Chapter 12

Astronomical Activity in Portugal in the Fourteenth Century*

Madrid, Biblioteca Nacional, ms 3349 (formerly at the Convento de Santo Tomás de Ávila, Spain), is a codex written in the first half of the fourteenth century, for the most part in Portuguese, containing a miscellaneous series of tables and short texts (ff. 1r–12v) and a copy of the Almanac of 1307 (ff. 13r–55r). Back in 1932, the eminent scholar, Jaime Cortesão, called the manuscript “Almanaques Astronómicos de Madrid”, but, as we shall see, this characterization does not render justice to it, given its content as well as the fact that it has nothing to do with Madrid, except for being preserved in a library there at the present time. It is the only known evidence for astronomical activity in Portugal during the fourteenth century or, in Fontoura’s words, “é o único documento escrito, até hoje conhecido, que evidencia o elevado grau da cultura astronómica portuguesa dos princípios do século XIV”. In 1949 Millás briefly described the contents of this manuscript. One section of it has received closer attention, namely, that containing the Almanac of 1307, which is also extant in Latin, Catalan, Castilian, and Hebrew, in addition to this Portuguese version. The folios preceding this almanac include a mixture of tables and short texts, the contents of which concern calendaric, astronomical, and astrological matters, that reflect elementary familiarity with these medieval disciplines. It is perhaps noteworthy that nothing is said about the motions of the planets.

3 J.M. Millás, “Almanaques catalanes y portugueses del siglo XIV, de origen árabe”, in J.M. Millás, Estudios sobre historia de la ciencia española (Barcelona, 1949), 387–397. According to Millás, the material preceding the almanac belongs to at least two separate sets: ff. 1–2 and 9–10 on the one hand, and ff. 3r–8 and 11–12 on the other. But neither the contents nor the handwriting supports Millás’s suggestion.
The first page (f. 1r) was initially left blank, but a later hand has drawn a table with no headings for the columns, assigning various integers to the 12 signs of the zodiac. This table, entitled “Table for fortune tellers” (*Tavoa diçentadores na boa ventura*), most probably for astrological purposes, has the date 12 September 1410 in the same hand.

On f. 1v there is a table, headed “Table for the reckoning of the days in a Roman year [arranged according to] the months of the year” (*Tavoa do conto dos dias do ano romano nos meses do ano*), in which each day of the year is numbered consecutively such that the first entry is 1 for March 1, the second entry is 2 for March 2, and so on. The table ends abruptly with the final day of the sixth month: the last entry is 184 for August 31. The rest of the table is not found in this manuscript. Then follows a “Table for the solar altitude for those places where the latitude is 40°” (*Tavoa da altura do sol nos logares que sa ladeza he 40 grados*) (f. 2v). For various days of each month (day 1 and days 3, 6, 9, ..., 30) we are given, in integer degrees, the meridian altitude of the Sun. The maximum altitude in the table, 75°, occurs on June 9–15, and the minimum, 27°, on December 6–12. From these entries we can deduce the latitude, φ, for which the table is valid, by means of the equation:

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\varphi = 90 - \frac{h_{\text{max}} + h_{\text{min}}}{2}.
\]

The result is \( \varphi = 39° \). To determine the place, we may look in the table for geographical coordinates on f. 11r, where we find the following latitudes of Portuguese cities: Lisbon, 40°0°; Santarem, 39°30°; Coimbra, both 39°40° and 39°50°.

On f. 2v the heading of the table, “Table of the *samt* in Burgos” (*Tavoa dos çomutes en Burgos*), mentions the name of a Spanish city, far from Portugal. Its latitude, 42°18°, is attested by several fourteenth- and fifteenth-century authors, including Juan Gil (see Madrid, BN, MS 23078, f. 148b) and Abraham Zacut, but it is quite different from the value embedded in the preceding table. Note that the term, *çomutes*, in the heading of the table is probably a rendering of the Arabic *sumūt*, the plural of *samt* (direction, azimuth, zenith). There are very few known examples of this table and they are associated with solar eclipses. For each degree of each zodiacal sign we are given a value in degrees and minutes;

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