

THE ANCIENTS

THE TERM *atom*, derived from the Greek α , a privative, and $\tau\epsilon\mu\epsilon\iota\nu$, to cut, appears first, I am told, in the writings of Greek philosophers of the fifth century BC. Democritus (late fifth century BC) taught that atoms are the smallest parts of matter, though in his view they were not necessarily minute. Empedocles (490–430 BC), physicist, physician, and statesman, held that there are four indestructible and unchangeable elements—fire, air, water and earth—eternally brought into union and eternally parted from each other by two divine forces, love and discord. Nothing new comes or can come into being. The only changes that can occur are those in the juxtaposition of element with element. Epicurus' (341–270 BC) opinion that atoms cannot be divided into smaller parts by physical means, yet that they have structure, was shared by prominent scientists well into the nineteenth century AD. The Roman poet Lucretius (98–55 BC) was an eloquent exponent of the theory that atoms, infinite in number but limited in their varieties, are, along with empty space, the only eternal and immutable entities of which our physical world is made. Today's scientist will not fail to note that in each of these speculative thinkers' considerations one finds elements that sound curiously modern.

The opposite position, that matter is infinitely divisible and continuous, likewise had its early distinguished proponents, notably Anaxagoras (c 500–428 BC) and Aristotle (384–322 BC). The latter's prestige eclipsed the atomists' view until the seventeenth century. Even that late, Rene Descartes (1596–1650) pronounced that there cannot exist any atoms or parts of matter that are of their own nature indivisible; for though God had rendered a particle so small that it was not in the power of any creature to divide it, He could not, however, deprive Himself of the ability to do so.²

THE NINETEENTH CENTURY

REGARDING THE UNDERSTANDING of the basic structure of matter, very little had changed between the days of speculation by the ancient Greek philosophers and the beginning of the nineteenth century, when, in 1808, the British chemist and physicist John Dalton (1766–1844) commenced publication of his *New System of Chemical*