Hebrew Calendar

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The Hebrew calendar is of the lunisolar type: months begin with the new moon and years are kept in tune with the seasons by the intercalation of a leap month every two or three years. The calendar day begins at sunset. In ancient and classical times, the month began with the observation by at least two witnesses of the crescent moon; leap months were added by the Jerusalem authorities as the need arose. In the Bible, months are usually identified by number, beginning in spring; the Hebrew names for the months were replaced by the present names of Babylonian origin in antiquity. The fixed calendar, attributed to the fourth-century patriarch, Hillel II, is based on a mean month of 29d 12h 44m 3.33s and on the 19-year Metonic cycle comprising 7 leap years, each containing 13 months. The average year length is 365.2468 days, which is slightly longer than the mean tropical year; on account of the accumulated discrepancy, Passover often occurs nowadays more than a month after the vernal equinox. The fixed calendar also incorporates several rules for delaying the onset of the year, as a consequence of which common years have 353-355 days, leap years have 383-385 days, and Passover never begins on Monday, Wednesday, or Friday. The details of the fixed calendar were only finalized in the tenth century; the evolution of the calendar between the fourth and tenth centuries is still a matter of dispute. In contrast to the Hebrew lunisolar calendar, the Gregorian calendar--designed at the end of the sixteenth century and used today throughout the world--is purely solar in nature. There were solar-based sectarian Jewish calendars in classical times, and there remain certain prayers that depend on the Julian (old-style) solar calendar. The Karaite lunisolar calendar is still observation-based.

Chapters 6-10 of MAIMONIDES, composed in 1166, are a primary source on the fixed calendar as used to this day, and resemble an earlier work on the calendar by Savasorda. The chapters preceding that section describe the procedures by which the Jerusalem court managed the observational calendar. The remaining chapters are astronomical in nature, based mainly on the work of the Moslem astronomer, al-Battani. They provide arithmetical methods of determining the moment of first visibility of the lunar crescent (and its orientation), which would help enable a court to determine the plausibility of reported observations. The introduction and notes by Obermann, notes by Gandz, astronomical commentary by Neugebauer, as well as the notes by Wiesenberg in volume XIV of the Yale series, are indispensable.

BURNABY, containing over 300 pages on the Hebrew calendar, has the most detailed description in English, but is long out of print. It includes historical details, methods of computation, an explanation of the 1802 formula for Rosh Hashanah by Gauss, various examples of erroneous dates in the literature, and a long list of festivals and other days of current or past significance.

FELDMAN writes on all aspects of mathematics and astronomy in the Talmud and subsequent rabbinic literature and includes several chapters explaining Maimonides' method of calculating visibility. Chapter XVII, on the fixed calendar, explains in detail the calculation of the time of mean conjunction, the four delays that may postpone Rosh Hashanah, and the resultant fourteen types of years. That chapter gives arithmetic rules for converting from a Hebrew date to the corresponding Gregorian date, and includes a discussion of various modern attempts to reform the calendar.

DERSHOWITZ and REINGOLD give precise algorithmic treatments of most of the major calendars of the world. Chapter 9 describes easily-programmed, simplified rules for the Hebrew calendar, for most of the Jewish and Israeli holidays, and for birthdays and yahrzeits. It includes a brief history of the fixed calendar, as well as a description of the controversy between tenth-century Babylonian and Palestinian geonim regarding the exact parameters of the delays.

SPIER is a standard work for converting dates between the Gregorian and Hebrew calendars, with tables for the twentieth and twenty-first centuries (in the latest editions). Sabbath Torah readings and holidays are noted. The book includes detailed rules (corrected in the third edition) for determining Hebrew birthdays and for yahrzeit according to prevalent Ashkenazic practice.

LEVI is most useful for determining times of day for ritual purposes, such as dawn and dusk, with tables for each degree of latitude and for 73 cities with large Jewish populations. Unlike most published tables, which use mean values for dawn regardless of season or location, the times in this work are derived from astronomical calculations of the depression angle of the sun. The English section of the book also includes a short chapter on the calendar and tables that allow conversion between Gregorian and Hebrew dates. It should be noted that there remain disputes where to place the dateline for the purposes of religious observance and what times to use in polar regions. In practice, the international dateline is used and the times of prayer and observance at nearby synagogues below the Arctic Circle are followed.

The index volume of the Judaica, edited by ROTH, contains a convenient calendar for the years 1920 through 2020, arranged by Gregorian year (and based on M. Greenfield's 150 year Calendar, 1963). The corresponding Hebrew date is given for each Gregorian day. Dates of all holidays and fasts (and an indication of postponement, if any), as well as the Sabbath readings for the Diaspora, are included. These accessible tables are ideal for determining the date for a bar-mitzvah or bat-mitzvah, as follows: Look up the Hebrew date corresponding to the actual day of birth of the child; if the child was born after sunset, take the following day instead. The same Hebrew date 13 years later is the day of the bar-mitzvah. For girls in Conservative and Orthodox practice, the bat-mitzvah is 12 years later. The event is usually celebrated on the first Saturday on or after that day, when the child is called to the Torah, but can be postponed for convenience. Occasionally, the event may be celebrated before Saturday (but not before the actual Hebrew birthday)--on Monday or Thursday, or on a festival day, when there is also a synagogue Torah reading. Complications arise when the child was born in the Hebrew month of Adar, since there is an intercalary Adar every two or three years. If the child was born in Adar of a common year, or in Adar II of a leap year, then the bar-mitzvah is in Adar in a common year, but in Adar II in a leap year. If the child was born in Adar I of a leap year, then the bar-mitzvah is in Adar I of a leap year and in Adar in a common year. If the child was born on the thirtieth day of Heshvan, Kislev, or Adar I, then it may happen that in the year of the bar-mitzvah the month has only twenty-nine days, in which case the first day of the following month is used instead.

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