CHAPTER 6
THE INFINITE

Infinity comes up for discussion at this point because it is related to the continuity of motion: A continuum is infinitely divisible. It also affects some basic conditions of motion, such as direction, diversity of elements etc. On the other hand, it is not a central discussion in the philosophy of nature.

Opinions of early philosophers (Book 3, Lesson 6)
- The Pythagoreans: The infinite is in sensible things extending beyond the heavens (= an infinite physical universe)
- Plato: The infinite is in the world of separated ideas.
- Anaxagoras: Since anything can come from anything, everything has infinitely divisible particles of every different thing, such as blood and bone; change is separating the parts out.
- Democritus: Particles are infinite and indivisible, differing only in figure.

Dialectical arguments for the existence of infinitude (Book 3, lesson 7)
- Time, it seems, has always existed.
- Any magnitude is infinitely divisible.
- If the world has always existed and will always exist, there is the generation and corruption of an infinite number of individuals.
- If everything is in a place, and place is an enclosing body, then everything must be bordered by another body *ad infinitum*.
- Number seems to be infinite, since the intellect can always add a new number without limit.

Distinctions concerning infinitude

Some clarification of the notion of infinitude is needed. The first is to distinguish between an infinite continuum and an infinite number of things.

Secondly, as a privative term it can have various meanings, just as "invisible can be said in three ways: 1) what is of its very nature not apt to be seen, for example, a sound which is not in the genus of visible things; 2) what is difficult to see, as what is seen in the dark or form a distance; 3) what is apt to be seen but is not, as something in total darkness. Likewise "infinite" (what cannot be crossed) can mean 1) what is outside the genus of traversable things, such as a point and a form; 2) what can be passed over but its passage is impossible or very difficult for us; in this way we say that the depth of the sea is infinite; 3) what is passable, but not to its end, such as a line without end or any other quantity without limits. This is the proper sense of the word "infinite".

Thirdly, we can talk of an actual infinite size or number, or a potential infinite: what can always be further divided or added to.

Finally, we can distinguish between metaphysical infinitude (such as that of God and his power etc.), abstract mathematical infinitude, and the infinitude of a sensible body. It is only the latter we are concerned with in this course.

Dialectical arguments against infinitude (Book 3, Lesson 8)

- It would seem that no body can be infinite, because it is limited by a surface, which must be finite, since it is expandable.
- It would seem that no infinite multitude, since if it can be numbered, whatever that number is, is finite.

- Every composite sensible body is made up of elements. If one of different kinds of elements is infinite, that would so dominate the whole that it would counteract any influence of the others, and thus destroy the equilibrium of the composite.

- The component elements of a body cannot be infinite, because each one of them would occupy all space, unless they were to interpenetrate, which is impossible.

- If any element were infinite, it would be impossible for the whole universe to be anything but that element, both because it would occupy all space and because it would overpower other elements, as Heraclitus says that at some future time all things will be converted into fire because of the excelling power of fire.

- (Lesson 9) A body of infinite size could either never be in motion or would always be in motion, since it would have no orientation of up or down, centre or edge, or any direction whatsoever, within or without itself.

- Were there to be motion of dissimilar parts (such as water and earth) within such a body, then the infinite whole would not be one body simply, but only a collection of contiguous bodies.

- There can be no infinite body without an infinite number of parts. They could be only of one kind, since that would destroy all competition.

- Every body is in a place, and place means being in some definite reference point to other bodies, up or down, right or left, as determined by gravitation to a place of rest. Such directional reference would be impossible in an infinite body.

The infinite as existing in potency (Book 3, Lesson 10)

The foregoing would indicate that there is no body of infinite size. On the other hand, some kind of infinitude must exist; otherwise time could not go on indefinitely (in an eternal world), and magnitudes would be divisible into parts that are not magnitudes because they are indivisible; likewise number could not increase indefinitely.

Therefore infinitude exists as something in potency, in the sense that every magnitude is always divisible and every number can be added to. But something is found to be in potency in two ways: In one way the whole can be reduced to act, as it is possible for this bronze to be a statue. But the infinite in potency is not meant ever to be entirely in act; rather it will be in act not all at once, but part after part. It is just as we say that today is actual, because one instant of this day is presently actual.

The infinitude of magnitudes and of numbers both consists in a finite actualization of something that can always be further actualized, by division or addition. But the two differ in that a magnitude that is divided or added to remains permanent and is not corrupted, but the finite parts of an infinite time and of successive generation are corrupted, while time and generation go on.

Definition of infinitude (Book 3, Lesson 11)

The **infinite** is *that beyond which there is always something*. This definition excludes a circle, which can be the subject of infinite motion, but the same parts are gone over again and again. It also excludes the definition of early philosophers, "that outside of which there is nothing", which is the definition of a perfect and whole thing. But the infinite, in as much as it is in potency, is like matter with respect to the perfection of magnitude, and like a whole in potency, not a whole in act. It is something imperfect, comparable to matter not having perfection. And, since the whole contains but matter is contained, the infinite as such does not contain but is contained, since whatever amount of the infinite is is in act is always contained by something greater, as it is possible to move to something beyond it.

From this, two other conclusions follow. One is that the infinite, as such, is unknown, because it is like matter without definition or form, and matter is not known except through form. The other conclusion is that the infinite has more the notion of a part than of a whole, since matter is compared to the whole

as a part. And it is not a surprise that the infinite conducts itself as a part, in as much as only a part of it is ever actual.

Explanations (Book 3, Lesson 12)

Infinity in numbers is opposite to that of magnitudes. For the unit is the principle of number, and divisions of numbers cannot go below the unit [since fractions and negative numbers are still computed in terms of a unit], but addition to number can go on without end. Magnitude, however, is always of a finite size, yet its division can go on infinitely [quantitatively, but physically there is a limit, just as there a physical limit to the size of anything].

Infinitude is not found according to the same respect in motion, magnitude and time. Rather, the infinitude of time derives from that of motion, of which it is a measure, and the infinitude of motion derives from that of magnitude, over which motion takes place, as will be explained in Chapter 7.

The infinite is a principle resembling matter, but not in so far as matter lies under a form, but in as much as matter has privation–for the infinite implies the lack of perfection and term. That is why the Philosopher adds that the notion of the infinite consists in privation. The *per se* subject of the privation which constitutes the nature of the infinite is the sensible continuum. This is clear from the fact that the infinite found in numbers is caused from the infinite division of magnitude; and similarly, the infinite in time and motion are caused by magnitude. Hence the first subject of the infinite is the continuum. And since really existing magnitude is not separated from sensible things, it follows that the subject of the infinite is sensible.

Answer to arguments for the existence of an actual infinite (Book 3, Lesson 13)

Here Aristotle answers five arguments advanced for the existence of something actually infinite:

1. If the world has always existed (as is logically possible), then there must be an infinite series of generations. – Such infinitude does not exist in act, but only in potency; each generation exists in act only successively.
2. Every body must be defined by its border with another body, and so on to infinity. – It is one thing to be "touched" and another to be "terminated. All that is required is that a body be terminated by its own surface. It is incidental to the finite that it be touching something else. Thus the outermost bodies of the universe need not be in contact with something further.
3. Space can be imagined as infinite. – We cannot transfer imagination to reality.
4. Time and motion are infinite. – They are not infinite in act, but only the present moment is actual.
5. Magnitude is infinitely divisible. – That points to a potential, not an actual infinite.