

ON THE NATURE OF MATTER – 2500 YEARS OF DEBATE*

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The ancient Greeks left an extensive record of discussion regarding the nature of matter, and the debate has continued ever since. The ideas of atoms and forces were not especially popular, and they were only fairly recently widely accepted. The discussion now has shifted to the nature of atoms (elementary particles) and the nature of forces (interactions of particles). A reductionist viewpoint has had considerable success, in comparison to alternatives (such as bootstraps), but it is strongly rejected in some circles. But indeed there is now also discussion of emergent phenomena, and of the extent to which detailed properties of individual more "elementary" objects are important in describing the behaviors of large systems of such objects. This Lecture focuses on the earlier (more clearly understood) stages of this debate, combining a general historical review of the stages of the discussion with an examination of the actual writings of protagonists. In these writings we will begin with Epicurus, Newton, Dalton and Maxwell, and we end with Bohr, Rutherford, Schrödinger and Yukawa. We note the shifts in the debate that are occurring in recent times.
