

tion of numbers to the physical problems of the universe, and lost themselves in forced analogies and conjecture regarding the "harmony of the spheres." According to Diogenes Laertius, Pythagoras imagined the universe in the form of a sphere. The earth was in the centre, and bore the axis around which the firmament revolved. The moon, the sun, Mercury, Venus, Mars, Jupiter, and Saturn described circular paths round the earth, and the harmonic motion of these bodies called forth the music of the spheres. The Pythagorean Philolaus improved on this conception. He described the universe as a system comprising ten heavenly bodies—the five planets, the sun, the moon, the earth, and a counter-earth which moved from west to east round a "central-fire." The earth turned one half towards the central-fire, whilst the other, or inhabited half, received light and heat from the sun. Entirely beyond the circles of this system lay the fixed stars and the illimitable ether from which the universe drew its breath.

The principle of constant change taught by Pythagoras and Heraclitus is also a leading feature in the doctrines of Empedocles of Agrigentum (492-432 B.C.). Empedocles supposed that everything had its origin in, and took its components from, four elements (earth, water, air, and fire); that these elements were without beginning and imperishable, but subject to never-ending change. From these elements the world at one time took shape, and it must at some future time be again dispersed. The course of the world's existence resolved itself into a history of recurring periods and phases. As Empedocles did not concern himself about an empirical basis for most of his theories, it is of little avail to enter into his physical and biological speculations. Geology, however, owes one distinct step in advance to this philosopher. Whereas the Pythagoreans had conjectured the presence of a central fire in the universe, Empedocles taught that the earth's centre was composed of molten material. Empedocles formed this opinion on the basis of his actual observation of the volcanic activities of Mount Etna. Tradition says that he met his death by falling into the crater of that volcano.

Leucippus and Democritus of Abdera (*circa* 490 B.C.) were the founders of the school of atomic philosophy, which of all the Greek systems approaches most nearly to the opinions of the present day. According to Democritus, the only realities