Biographical Encyclopedia of Astronomers

Jacob ben Makhir ibn Tibbon

Born possibly Marseilles, France, circa 1236

Died circa 1305

Jacob ben Makhir was a translator of Arabic scientific works into Hebrew and also wrote a few original astronomical works. Known also as Don Profeit Tibbon, he was a Jewish scholar who lived in Montpellier and other Provençal towns. He wrote exclusively in Hebrew; his extensive output included both translations into Hebrew and original compositions. Since he was known under two distinct Hebrew names, modern scholars had treated these as representing two separate persons, until Salomon Munk (*Mélanges*, p. 489, n. 3) showed they were one and the same. The Hebrew word *makîr* means "gain" or "profit," hence the Provençal form Profeit (and many variants) and the Latin Profatius

Jacob ben Makhir's translations were almost entirely of mathematical and astronomical works, both original Arabic tracts and Arabic versions of Greek works. These included Euclid's *Elements* and *Data*; Autolycus' *Moving Sphere*; Menelaus' *Sphere*; Qustā ibn Lūqā's *On the Spherical Astrolabe* (al-Kura al-falakiyya); Ibn al-Haytham's *On the Configuration of the World* (Fi hay'at al-'ālam); Ibn al-Ṣaffar's i (al-'Amal bi-'l-asturlāb); Jābir ibn Aflah's *Correction of the Almagest* (Islah al-Majisṭi); and Zarqālī's *On the al-safiha* (A development of the astrolabe plate).

Jacob ben Makhir's two original works were on the quadrant and an "almanach." His *Explanation of the Instrument Called the Quadrant of Israel* was widely translated into Latin, where it was referred to as *Quadrans Novus*; it is found in the manuscripts with various incipits (such *as quoniam scientie astronomie non completur absque instrumentis*). The work had a wide influence from the last decade of the 13th century.

The *Almanach* was known simply in Hebrew as *luhot*, a term used for all astronomical tables. This is based directly, as the author says, on a quite similar work by Zarqālī (*circa* 1075), and calculated according to the Toledan Tables, but with a change of meridian from Toledo to Montpellier. This is not a set of tables like those found in a typical Arabic handbook (*zīj*). Rather, the true tropical positions of the Sun and the planets are given in cycles such that only small corrections are required for cycles beyond the original one. In the case of the Moon, some calculations are necessary, but much fewer than when working directly from the tables of a *zīj*. The tabulation of the Sun is given in a 4-year cycle, beginning on March 1, 1301, while the five planets (Saturn to Mercury) begin on March 10, 1300 (outer planets), March 5, 1301 (Venus), and March 5, 1300 (Mercury); the periods in years of the tabulations are approximately 60, 84, 80, 9, and 47 years, respectively. The tabulation of the corrected equation of the Moon is given daily from March 22, 1300, for 23 years. In these tables, the amount of precession, represented by the "equation of the eighth sphere," has been added to the sidereal longitudes derived from the *Toledan Tables* to give tropical longitudes. A table of the equation

of the eighth sphere is found in manuscripts of the *Almanach*, but it is not included in the edition by Boffito d'Eril. Both this work and the *Almanach of Zarqali* could be usefully examined in greater depth.

Jacob ben Makhir was influential long after his time, perhaps surprisingly so given his extant work. For example, Nicholas Copernicus (*De Revolutionibus*, III, 2 and 6) attributes to him the value 23° 32′ of the obliquity for the year 1290, although this has not been traced to any surviving text.

Finally, we should mention that Jacob ben Makhir also produced Hebrew versions of the works of various philosophers, including Ibn Rushd.

Raymond Mercier

Alternate names

Don Profeit Tibbon

Profatius

Selected References

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