It is unwise to discuss so pervasive a cluster of concepts from 17th century natural philosophy as space, matter, extension, and infinity, without referring to Aristotelian and scholastic doctrine. One may argue far into the night over the question of whether Newton’s words reveal a dependance on Burthogge, rather than Herveus Natalis, and whether Descartes at a particular place was using Anselm or John Damascene; but one thing we must surely accept is that the language used was that of the Aristotelian inheritance. Of course it was changed in many ways; but just as when trees are turned into telegraph poles, the grain of the wood remaining visible, so with the language of Aristotle. Since we are particularly concerned with doctrines of the infinite, I will give the merest outline of those parts of Aristotle which seem to me to have a bearing on the 17th century discussion. I will then place rather more emphasis than Ted McGuire is inclined to do on the common element in the thought of Descartes, Locke, and Newton. In the time available I shall not be able to make more than passing reference to scholastic discussions of the same themes, although I am sure that to do so would show that, whether he liked it or not, 17th century man was a lineal descendent of the scholastics. As it happened, Georg Cantor gave the palm to the seventeenth century for its arguments against the actual infinite — arguments which he judged to be more cogent than Aristotle’s, but arguments which he believed he could refute. He commended Locke, Descartes, Spinoza, and Leibniz, while suggesting Hobbes and Berkeley as additional reading.

ARISTOTLE ON THE INFINITE

Aristotle opens his discussion of the infinite with a sentence that could hardly have been bettered as a source of questions for debate:

The science of nature is concerned with spatial magnitudes and motion and time, each of these being necessarily either infinite or finite — even though some things dealt with by the science (e.g. a quality or a point) are not, and should perhaps not be, put necessarily under either heading.¹

After a brief survey of the views of the Pythagoreans, Anaxagoras, the
atomists, and Plato (of whom more anon), Aristotle sets out his own position. He distinguishes (i) the infinite in respect of addition, and (ii) the infinite in respect of division — number being infinite in the first sense, space in the second, and time in both. Even more fundamental, however, is Aristotle's (perfectly natural but also perfectly dangerous) insistence that he takes the word "infinite" in the sense "that which cannot be gone through". It might be of the nature of a thing that it is "incapable of being gone through" (and "this is the sense in which the voice is invisible" — an example repeated at Met. 1066a. 35—); the process of traversing might be possible, but have no termination; the traversal might present difficulties; or it might not be actually begun or ended. There are many echoes of these distinctions in the middle ages. Aquinas and Ockham accepted them, more or less — to name only two influential writers.

Here, then, is one statement amounting to a definition of what Aristotle meant by "infinite". Even though the Physica is a work chiefly devoted to the study of the objects of sense, Aristotle clearly wanted the word to take its primary meaning from mathematics — where the integers provide a paradigm of a sequence which "cannot be gone through". In Metaphysica (K. 10), he shows that he has seen, and studiously left alone, two concepts beloved of later theologians. His infinite is not a "separate, independent thing", nor is it "the indivisible". The first of these would reduce to the second — or so he appears to think — and he is simply "not examining this sort of infinite, but the infinite as untraversable". For Aristotle, the infinite must be "of a certain quantity", and it cannot, in consequence, be indivisible. It is emphatically not The One.

Another concept that Aristotle seems to be carefully avoiding is space, at least in the sense of χώρα. He has much to say about place, and spatial magnitude, and the void, however. Place is the limit of the container, the first (i.e. working outwards) unmoved body that bounds the thing with whose place we are concerned. Everything in the universe is in place, but not the universe itself. Clearly what he says about body has implications for place — and thus (since for Aristotle there can be no infinite body) it is misleading to say, as is occasionally said, that "Aristotle supposed space to be infinite in extent". Again, on the question of the void, it is too simplistic by far to say only that Aristotle "rejected the notion of void". Anticipating a little, in order to put the problem of the void to one side, I should like to draw attention to an extremely interesting analogy between the void and the infinite, as drawn by Aristotle in the Metaphysica. There is, he explains, no actual void (whether separate from bodies, occupied by bodies, or in the