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Āryabhaṭa II

A. Vagiswari

Alternate name

Āryabhaṭa the Younger

Flourished (India), circa 950-1100

Āryabhaṭa II, the Hindu astronomer, is best known for his work entitled *Mahāsiddhānta* or *Āryasiddhānta*. It has been established indirectly that he lived and worked around the 10th century. In order not to confuse him with the well-known astronomer **Āryabhaṭa**, who lived in the fifth century, he is known as Āryabhaṭa II or the Younger.

The *Mahāsiddhānta* or *Āryasiddhānta* is an astronomical compendium based on the orthodox tradition of *Smṛtis* (passages from Vedic literature). The treatise written in Sanskrit consists of 18 chapters and 625 *ślokas* (verses). The first 12 chapters deal with mathematical astronomy. Detailed derivations are presented on topics such as the mean and true longitudes of the planets, eclipses of the Sun and the Moon, the projections of eclipses, the lunar crescent, and the heliacal rising and settings of planets, including some calculations on conjunctions of planets as well as planets with stars. The remaining six chapters of the *Mahāsiddhānta* form a separate section called the *Golādhyāya* (On the sphere) where topics on geometry, geography, and algebra are discussed with reference to celestial astronomy. In Chapter 17, for example, shortcuts are provided for determining the mean longitudes of the planets. In Chapter 18, under the section called *Kuṭṭakādhyāya*, Āryabhaṭa II discusses the topic of the solution of indeterminate equations of the first degree. He improves upon earlier methods and suggests a shorter procedure. In his work, Āryabhaṭa II also touches upon several arithmetical operations such as the four fundamental operations, operations with zero, extraction of square and cube roots, the rule of three, and fractions. To represent numbers, he adopts the famous *kaṭapayādi* system of letter numerals. This practice does not conform to the method followed by some of his predecessors, who used the well-known *bhūta samkhyā* system of word numerals. The text does not say anything about the year and place of Āryabhaṭa II's birth, nor does it give any other personal information. In recent years several scholars have tried to establish an approximate period in which he lived based on the cross-references to his work made by other contemporary and younger scholars. D. Pingee believed that Āryabhaṭa II's treatise was written between 950 and 1100, and G. R. Kaye concludes that he lived before **Bīrūnī** (973-circa 1050). However, B. Datta disagrees with the date given by Kaye and

argues that Āryabhaṭa II must have lived much later. Many recent articles on this subject state that his main work was written in 950. **Brahmagupta** (born: 598) leveled several criticisms on Āryabhaṭa I but not on Āryabhaṭa II. S. Dikshita has therefore put forward the argument that places Āryabhaṭa II later than Brahmagupta. Another important point noted is that Āryabhaṭa II tried to remove some discrepancies involving the criticism of Brahmagupta on Āryabhaṭa I. Thus Dikshita assigns him a date around śātavāhana śaka 875, which corresponds to 953. This corroborates the opinions of other historians as well.

Selected References

Bose, D. M., S. N. Sen, and B. V. Subbarayappa (1971). *A Concise History of Science in India*. New Delhi: Indian National Science Academy, p. 167.

Datta, B. (1926). "Two Āryabhaṭas of al-Bīrūnī." *Bulletin of the Calcutta Mathematical Society* 17: 59-74.

Dikshita, S. B. (1896). *Bhāratīya Jyotiṣha*. Poona. (English translation by R. V. Vaidya. 2 pts. New Delhi: Government of India Press, Controller of Publications, 1969, 1981, pp. 95-99.)

Dvivedin, Sudhakar (ed. and comm.) (1910). *Mahāsiddhānta*. Benares Sanskrit Series Vol. 36, nos. 148-150. Benares. (Reprint, New Delhi: Caukamba Sanskrit Prathista, 1995.)

Jha, V. N. (1994). "Indeterminate Analysis in the Context of the Mahāsiddhānta of Āryabhaṭa II." *Indian Journal of History of Science* 29: 565-578.

——— (1997). "Āryabhaṭa II's Method for Finding Cube Root of a Number." *Ganita Bhāratī* 19: 60-68.

Kaye, G. R. (1910). "The Two Āryabhaṭas." *Bibliotheca Mathematica* 10: 289-292.

Pingree, David (1970). "Āryabhaṭa II." In *Dictionary of Scientific Biography*, edited by Charles Coulston Gillispie. Vol. 1, pp. 309-310. New York: Charles Scribner's Sons.

——— *Census of the Exact Sciences in Sanskrit*. Series A. Vol. 1 (1970): 53b-54a; Vol. 2 (1971): 15b-16a; Vol. 4 (1981): 28a; Vol. 5 (1994): 17a. Philadelphia: American Philosophical Society.

——— (1992). "On the Date of the Mahāsiddhānta of the Second Āryabhaṭa." *Ganita Bhāratī* 14: 55-56.