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Sanad ibn 'Alī: Abū al-Ṭayyib Sanad ibn 'Alī al-Yahūdī

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Flourished **Baghdad, (Iraq), 9th century**

Sanad ibn 'Alī was an active mathematician and astronomer in Baghdad during the 9th century and worked as an astrologer for Caliph **Ma'mūn**. Sanad was the son of a Jewish astrologer who worked in Baghdad and counted among his clients people from the 'Abbāsīd court. Sanad converted to Islam responding to the lure exercised by the caliph.

In his youth, Sanad studied by himself several scientific books, among them the *Almagest*. He tried to gain access to the illustrious circle of scholars around '**Abbās ibn Sa'id al-Jawharī** (first half of the 9th century), who regularly met in his house to discuss the latest scholarly and social news. But being merely 20 years old at this time proved to be an obstacle. According to a story told by Aḥmad ibn Yūsuf ibn al-Dāya (died: *circa* 952) on the authority of Abū Kāmil Shujā' ibn Aslam (*circa* 850-*circa* 930), Sanad convinced Jawharī of his superior knowledge of the *Almagest*. As a result, Sanad was not only permitted to stay and take part in the talks of the illustrious circle, but Jawharī, who was a companion of the caliph, also introduced him to Ma'mūn and recommended him as a new, promising servant.

Sanad wrote four mathematical texts on algebra, Indian arithmetic, mental calculation, and Euclidean irrational quantities, the latter being one of the earliest commentaries on Book X of Euclid's *Elements*. He composed a *zīj* (astronomical handbook) and explained a method for determining the circumference of the Earth by observations of the Sun. There is also a report by **Bīrūnī** in his *The Determination of the Coordinates of Cities* (Ali, 1967, pp. 185–186) that Sanad had found the size of the Earth by measuring the dip of the horizon from the summit of a high mountain, a method later used to good effect by Bīrūnī himself; this had been done “in the company of Ma'mūn when he made his campaign against the Byzantines.” His *zīj* is presumably lost, and thus it is unclear how it was related to the famous so called *al-Zīj al-mumtaḥan* (The verified *zīj*) produced by a group of astronomers from Ma'mūn's court.

Sanad built and headed an observatory behind the Bāb Shammāsiyya in Baghdad, collaborating there with a group of observers. According to an account of the Egyptian astronomer **Ibn Yūnus** of the astronomical excursions carried out by the court astronomers in Ma'mūn's lifetime, Sanad had himself written such an account in which he claimed to have participated in one of these expeditions. However, R. Mercier, and following him D. King, doubt the authenticity of both these claims.

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