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## Observations and Predictions of Eclipse Times by Early Astronomers

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### 2.3.3 LBAT 1413

This tablet records observations of four successive lunar eclipses observed in the accession, 1st and 2nd years of an unknown reign. This is followed by two predictions for the 2nd and 3rd year. The tablet, Pinches' copy of which was published by Sachs (1955) (reproduced here as Figure 2.5), is very badly damaged. As discussed in Section 2.2 above, Sachs (1955) dated this tablet to the reign of Nabonassar, making it the earliest known observational text from Babylon. However, the date has been questioned by Huber (1973), and so it is appropriate to discuss its dating in detail.

I give below H. Hunger's translation of the tablet:

0. At the command of Bel and Beltija may it go well.
1. 1,40. Accession year [of ...]
2. Month XII, (after) 5 month, the 14th, morning watch, ... [...]
3. 2,10. Year 1. Month VI, [the 1]5th (?), onset (?). It began in the north [...]
4. [...] the south wind blew. It set eclipsed. Month VI was in[tercalary.]
5. [Month XI, the 1]4th, onset (?). 1,40° remained to clearing.
6. [Year 2. Month] V, the 14th, it made a total (eclipse).
7. [Month XI,] omitted.
8. [Year 3. Month V, omitt]ed. Month VI was intercalary.
9. [...] ... [...]

The essential observations in attempting to obtain the date of this tablet are that in month XII of the accession year of an unknown king, there was a lunar eclipse in



Figure 2.5: Pinches' copy of LBAT 1413. [Courtesy: The Trustees of the British Museum]

the latter part of the night. This was followed by a lunar eclipse in month VI which set whilst it was still eclipsed. In month XI, there was another lunar eclipse, and then in the following month V, there was a total lunar eclipse. It is quite unusual for four lunar eclipses to be visible in a row, and so for this to happen at the beginning of a king's reign is a very rare event, and there should be a good chance that the tablet is dateable.

Huber (1973) found that there were only three possible dates for the text between 930 BC and 311 BC (after which time accession years were no longer used): 801–800 BC, 747–746 BC, and 693–692 BC. Independently, I have found that between 850 BC and 311 BC only 801–800 BC and 747–746 BC are possible. The third eclipse in the 693–692 BC group could not have set whilst being eclipsed. I will go through both cases in detail below.

On 4 January 801 BC there was a lunar eclipse in the latter part of the night. This was followed six months later by an eclipse on 29 June 801 BC. This eclipse set during totality. There was a third eclipse on 23 December 801 BC, and then a fourth on 18 June 800 BC. This final eclipse rose just after it began and became total.

On 5 February 747 BC the moon was eclipsed. Six months later, on 1 August 747 BC, the moon set eclipsed just before it had cleared. A third eclipse was visible on 25 January 746 BC, and then a fourth on the 21 July 746 BC. This final eclipse was total, but only rose above the ground just as it began to clear. It is therefore questionable whether the total phase of this eclipse could have been seen.

The first set of dates, that of 801–800 BC, gives the best fit to the observation.

However, they would suggest that the first month of the Babylonian year began around 20 January. Typically, the Babylonian year began around the end of March or the beginning of April. The second set of dates would result in a Babylonian year beginning around 20 February, which, whilst still being rather early, is more plausible than 20 of January. It is also known that 747 BC was the accession year of Nabonassar, which would fit the mention of an accession year in line 1. Unfortunately, the Babylonian chronology of the period around 800 BC is insufficiently well known to comment as to whether 801 BC was also an accession year. I am therefore forced to tentatively accept Sachs' (1955) date for LBAT 1413 of 747–746 BC.