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Zacut: Abraham ben Samuel Zacut

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Born Salamanca, (Spain), probably 1452

Died Damascus, (Syria), probably 1515

Abraham Zacut was an important Jewish astronomer who contributed to observational astronomy, astronomical tables, and our historical knowledge of astronomy in Spain. Zacut came from a family originally from France; however, the evidence indicates that he was born in Salamanca, and spent his early years there as a pupil of Isaac Aboab, from whom he received the extensive knowledge that would later make him famous. Although professionally a doctor, Zacut's fame came from his works in astronomy.

During his lifetime, Zacut maintained relationships with several notable figures, including Don Juan de Zúñiga, the last Master of the Order of Alcántara (*Maestre de la Orden de Alcántara*), and the Bishop of Salamanca, Gonzalo de Vivero, to whom he dedicated his most famous astronomical work. When Bishop Vivero died in 1480, Zacut lost his protector in Salamanca and moved to the court of Don Juan de Zúñiga for whom he produced the following works: *Tratado breve de las influencias del cielo* (Short treatise on the influence of the heavens) and *De los eclipses del sol y la luna* (On solar and lunar eclipses). We know that Zacut was in Lisbon on 9 June 1493, working for Juan II of Portugal. It is logical to assume that he moved to this city when the Jews were expelled from Spain following the order of the Catholic kings in 1492. Zacut also worked for the brother of King Manuel I, who is said to have sought Zacut's advice for Vasco de Gama's trip around Africa, for which Zacut gave a favorable opinion. When in 1496 King Don Manuel ordered the Jews expelled from Portugal, Zacut fled Portugal and moved to Tunisia, where he was welcomed by a large Jewish colony. He lived in Carthage for several months, giving lessons in subjects for which his expertise was renowned. He eventually moved to the Ottoman lands and died, probably in 1515 although a death date of 1522 has also been suggested.

It is not clear whether or not Zacut taught at the University of Salamanca. However, he was in contact with and influenced some of the professors of astrology there. For example, Juan de Salaya, who was a professor of astrology from 1464 to 1469, translated Zacut's work titled *La Compilación Magna* (*ha-Hibbur ha-gadol* or The magnus compilation) from Hebrew into Spanish. The Latin translation, known as *Almanach Perpetuum*, was made by José Vizinho and first published in Leira in 1496. It became essential for the development of Spanish and Portuguese navigation at the end of the 15th century. The Spanish translation made Zacut famous due to its influence on his contemporaries.

La Compilación Magna was commissioned by Zacut's protector, Gonzalo de Vivero. Indeed the bishop left instructions regarding Zacut in his will as follows:

...to deliver to the Jew Abraham, astrologist, five hundred maravedises and ten measures of grain, and instructed that certain works which were in Romance, written by the mentioned Jew, should all be published in a volume together with his other books in his [*i. e.* the bishop's] church, because it is worthy to understand the tables made by the mentioned Jew.

This volume could be Incunable 176, presently kept at the Salamanca University Library, which contains the Spanish translation of *La Compilación Magna* that was dictated by Zacut to the translator Juan de Salaya.

La Compilación Magna is a collection of astronomical tables with rules (canons) that served several purposes. The tables were calculated for the meridian of Salamanca for the *radix* year 1473. The first part of the collection contains the rules in 19 chapters, a number Zacut uses because he considers it a golden number, following the indication of **Maimonides**. In those chapters he first analyzes the positions of the Moon and the Sun, their movements, circumstances, and eclipses, and then moves to the astrological houses and to the ascendant. He also provides the longitudes and latitudes of the main cities; finally he devotes a chapter to the fixed stars. In the second part of the canons, Zacut explains the circumstances of the other planets (Saturn, Jupiter, Mars, Venus, and Mercury) and devotes one chapter to the Jewish, Christian, Islamic, and Persian calendars. This second part comes to a close with Chapter 19, where he explains the movements of the seven planets and of the lunar node (Dragon Head). After the canons, he gives the tables for the material discussed in these 19 chapters. The structure of the tables is influenced by Jacob Poel (Bonet Bonjorn), an intermediary who connected the work of **Gersonides** and Zacut. More than 50 manuscripts are known of these tables, of which we should particularly note MS Sassoon 823 for its detailed "representation" of its catalog of stars. In addition to mentioning Bonet Bonjorn, whom the translator Salaya refers to by his Hebrew name Jacob Poel (Po 'el meaning "the artisan"), Zacut mentions the Jewish scholar Yehuda ben Aser. There are also references to the tables and calendar of King **Alfonso X**.

The canons of the *Almanach perpetuum* also exist in another Spanish version that was made by the same José Vizinho who made the Latin translation. A copy of this Spanish version is kept in an *incunabulum* of the Colombin Library of Seville's Cathedral. It consists of 23 chapters dealing with the ascendants of the 12 houses, explanations of the positions of the Sun and the Moon and their eclipses, the places and movements of the planets, and a reference in the last chapter to an "animodar."

Zacut's empirical interests are indicated by his observation in 1474 of the Moon covering the star of the spike in Virgo's hand, when this constellation was approximately in the middle of the sky. Other astronomical observations attributed to him are an occultation of Venus by the Moon in July 1476, and a total solar eclipse in June 1478.

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