students of the third book *On the Soul* know that Aristotle refers to Anaxagoras when he reasons that the mind or reason of man must be unmixed with matter in order to know all material things. Anaxagoras is reasoning then that the greater mind is separate from matter and suggests a reason for saying that our mind is not material. This is a great advance over Empedocles who said that "the blood around the heart in men is thought" (DK 105).

But this reason of Anaxagoras seems to contradict the previous statement that the mind is self-ruling. If the ruler must be separated from the ruled, how can the mind rule itself since the mind cannot be separated from itself? Yet the existence of logic is good sign that the mind can rule itself and there are

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[18] "On Scientific Truth" in *Essays in Science*., Philosophical Library, p. 11

[19] Vol. II of *Democracy in America*, Book I, Chapter 7

excellent reasons for saying the ruler must be separated from the ruled. The untying of this contradiction is the discovery of the first step necessary for the mind to rule itself.

The solution of this difficulty can be approached through a larger picture in imitation of what Socrates does in the *Republic*. When a colony is ruled by the mother country, the colony is not said to enjoy self-rule. But when the colony is granted independence, it can begin to enjoy self-rule. But this does not mean that the ruler and the ruled are not distinct. The whole is not governing the whole, but one part, the government, is ruling the other parts. Likewise, when we say that a man rules himself or has self-control, we do not mean that the whole man is ruling the whole man, but that one part, his reason, is ruling the other parts (such as his emotions and hands). But how can this be applied to the mind or reason which does not have parts (especially if it is the thinnest of things as Anaxagoras says)?

Socrates' life gives us the clue to untying the apparent contradiction in the mind or reason ruling itself. Socrates found that all or most men have mixed up what they do not know with what they do know. Before reason can begin to rule itself, it must separate what it knows from what it does not know (but thinks it knows). Reason should be ruled in what it does not know by what it does know.

Separating the known from the unknown is the first step towards the mind ruling itself. The mind must also know how to use the known to investigate and know the unknown. Logic is about how to use the known to investigate the unknown and eventually know it.

The mind ruling itself also requires that reason separate the more known from the less known and the known through itself from the known through another. For the former in each pair should rule over the latter.

Parmenides and Socrates and Aristotle also separated the king of statements, the most known statement, from all the other more known statements and statements known through themselves. The king of statements is the statement about contradiction. Every true statement either affirms or denies, but does not do both. Hence it presupposes the statement about contradiction. Indeed the very meaning of truth and falsity cannot be grasped without the statement about contradiction being known. The statement about contradiction is the king of all statements because it rules over all other statements for their good. Socrates also used the statement about contradiction to help men

separate what they did know from what they did not know which is the first step on the road to reason ruling itself. But since most men have not separated them, the reasons of most men are unable to rule themselves. Most men cannot think for themselves.

We can see then how Socrates and Aristotle help reason to rule itself when they help it to distinguish between the known and the unknown, the more known and the less known, the known through itself and the known through another, and the most known from all the rest.

The next statement of Anaxagoras is that the mind is the thinnest of all things. (Is this said metaphorically of the immaterial mind or properly? We speak of a good mind as sharp or penetrating as if it has by antonomasia what every mind has. As the sharpness or thinness of the knife enable it to divide or separate things, so the mind must be the thinnest of all things if it can not only separate those things which can be separated in things, but also things which can be separated only in the mind. Thus the mind separates the general from the particular and numbers and shapes from sensible matter, and the concave and the convex surface, and the shape of the clay from the clay. Since the object of the mind is the what it is of things, it must be able to penetrate into them. And this is a characteristic of the thin.

The next statement of Anaxagoras, that the mind is the purest of things, seems to be saying nothing more than what was said before - that the mind is unmixed with things. But Anaxagoras could be pointing out that the mind is not only not mixed with other things, but is itself not a mixture of many things. How could it be a mixture of many things if it is the thinnest of all things?

The next statement that the mind has all knowledge about everything would seem to apply to some greater mind than our own. But it is because the mind is the thinnest of all things, that it can penetrate all things, and therefore know all things.

And if Bacon is correct in saying that knowledge is power, then the mind has the greatest power because it has all knowledge about everything. But someone might want more proof than that.

Anaxagoras now proceeds to speak of the mind's distinguishing and ordering and ruling over other things. And he first speaks of the mind in reference to living things in particular: "And the mind rules all things which have life, both the

greater and the lesser." It is significant that he singles out living things in particular, although the greater mind's causality is not limited to them. In living bodies, animals and plants, we see a distinction of parts that are well arranged while non-living bodies, like water or a stone, seem more homogenous. The distinction and order of the parts of artificial things are, of course, an effect of our mind or reason. And since like effects have like causes, it is reasonable to guess that the distinction and order of the parts of animals and plants are also an effect of some mind. Further, we call these parts *organs* which is the Greek words for *tools*. But a tool is clearly for the sake of something. Hence, the parts of living bodies, as well as what they do, seem to be for the sake of something. But it is mind that makes or acts with some end in mind. But it does not appear at first that non-living bodies, such as water or rocks, are for the sake of something or that do what they do for the sake of something. Hence, it is less apparent in them that a mind is their cause. It is thus in living things that action for an end is more manifest and action for an end would seem to require a mind.

Anaxagoras speaks of the greater mind as separating things in general by a circular motion which is also used by our mind in difficult cases from swinging a rock around our head before releasing it to the cyclotron used in splitting particles. It is reasonable that Anaxagoras speaks of the mind as separating things before he speaks of it as setting things in order for distinction or separation is naturally before order - order can be found only in those things that are distinguished. Hence, confusion, which is opposed to distinction, also implies disorder. (Hence, Aristotle speaks of opposition, the basis of distinction, in the *Categories*, before *before and after* which define order. Nothing is before or after itself.)

Everyone who has thought about the mind has seen a connection between the mind and order. Our own mind tries either to find order or to make it. But the greater mind of Anaxagoras does not find order in things since, according to Anaxagoras, all things ere mixed together or confused in the beginning, that is, all material things. But our mind or reason often finds order which is not made by it (either not made by the human reason as is the order in natural things or made by some other human mind, as when we find order in the poem or book of another man). But the greater mind does not find order, but only makes it in things.

One can ask a theological question here. What is the greater mind? What is the mind greater than our own, that Anaxagoras has arrived at by seeing the distinction and order of natural things? Is this the divine mind or the mind of an

angel? This is, of course, a question that Anaxagoras could not ask, but it is of interest to the Christian.

Anaxagoras has arrived at a mind that is separate from matter and that can act upon matter by moving it in place and separating what is in it and ordering it. But this greater mind of Anaxagoras is not responsible for the existence of matter. It does not create matter. Rather it acts upon a matter existing independently of it. Anaxagoras has arrived at an angelic mind, not the divine mind, although much of what he says could be applied in its own way to the divine mind. And although Anaxagoras might call his greater mind the divine mind since it is the highest mind known to him; yet the Christian knows that he has not arrived at a mind that creates matter. Like the mind of the *demiourgos* in the *Timaeus* of Plato, it does not create matter, but only acts upon it.

Anaxagoras and the *Timaeus* suggest that it is easier to arrive at the angelic mind than the divine mind. They also suggest that there is something wrong with the division of thinkers into those who say matter is the beginning of all things, even of mind and those who say that mind or thought is the beginning of all things, things, even of matter.[20] By leaving out the middle position (that both mind and matter are beginnings, existing independently of one another) they make impossible the movement of human reason from the first to the last position.

Although there is a great distance between our mind and the angelic mind, yet our mind is more like the angelic mind than like the divine mind. And the angelic mind is more like the divine mind than is our mind. Since our mind is also the most known to us, the beginning of our consideration of the mind is the consideration of our mind, as in the third book *On the Soul* of Aristotle. The middle of our consideration of mind is the consideration of the angelic mind. And the end of our consideration of mind is to consider the divine mind. We have seen how Anaxagoras, starting with our mind, was more able to ascend to the angelic mind than to the divine mind.

This philosophical order from the more known to us to the less known to us is, of course, the reverse of the order in theology as every student of the *Prima Pars* of the *Summa Theologiae* must know. But the orders of philosophy and theology are contrary for the reasons Thomas gives in the beginning of the

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[20] See, for example, Engels, *Ludwig Feuerbach And the End of Classical German Philosophy*, Moscow Edition of *Marx & Engels On Religion*, 1966, pp. 202-203

second book of the *Summa Contra Gentiles*.[21] In the beginning of the philosophical consideration of the mind, we consider the human mind by itself in its own nature. At the end of the theological consideration of mind, we find that our mind is part of the truth that we are made in the image and likeness of God. But it seems to me that we should first consider mind in the philosophical order.

LEUCIPPUS

> Nothing happens at random; but everything comes to be from reason and by necessity. (Leucippus, DK 2)

Leucippus has here stated what was the absolute principle of modern science in the seventeenth, eighteenth and nineteenth centuries and not challenged in the twentieth century until the Copenhagen Interpretation of quantum theory. We can see that this was the absolute principle of modern science from the way it was adopted by those trying to make biology or even psychology more "scientific" like the physical sciences. Claude Bernard, for example, saw doubt as intrinsic to the experimental method, but he excluded determinism from this doubt. To doubt determinism was to doubt science, he thought. In modern times, this seems to have come in large part from pursuing a mathematical knowledge of the natural world. For in mathematics, there is complete determinism. But in quantum theory in the twentieth century, determinism was doubted, if not rejected. Aristotle also rejected this position from his understanding of the ability of matter or that is matter.

DEMOCRITUS

> Sweet exists by custom, the bitter by custom, the warm by custom, the cold by custom, color by custom; but truly the atoms and the empty. (Democritus, DK 9)

If the sense qualities were real, then the change of these would be a different change from change of place. A mathematical study of the natural world could also make one deny the sense qualities, since there are none in mathematics.

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[21] Caput IV

Democritus is said to have arrived at the atoms by what Einstein would call a thought experiment. If we imagine bodies cut in every way they could be cut, would something uncut remain or nothing? The second is impossible because a thing is made out of what it is cut into. Hence, if a thing could be cut up into nothing, it would be made out of nothing, which is absurd. Hence, something uncut must remain. And this is what the Greek word *atom* means. *tom* means *cut* and *a* is the negative prefix. Hence, the word *atom* means uncut, but in the context of what was left uncut when a body had been cut in every possible way, it would have the sense of uncuttable or unable to be cut.

Democritus is thought to have said that the empty exists because otherwise motion would be impossible. Without the empty, everything would be full and so tightly packed that nothing could move. Since the empty is nothing, Democritus is saying that nothing exists. Like Heraclitus in words, he is admitting a contradiction in the world to save the reality of motion.

Erwin Schrödinger comments on Democritus' thought in comparison to modern science

> Matter is constituted of particles, separated by comparatively large distances; it is embedded in empty space. This notion goes back to Leucippus and Democritus, who lived in Abdera in the fifth century B.C. This conception of particles and empty space (atomoi kai kenon) is retained today (with a modification that is just the thing I want to explain now) - and not only that, there is a complete historical continuity; that is to say, whenever the idea was taken up again it was in full awareness of the fact that one was taking up the concepts of the ancient philosophers.[22]

> Man is a little universe (*Microcosm*) (Democritus, DK 34)

Man seems to have something in common with everything in the universe. With inanimate bodies, he has three dimensions. With the plants, he has growth and reproduction. With the animals, he has sensation. If there are greater minds in the universe, we have mind in common with them.

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[22] : *Science and Humanism,* p. 13

> We have become pupils in the most important things: of the spider for spinning and mending, of the swallow for building, and of the songsters, swan and nightingale, for singing, by way of imitation. (Democritus, DK 154)

Man is the most imitative of the animals and at first we learn by imitation. And since our knowledge begins with our senses we imitate natural things. Most of all, human art imitates nature

Duane H. Berquist