Saturday, 1 March 2008 (after 29 February 2008, a leap year)
24 Adar (I) 5768 (leap month in leap year)
Dr Maurice M. Mizrahi
Congregation Adat Reyim
Lunch and Learn

The Jewish Calendar

-Final form by Hillel II in 358 CE (last decision of last Sanhedrin)
-So accurate it never had to be adjusted
    -Unlike Julian (Roman) or Gregorian (Christian, in use today)
        -Julian: Year = 365 days, but every 4 years a day is added to the year.
        -Gregorian: Same, but do not add a day when year is divisible by 100 but not by 400.

-Lunisolar (uses both sun AND moon)
-Torah constraints: Certain festivals must take place during certain seasons, or must not fall on certain days of the week
    -Yom Kippur must not precede or follow Shabbat (would cause practical difficulties)
    -Hoshana Rabba must not be on Shabbat (so as not to lose certain ceremonies)
-Before it, testimony of witnesses determined new moon ("molad"), and practice of "second day" was instituted.
-After it, it became purely mathematical, not based on observation.

-Method
    -Average lunar month = 29 days + 12.734 hours = 29.53058333... days
    -So 12 months ~ 12x29.5306.. days ~ 354.37 days
    -So need to provide for ~11 more days/year to preserve seasons
    -So add a 13th month of 30 days (Adar I) 7 times every 19 years:
        -Years 3,6,8,11,14,17,19; these are leap ("pregnant") years
        -Adar II is the "regular" Adar (29 days); so Purim is in Adar II
        -Not enough: Need more adjustments, see below

-Regular months alternate between 29 and 30 days
    -Deficient (chaser, 29 days) -- iyyar, tammuz, elul, cheshvan, tevet, adar
    -Full (male, 30 days) -- nisan, sivan, av, tishri, kislev, shevat

-Adjust by changing length of Kislev and Cheshvan
    -Years alternate between
        -Deficient (chaser) (Kislev and Cheshvan have 29 days)
        -Regular (kesidrah) (Kislev has 30 days and Cheshvan has 29 days) [or vice-versa?]
        -Full (shlemah) (Kislev and Cheshvan have 30 days)

-Due to these small adjustments, a full cycle repeats exactly, not every 19 years, but only every 689,472 years.

-In full months, both the 30th day and the 1st day of the next month are Rosh Hodesh, because new moon straddles both days.

-Now, Rosh Hashana is the only holiday to fall on 1st of a month. Before calendar, to be sure of time and so as not to rely on last-minute witnesses for such a major holiday, Jews always celebrated for 2 days, even in Israel.
    -Means also can hear shofar even if one of the two days is Shabbat.

-Day ends when 3 stars are seen (Rambam)
-Year 1 is ~1 year BEFORE creation
    -First day of Jewish calendar is 1 Tishri 1 (Monday 7 October 3761 BCE)
    -Creation is 25 Elul 1; some say in Nisan
-Jews say BCE and CE (common era) to designate secular years, not BC and AD
-Jewish unit of time is the helek (3 1/3 seconds)
    -18 halakim/minute

-Calendar would be perfect if nature did not change
    -Variations in the tides causes Earth's rotation rate to slow
    -So average lunar month 0.6 seconds longer than at time of Hillel II
    -So 10,000 years from now Pesach will drift dangerously close to summertime
        -New algorithm will be needed

-Read *The Jewish Calendar: A Closer Look* at:
http://www.jewfaq.org/calendr2.htm
for detailed mathematical algorithm to program a Jewish calendar.