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# Jacob ben Makhir ibn Tibbon

Raymond Mercier

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**Alternate names**

Don Profeit Tibbon

Profatius

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*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 *mekîr* 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*; **Qusṭā ibn Lūqā**'s *On the Spherical Astrolabe* (al-Kura al-falakiyya); **Ibn al-Haytham**'s *On the Configuration of the World* (Fī hay'at al-ʿālam); **Ibn al-Ṣaffār**'s *On Using the Astrolabe* (al-ʿAmal bi-'l-asṭurlāb); **Jābir ibn Aflaḥ**'s Correction of the *Almagest* (Iṣlāḥ *al-Majisṭi*); and **Zarqālī**'s, *On the al-ṣafīḥa* (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 translated widely 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 *luḥot*, 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 to be applied to cycles beyond the original one. In the case of the Moon, some calculations are required, but much less than when working directly from the tables of a *zīj*. The tabulation of the Sun is given in a 4-year cycle, beginning 1 March 1301, while the five planets (Saturn to Mercury) begin on 10 March 1300 (outer planets), 5 March 1301 (Venus), and 5 March 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 22 March 1300 for 23 years. In these tables the amount of precession, which is represented by the "equation of the eighth sphere," has been added to the sidereal longitudes derived from the *Toledan Tables*, so as 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 Zarqālī could be usefully examined in greater depth.

Jacob ben Makhir was influential long after his time, perhaps surprising in view of 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**.

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