Āryabhaṭa I

Narahari Achar

Alternate name

Āryabhaṭa the Elder

Born   **(India), 476**

Āryabhaṭa I is the foremost astronomer of the classical age of India. He was born in 476 in Aśmaka, but later lived in Kusumapura, identified as the modern city of Patna. Nothing much is known about his personal life, except that he was a great and revered teacher. He is referred to as Kulapa (or Kulapati, vice chancellor), quite possibly of the Nalanda School. His work *Āryabhaṭīya* is the earliest preserved astronomical text of the scientific period of ancient Indian astronomy that bears the name of an individual.

Āryabhaṭa wrote at least two works on astronomy: (1) *Āryabhaṭīya,* a very well known work and (2) *Āryabhaṭa-siddhānta*, a work known only through references to it in later works. *Āryabhaṭīya* deals with both mathematics and astronomy and is noted for its brevity and conciseness of composition. It contains 121 stanzas in all and is divided into four chapters, each called a pāda. There exist a number of commentaries written in Sanskrit and other regional languages of India, and there also exist a large number of independent astronomical works based on it. Several English translations of *Āryabhaṭīya* have been published, including a critical edition of the text in Sanskrit accompanied by an English translation. Several critically edited commentaries on *Āryabhaṭīya* by earlier Indian astronomers, together with English translations, have also been published. *Āryabhaṭīya* was translated into Arabic around 800 as the *Zīj al-Arjabhar*.

The notable features of Āryabhaṭa's contributions are his acceptance of the possibility of the Earth's rotation, a set of excellent planetary parameters that may be based on his own observations, and a theory of epicycles. It may be noted that his theory of epicycles differs from that of **Ptolemy**. Ptolemy's epicycles remain the same in size from place to place whereas Āryabhaṭa's epicycles vary in size from place to place. Āryabhaṭa's contributions in mathematics include an alphabetical system of numerical notation, and giving the approximate value of Pi (π) as 3.1416. He also provided a table of sine differences, and formulae for sines of angles greater than 90°. He gave solutions to some indeterminate equations.

The other work, *Āryabhaṭa-siddhānta*, is known only through the references to it by other

astronomers such as Varāhamihira and **Brahmagupta**. The astronomical methods and parameters in *Āryabhaṭa-siddhānta* differed somewhat from those in the *Āryabhaṭīya*, notably the reckoning of the day from midnight to midnight. Unfortunately, after Brahmagupta wrote the *Khaṇḍakhādyaka* based on the *Āryabhaṭa-siddhānta*, the original work was lost. Brahmagupta was a severe critic of Āryabhaṭa.

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