# Biographical Encyclopedia of Astronomers

Adelard of Bath

Born probably in Bath, England, circa 1080

Died circa 1152

Adelard of Bath, Arabic scholar and humanist, was a pioneer in introducing Arabic science into the Latin curriculum of the liberal arts

Originally from Bath in the west of England, Adelard went abroad to study, first to France, and then, probably following in the wake of the First Crusade, to the Principality of Antioch, and to Magna Graecia (southern Italy) and Sicily. After seven years of absence, he returned to England, probably spending most of his time in Bath, but during the troubled years of the Civil War (1135–1154), he may have joined the household of the Duke of Normandy, since he dedicated his last work, *De opere astrolapsus*, to Henry, the duke's son, and the future King Henry II. His works were well known both in northern France (e.g., at Mont Saint-Michel and Chartres) and in England, where several students and followers of his can be identified.

Adelard regarded "philosophy" (the seven liberal arts that were the backbone of education in the secular arts since late antiquity) as a whole, whose parts could not be studied without one another He aimed to demonstrate this in an exhortation to the study of philosophy, which he called *De eodem et diverso* (On the same and the different), and we have notes by him on music, as well as evidence that he wrote a text on rhetoric. Nevertheless, it was to geometry and astronomy that Adelard paid the most attention. He made the first complete translation (from Arabic) of Euclid's Elements, and his adaptation of this version for teaching (the so-called Adelard II Version) became the standard textbook used for teaching geometry for several generations of students. In astronomy, Adelard translated a set of astronomical tables by al-Khwarizmi, along with the rules for their use. The starting point of the tables is 1126, and one of the half-dozen extant manuscripts preserves a copy made in the scriptorium of Worcester Cathedral before 1140. They follow the Indian models of computation that had been used by early generations of astronomers of the Abba-sid Period in Baghdad, but which had been superseded by Ptolemaic models in the Islamic Orient by Adelard's time.

Drawing on his translation of the *Elements* and on the *Tables*, as well as on earlier texts on the instrument, Adelard wrote an original work on the astrolabe: *De opere astrolapsus* (1150). Aside from giving instructions on how to use the astrolabe, this work provides an account of Ptolemaic cosmology Adelard regarded the ultimate aim of astronomy as enabling one "not only to declare the present condition of earthly things, but also their past or future conditions" (De eodem et diverso, p. 69), and to further this aim he translated two Arabic texts on astrology: *The Abbreviation of the Introduction to Astrology* by Abu Ma'shar, and the *Hundred Aphorisms* attributed to Ptolemy, as well as, apparently, comparing the doctrines of Arabic astrology with those of the Latin textbook of *Firmicus Maternus*. Another application of astronomy was magic, to which Adelard contributed by translating a text on the manufacture of talismans by Thabit ibn Qurra.

Through his translations of Euclid's *Elements* and the *Tables* of al-Khwarizmi, Adelard considerably expanded the range of the traditional seven liberal arts. (Both texts were included in the well-known two-volume "Library of the Liberal Arts"—the Heptateuchon) (of Thierry of Chartres of the early 1140s.) However, he also ventured outside this curriculum by introducing (apparently as a result of his "Arabic studies"—*studia Arabica*) the science of

nature, or physics, in the form of a series of questions concerning topics arranged in ascending order, from the seeds within the Earth to the highest heaven (his *Quaestiones naturales*). The physical questions concerning the celestial bodies include "Why is the Moon deprived of light?", "Why do the planets not move with a constant motion?", "Why do the planets move in the opposite direction from the fixed stars?", "Why do stars appear to fall from the sky?", and "Are the celestial bodies animate?"

Adelard's influence on the teaching of geometry in Western Europe was much greater than on that of astronomy, since the Tables of al-Khwarizmi were soon eclipsed by those of Toledo, and other texts on the astrolabe and astrology issuing especially from Toledo proved more popular than his own. However, the popularity of the *Quaestiones naturales* ensured that his discussions of cosmology were well known, and at least one English scholar, Daniel of Morley (flourished 1175), knew the cosmological section of the *De opere astrolapsus*, which he quotes in his own cosmology, the *Philosophia*.

*Charles Burnett*

## Selected References

Adelard of Bath (1998). Conversations with His Nephew: On the Same and the Different, Questions on Natural Science, and On Birds, edited and translated by Charles Burnett, with the collaboration of Italo Ronca, Pedro Mantas España, and Baudouin van den Abeele. Cambridge: Cambridge University Press. (The most up-to-date bibliography and list of works by Adelard is provided in the introduction.)

Burnett, Charles (ed.) (1987). Adelard of Bath: An English Scientist and Arabist of the Early Twelfth Century. London: Warburg Institute. (The essays most relevant to astronomy are: Raymond Mercier, "Astronomical Tables in the Twelfth Century," pp. 87–118; Emmanuel Poulle, "Le Traité de l'astrolabe d'Adélard de Bath," pp. 119–132; Charles Burnett, "Adelard, Ergaphalau and the Science of the Stars," pp. 133–145; and J. D. North, "Some Norman Horoscopes," pp. 147–161.)

Dickey, Bruce G. (1982). "Adelard of Bath: An Examination Based on Heretofore Unexamined Manuscripts." Ph.D. diss., University of Toronto. (Edition of the text on the astrolabe.)

Suter, Heinrich, A. Bjørnbo, and R. O. Besthorn (1914). The astronomical tables of Muhammed ibn Mūsā al-Khwarizmi in the edition by Maslama ibn Ahmed al-Madjrīṭi and the Latin translation by Adelhard of Bath. Copenhagen: Kongelige Danske Videnskabernes Selskab. (Reprinted in Suter, Beiträge zur Geschichte der Mathematik und Astronomie im Islam. Vol. 1, pp. 473-751. Frankfurt am Main, 1986.)