

## Session 1

### Readings for Monday Lecture by Michael Augros

#### **ARISTOTLE, *Physics 1.1***

[1] In every science in which there are principles or causes or elements, understanding and knowing why result from knowing these. For we think we know each thing when we know its first causes and first principles and have reached its elements. It is clear, then, that in natural science as well one must try to determine first what concerns the principles.

And the natural path is to go from the things which are more known and more certain to us toward those which are more certain and more known by nature. For the more known to us, and [the more known] simply, are not the same. And so it is necessary to proceed in this way from the more uncertain by nature but more certain to us toward what is more certain and more known by nature.

But what is first obvious and certain for us is the more confused. Afterwards, by dividing it, the elements and the principles come to be known from it.

Hence, one should proceed from the general to the particulars.

For the whole is more known by sense. And the general is a kind of whole, since the general includes many things as parts.

In a way, the same thing happens with names compared to definitions. For they signify some kind of whole indistinctly—for example, “circle.” But the definition of it divides it into particulars.

And children first call all men father, and all women mother, but afterwards separate each of these.

#### **THALES**

[2] Water is the beginning or source of all things.

#### **PYTHAGORAS**

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

#### **DEMOCRITUS**

[4] Sweet exists by custom, the bitter by custom, the hot by custom, the cold by custom, color by custom; but truly, the atoms and the empty ... We perceive nothing exactly in reality, but only what changes according to the disposition of the body and what flows into it and presses against it. (DK 7; DK 9)

[5] There are two forms of knowledge: the one legitimate and the other bastard. To the bastard belong all these: sight, hearing, smell, taste, and touch. The legitimate is separate from these. When the bastard [kind] is no longer able to see anything smaller, neither to hear, nor to smell, nor to taste, nor to sense by touch, and yet it is necessary to inquire into what is smaller, then the legitimate [kind] which has a tool for knowing what is smaller comes in. (DK 11)

[6] [Democritus makes the mind say] Color is by custom, the sweet is by custom, the bitter is by custom, but in truth, the atoms and the empty. [And he makes the senses reply to the mind] Wretched mind, taking your arguments from us, you try to overthrow us. The overthrow will be your downfall. (DK 125)

[7] We really know nothing. Truth is in the depths. (DK 117)

### ***HERACLITUS***

[8] Nature loves to hide. (DK 123)

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

[10] 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. (DK 30)

[11] The most beautiful universe is a heap piled up at random. (DK 124)

### ***EMPEDOCLES***

[12] 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. (DK 11)

[13] For it is impossible that anything comes to be from what in no way is, and that what should perish completely is not heard of. For it will always be there where anyone puts it. (DK 12)

### ***ANAXAGORAS***

[14] How could hair come from what is not hair, or flesh from what is not flesh? (DK 10)

[16] 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 ... 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. (DK 4)

[17] 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, nor to come to be by itself, but just as in the beginning, so now they are all together. (DK 6)

[18] For there is a part of everything in everything ... Nothing else is like anything else, but each thing is and was most clearly those things of which it has the most. (from DK 12)

[19] The Greeks are not right to accept 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.' (DK 17)

## **LEUCIPPUS**

[20] Nothing happens at random; but everything comes to be for a reason and by necessity. (DK 2)

## **ARISTOTLE (SELECTED PASSAGES)**

[21] As the physicists say, there are two ways [of getting many things from one].

For some, who make 'being' one underlying body (either one of the three [water, air, or fire], or another which is denser than fire but rarer than air), generate other things, making many, by density and rarity. Now these are contraries, and are, more generally, excess and defect. ...

But others segregate the inhering contraries from the one, as Anaximander says, and whoever says there are one and many things, like Empedocles and Anaxagoras. (*Physics* 1.4 187a11-25)

[22] The next thing would be to say whether [the principles] are two or three or more.

There cannot be one, because contraries are not one.

Nor can they be infinite, because being would not be understandable, ... and because [coming to be] can be from a finite [number of principles]. And, as Empedocles says, better from finite ones than from infinite ones. For he thinks he can render an account of all the things which Anaxagoras does from infinite ones. (*Physics* 1.6 189a12-18)

[23] Of things which are, some are by nature and some through other causes. The animals and their parts and the plants and simple bodies, such as earth, fire, air, and water, are by nature. For we say that these and the like are by nature. But all these things seem to differ from things not constituted by nature. For each of these has in itself a principle of motion and of staying still—some with respect to place, some with respect to growth and shrinking, and some with respect to alteration. A bed or a coat, however, and anything else of the kind, insofar as they are subject to these predicates, and to the degree that they are from art, do not have any inborn impulse to change. But insofar as they happen to be rock or earth or a mixture of these, they do have one, and just to that extent, as though nature is some principle and cause of moving and of resting in that to which it [i.e. the moving or resting] belongs first, through itself, and not incidentally.

... Nature, then, is what was said; things which have a principle of this kind 'have a nature.' And all these are substances. For nature is always something underlying and always in something underlying.

... But to try to show that nature exists is ridiculous. For it is evident that there are many such things among beings. To show the evident through what is not evident is to be incapable of distinguishing what is known through itself from what is not known through itself.

(*Physics* 2.1 192b8-193a5)

[24] Of the first philosophers, then, most thought the principles which were of the nature of matter were the only principles of all things. (*Metaphysics* 1.3 983b7)

[25] When these men and the principles of this kind had had their day, as the latter were found inadequate to generate the nature of things, men were again forced by the truth itself, as was said, to inquire into the next kind of cause. For it is not likely either that fire or earth or

any such element should be the reason why things manifest goodness and beauty both in their being and in their coming to be, or that those thinkers should have supposed it was; nor again could it be right to entrust so great a matter to chance and fortune. When one of them said, then, that reason was present—as in animals, so throughout nature—as the cause of order and of all arrangement, he seemed like a sober man in contrast with the random talk of his predecessors. We know that Anaxagoras certainly adopted these views, but Hermodotus of Clazomenae is credited with expressing them earlier. Those who thought thus stated that there is a principle of things which is at the same time the cause of beauty and that sort of cause from which things acquire movement. (*Metaphysics* 1.3 984b9-24)

[26] It is evident, then, even from what we have said before, that all men seem to seek the causes named in the *Physics*, and that we cannot name any beyond these; but they seek these confusedly, and though in a sense they have all been described before, in a sense they have not been described at all. For the earliest philosophy is, on all subjects, like one who lisps, since it is young and in its beginnings. (*Metaphysics* 1.10 993a11-15)

[27] The observed facts show that nature is not a series of episodes, like a bad tragedy. (*Metaphysics* 14.3 1090b20)

[28] In the case of all things which have several parts and in which the totality is not, as it were, a mere heap, but the whole is something besides the parts, there is a cause. (*Metaphysics* 8.6 1045a7-10)

[29] It has been proved and explained elsewhere that no one makes or begets the form, but it is the individual that is made, i.e. the composite of form and matter is what is generated. Whether the substances of destructible things can exist apart is not yet at all clear, except that obviously this is impossible in some cases—in the case of things which cannot exist apart from the individual instances, e.g. house or vase. Perhaps, indeed, neither these nor any of the other things which are not constituted by nature are substances at all; for one might say that the nature in natural things is the only substance to be found in destructible things.

... Therefore substance as composite can be defined and formulated, whether it be perceptible or intelligible; but the primary parts of which this consists cannot be defined, since a defining formula signifies something of something, and one part must be as matter and the other as form.

It is also obvious that, if substances are in a sense numbers, they are so in this sense and not, as some say, as numbers of units. For a definition is a sort of number;

For it is divisible, and into indivisible parts (for definitions are not infinite), and number also is of that sort;

And as, when one of the parts of which a number consists has been taken from or added to the number, it is no longer the same number, but a different one, even if it is the very smallest part that has been taken away or added, so too neither the definition nor what-it-is will remain when anything has been taken away or added;

And the number must be something in virtue of which it is one, and this these thinkers cannot state—what makes it one, if it is one (for either it is not one but a sort of heap, or if it is, we ought to say what it is that makes one out of many); and the definition is one, but similarly they cannot say what makes *it* one. And this is a natural result; for the same reason is

applicable, and substance is one in the sense which we have explained, and not, as some say, by being a sort of unit or point; each is a complete actuality and a certain nature;

And as number does not admit of more and less, neither does form in the sense of substance; but rather if it does, it does so only together with the matter.

Let this, then, suffice for an account of the generation and destruction of things called substances—in what sense it is possible and in what sense impossible—and of the comparison of things to number. (*Metaphysics* 8.3 1043b15-1044a14)