

Excerpts from the calendar passage in Babylonian Talmud, *Rosh Hashanah* 20b:

- I. Samuel said: I am able to arrange it (viz. the calendar) for the entire Diaspora.

- II. Abba, the father of Rabbi Simlai, said to Samuel, 'Does the master (= Samuel) know that which we learnt in the 'sōd¹ of the (Jewish) calendar (= 'ibbūr)': '... if it (viz. the moon) was 'born'² before mid[day] or after mid[day]?' 'No', said he to him; whereupon he said, 'Since the master does not know this, there are other matters that the master does not know'.

- III. When Rabbi Zera went up (to the Land of Israel), he sent word back to them (in Babylon), 'There must be a night and a day of the new [moon]'.

- IV. This is the meaning of the statement of Abba, father of Rabbi Simlai, before Samuel, '[... if its *mōlād* occurred before mid[day] or after mid[day]': we calculate its *mōlād*.] If it was born before mid[day], it is known that it will be seen close to sunset; if it was not born before mid[day], it is known that it will not be seen close to sunset.

- V. What practical difference do we derive from this? Rabbi Ashi said: for confuting witnesses.

- VI. Rabbi Zera said, 'Rabbi Naḥman said: For 24 hours the moon is covered over (= non-sightable). For us, six [hours] are of the old, and 18 are of the new; whereas for them, six are of the new, and 18 are of the old'.

Topic: Duration of non-sightability, constituting end of old moon, conjunction, beginning of new moon.

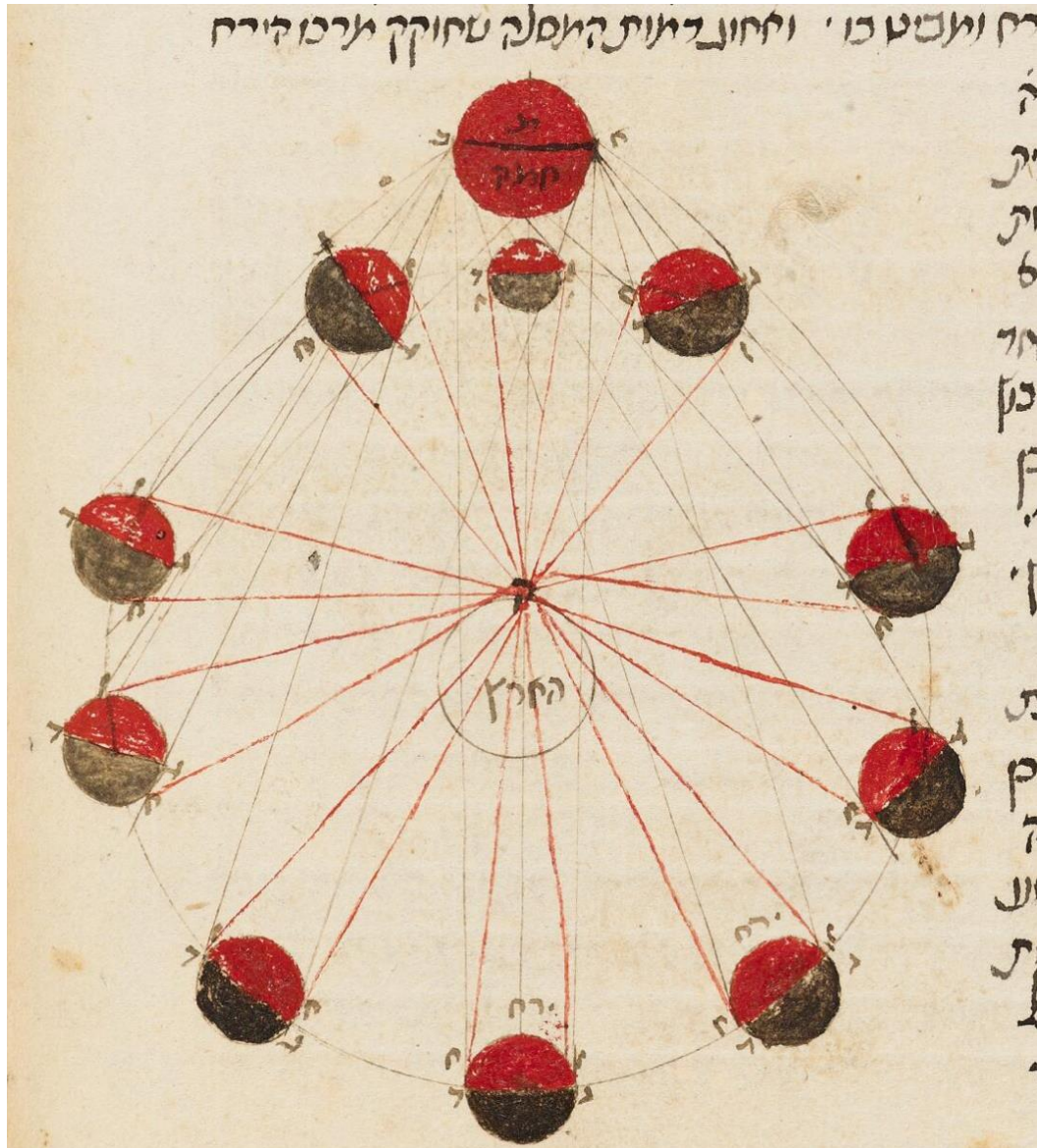
Difficulties: Initial, superficial analysis of the Talmud passage, before scientific commentary, renders apparently contradictory time-frames:

- A) (section III) Night & Day of New moon (= 24 hours [from conjunction until sightability])
- B) (section IV) just before midday to sunset (6 hours + [from conjunction until sightability])
- C) (section VI) [12 hours average from conjunction until sightability], viz. 24 hours total non-sightability, including two periods: 1) time from end of sightability of old moon to the conjunction; plus 2) from the conjunction to the sightability of the new moon.

C.1: why not 12 + 12, but rather 6 + 18 in one location, and 18 + 6 in another?

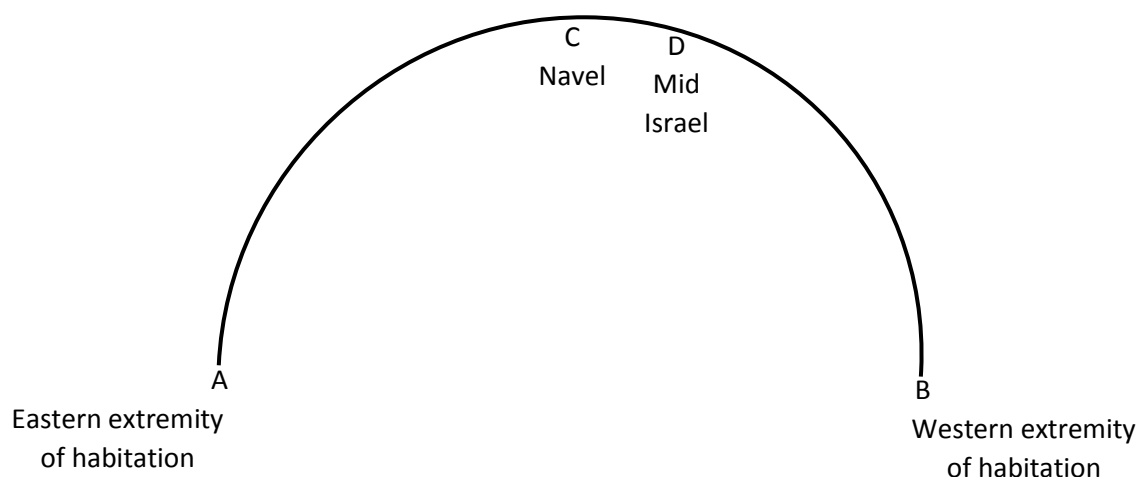
¹ Lit. 'secret'. Two main interpretations of this are 'esoterica' (due to its difficulty) or 'council' (an exclusive body of sages).

² Heb. *nōlād* / נולד (cf. *mōlād*). In *Yesod Olam* 4:8, Israeli analyses the exact connotation of this technical term.



'Phases of the Moon', MS Oxford Bodleian Huntington 299 f. 104b, detail

Diagram of Israeli's explanation of IV: '... born before midday ... may be seen at sunset'

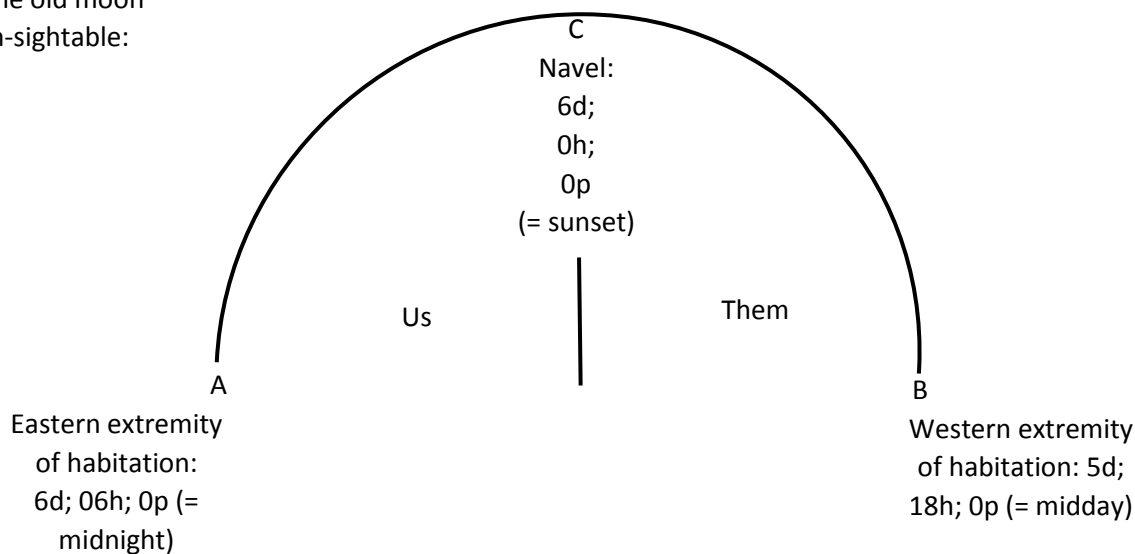


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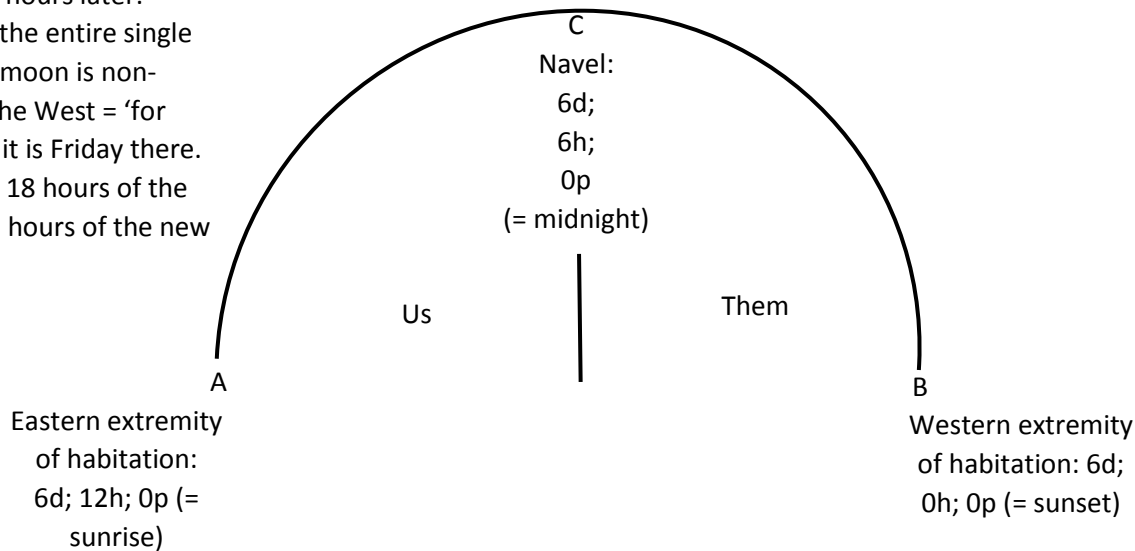
1. The renewal (= true conjunction) of Tišrī is at least 22½ hours before the first possible sightability of its new moon.
2. The *mōlād* (= mean conjunction) of the month of Tišrī may fall up to 14h; 648p after that month's renewal.
3. Times given for the *mōlād* are for what time it is at point C, the earth's navel, when the *mōlād* falls.
4. In contrast, first sightability is calculated for the middle of the Land of Israel, viz. point D.
5. Point D is approximately 1h; 612p to the west of point C. Thus, sunset (= 24h) at point D is 7h; 612p after midday (= 18h) at point C (= 6h for noon to sunset, + the 1h; 612p).
6. 14h; 648p (= amount by which *mōlād* may precede renewal) + 7h; 612p (= amount by which sunset Israel follows noon Navel) = 22h 180p. This is 360p = 1/3h shy of 22½ hours = 1st possible sightability from renewal, which will thus be 1/3h after sunset.
7. Thus, if, when the *mōlād* occurs, at point C it is 18h or earlier of 29d, then there is a chance that the new moon will be sightable at point D when, at point D, it is 1/3h (= 360p) into 30d.
8. However, if, when the *mōlād* occurs, at point C it is later than 18h of 29d, then it will be impossible for the new moon to be sightable at point D when, at point D, it is 1/3h into 30d.

Diagram of 1 of Israeli’s interpretations of VI: 24 hours covered, 6:18: us, old:new; them, new:old

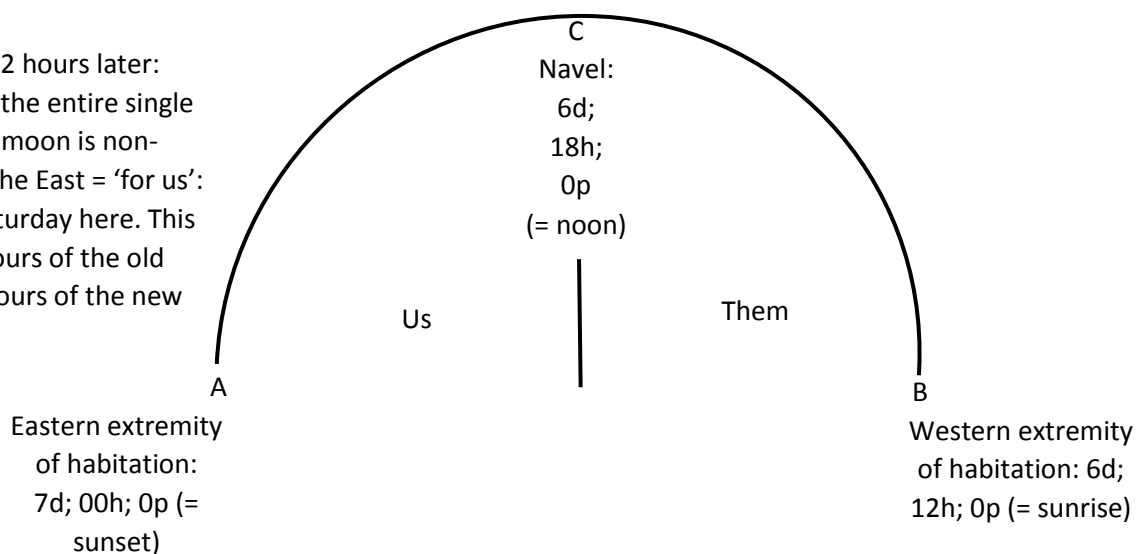
Moment 1: the old moon becomes non-sightable:



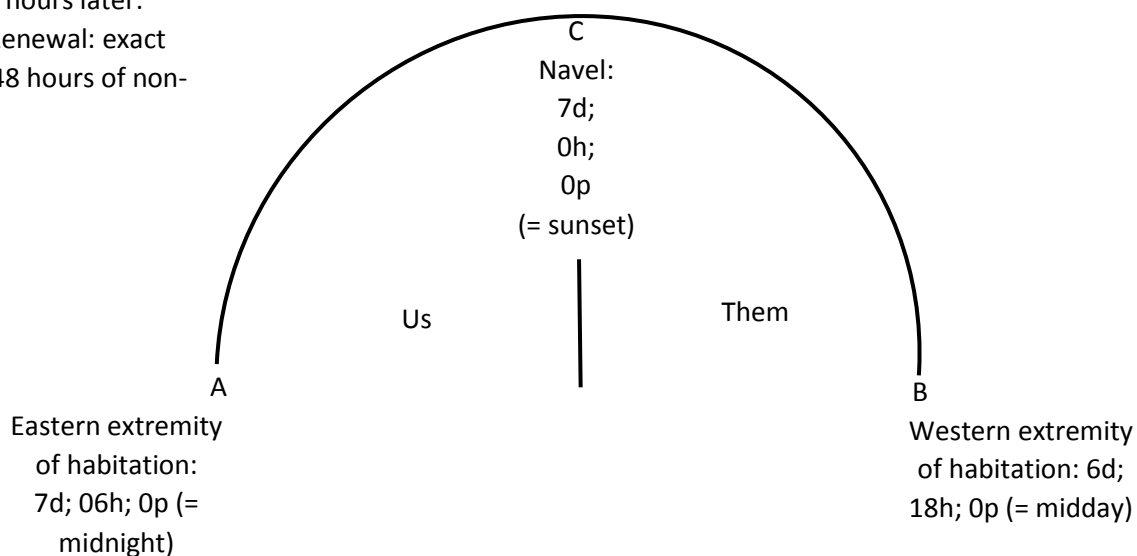
Moment 2: 6 hours later: beginning of the entire single day in which moon is non-sightable in the West = 'for them': when it is Friday there. This contains 18 hours of the old moon + 6 hours of the new moon.



Moment 3: 12 hours later:
beginning of the entire single
day in which moon is non-
sightable in the East = 'for us':
when it is Saturday here. This
contains 6 hours of the old
moon + 18 hours of the new
moon.



Moment 4: 6 hours later:
Moment of Renewal: exact
midpoint of 48 hours of non-
sightability



Moment 5: 24 hours later:
Moment of first sightability
{caveat: in truth, an additional
1/3h is required}

