65. Our Picture of the Universe

Stephen Hawking

In this text the author has made an attempt to present a brief survey of ideas about the origin, development, and structure and functioning of the universe. At various stages of the development of human civilization, philosophers, theorists and scientists have developed their theories of the universe. Some of the theories are hypothetical, some are rational and some are scientific. None of them are final.

The Greek philosopher Aristotle gave two arguments to prove that the earth was a round sphere rather than a flat plate: the shadow on the moon was always round, the position of the North Star in the sky. Aristotle thought that the earth was stationary and that the sun, the moon, the planets and the stars moved in circular orbits about the earth. This idea was further elaborated by Ptolemy in the second century A.D. (see para 4)

In 1514 Nicholas Copernicus proposed the idea that the sun was stationary in the centre and the earth and the planets moved in circular orbits around the sun. Two astronomers - the German, Johannes Kepler and the Italian, Galileo Galilei supported the theory of Copernicus.

In1687 Sir Isaac Newton postulated a law of universal gravitation. There has not been a single concrete idea about the stars; various ideas are found. Similarly, there are various ideas

about the beginning of the universe. According to early cosmologies and the Jewish/ Christian/Muslim tradition the universe started at a finite time in the past.St. Augustine accepted a date of about 5000 B.C. for the creation of the universe.

Aristotle and most other Greek philosophers believed that the human race and the world around it had existed and would exist forever.

Immanuel Kant analysed the relation between the universe and time in terms of thesis and antithesis. The concept of time has no meaning before the beginning of the universe.

In 1929 Edwin Hubble said that the universe is expanding.

One needs to be clear about scientific theory in order to discuss questions about the universe. A theory is a good theory if it satisfies two requirements: it must accurately describe a large class of observations and it must make definite predictions.

Any physical theory is always provisional; it is only hypothesis. We cannot be sure that another experiment will not bring different result. A theory survives as long as the results agree with it; once the results are different, it needs to be modified.