

The origins of the atomic theory of matter

In the 5th century BC, in ancient Greece, **Leucippus** initially and **Democritus** in greater detail, stated that all matter is made up of extremely small particles that move at random in a void. Democritus described these units as indivisible and indestructible, and called them atomos (in Greek 'uncuttable').

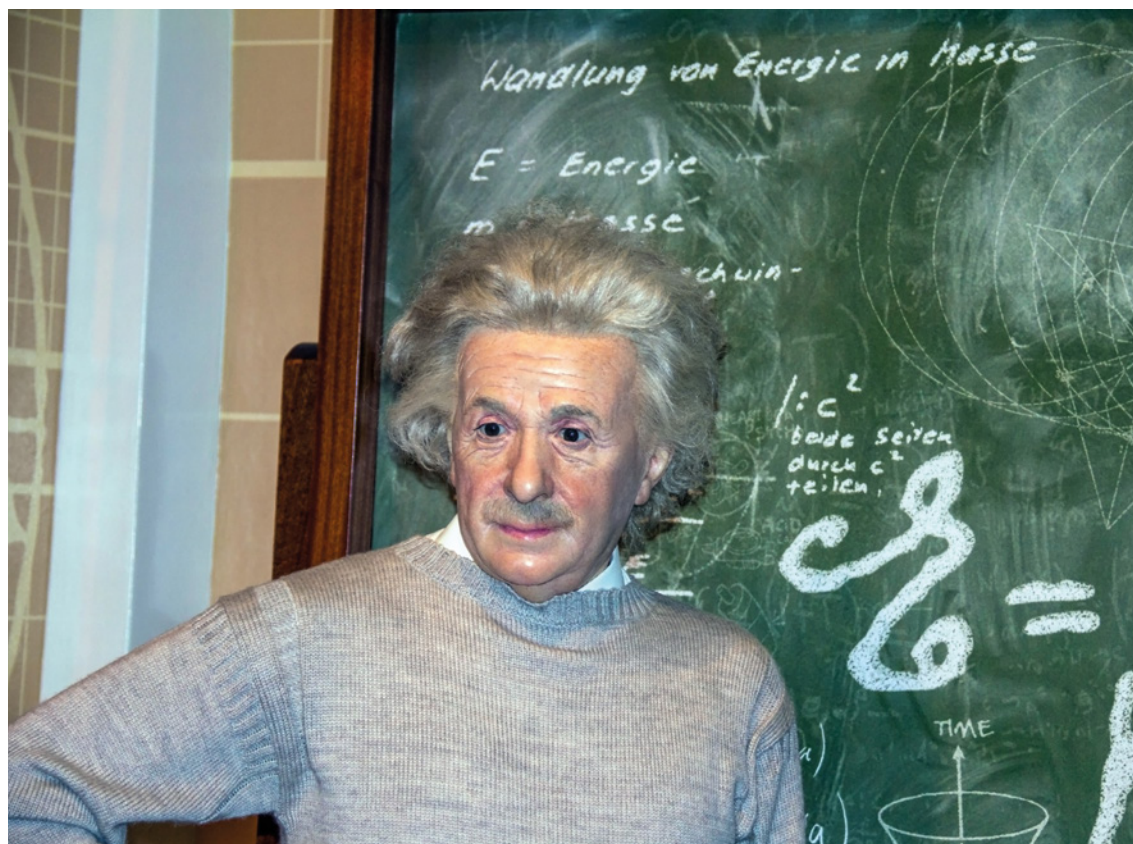
According to his theory the atoms are of different shapes and sizes, and their inevitable collisions form the substances which make up the object of our perception. Democritus left no place for the notion¹ of purpose and the intervention of gods in the workings² of the world. Unsurprisingly these views were fiercely attacked by his contemporaries. In particular Aristotle harshly criticised the atomic theory, and instead stated that all matter comes from only four elements: earth, air, fire and water.

The **atomic theory** was ignored and forgotten for more than two thousand years. However, Democritus' ideas survived both in Aristotle's works (with his arguments against) and in the Roman author Lucretius with his *De Rerum Natura* (*On the Nature of Things*) which was rediscovered in Europe at the start of the Renaissance. The real change happened in the early 1800s, when the **modern atomic theory** is said to have begun with the English scientist John Dalton: with his experiments he showed that matter seems to consist of elementary spherical solid particles. After him different models about atomic structure were developed, through the works of important scientists such as Ernest Rutherford, Niels Bohr, Albert Einstein and Enrico Fermi, up to the current **quantum mechanical theory**.

Today the antique notion of indivisible and indestructible atoms is definitely surpassed³, nonetheless Leucippus and Democritus' theory remains one of the most amazing intellectual achievements of ancient times.

GLOSSARY

- 1 concept
- 2 creation, making
- 3 exceeded



LONDON - JUNE 7, 2015: Albert Einstein, the scientist, at the Madame Tussauds museum in London. Marie Tussaud was born as Marie Grosholtz in 1761

ACTIVITIES

- 1 It seems that Democritus once said: 'I would rather discover a single causal connection that win the throne

of Persia'. Discuss the quotation with your classmates.