

# HISTORICAL ECLIPSES AND EARTH'S ROTATION

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### 8.3 The Chou dynasty and Warring States period (c. 1050–221 BC)

Around 1050 BC, the inhabitants of the Chou region in western China overthrew the Shang kingdom and established a new dynasty. Early Chou history is very fragmentary and there are no direct references to eclipses until the eighth century BC. Various attempts have been made to explain a supposed 'double-dawn' occurring around 900 BC as produced by a major eclipse at sunrise. This phenomenon is recorded in the 'Bamboo Annals' (*Chu-shu Chi-nien*), a chronicle recovered in AD 281 from the tomb of a prince who had died in 296 BC. Although the chronicle has long since been lost again, its content was partially reconstructed during the last (Ch'ing) dynasty from preserved quotations in a variety of writings (Keightley, 1978b). It might be mentioned here that before the invention of paper in the first century BC, bamboo was a common writing medium, a book being formed by tying together a number of strips, each of typical length about 50 cm. The record of interest, which like other entries in the Bamboo Annals is very brief, may be translated as follows:

During the first year of King I (of western Chou), the day dawned twice in Cheng.

King I, the seventh Chou ruler, is believed to have reigned at some time between about 966 and 895 BC (Pang *et al.*, 1988a).

Cheng was located in central China, not far from present-day Lo-yang. (The approximate geographical co-ordinates of the site are: lat. = 34.50 deg, long. = -109.80 deg.) In principle, it would perhaps not be unreasonable to attribute the phenomenon described in the Bamboo Annals to a total eclipse occurring at sunrise. Rather similar phenomena were recorded during medieval times in England (AD 1230) and in Russia (1476) – see chapter 11. However, it should be stressed that in the Chou texts there is no direct reference to the cause of the phenomenon. If the Sun rose fully obscured, the closing stages of the event would resemble any other eclipse so that its true nature would be evident. It is clear from the descriptions given by the medieval European observers mentioned above that they were well aware that an eclipse was responsible for the darkness which they experienced. In contrast, the absence of the term *shih* in the Chinese account materially weakens an eclipse interpretation.

Several investigations on the eclipse theme have been published since the pioneering work of Liu Chao-yang (1944), but none can be regarded as successful. The most recent attempt is that of Pang *et al.* (1988a). From a computer check of all eclipses during the selected interval from 966 to 895 BC, these authors chose the sunrise eclipse of Apr 21 in 899 BC as the ‘only possible match’. However, this eclipse was merely annular and even at those places where the central phase was witnessed fully ten per cent (by area) of the solar disk would remain unobscured. Hence the reduction in the level of illumination would be scarcely noticeable – less than on a typical overcast day.

As is apparent from the historical eclipse maps for East Asia produced by Stephenson and Houlden (1986), no eclipse in the preferred date range could possibly have been *total* at Cheng, even if large uncertainties in the value of  $\Delta T$  at this epoch were supposed. It seems doubtful whether any alternative natural explanation (e.g. meteorological) can be found. Possibly the original account in the Bamboo Annals was merely drawing on legend rather than having a real, factual basis. For a recent critical re-appraisal of the evidence, see Stephenson (1992).