

## CAVEAT LECTOR: COMMENTS ON DOUGLAS J. KEENAN, 'ASTRO-HISTORIOGRAPHIC CHRONOLOGIES OF EARLY CHINA ARE UNFOUNDED'

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**Abstract:** The author offers a point-by-point rebuttal of Douglas J. Keenan's criticism of the use of astronomical records in dating the earliest Chinese dynasties in the 2<sup>nd</sup> millennium BCE. Detailed references are provided to the abundant historiographical and archaeological evidence bearing on the early chronology which Keenan ignored in his critique.

**Keywords:** ancient Chinese chronology, planetary conjunctions, astronomical dating, ancient Chinese history

### 1 INTRODUCTION

Douglas J. Keenan (2002) criticizes recent efforts to establish the chronology of ancient China's earliest dynasties. He begins by asserting that China's five-year long (1995-2000), national research program, the *Xia-Shang-Zhou Chronology Project* (hereafter the *Project*), produced a chronology "... relying on a record of a solar eclipse." In this way he leaves the reader with the impression that the results of five years of intensive research by hundreds of Chinese scholars working collaboratively rests on the slender reed of one bit of astronomical evidence, the so-called 'double-dawn' solar eclipse of 899 BCE. Keenan then points to disagreement (comparatively minor) between the chronology for the Chinese Bronze Age presented in the preliminary report of the *Xia-Shang-Zhou Chronology Project* (2000) and that found in the previously-published *Cambridge History of Ancient China* (Loewe and Shaughnessy, 1999). In a second questionable claim, he asserts (Keenan, 2002: 61) that the *Cambridge History* dating also "... is based on records of conjunctions of the five visible planets." Once again, according to Keenan, it all comes down to a single astronomical reed, which he aims to snap, thereby bringing down the entire scholarly edifice.

Despite the 'historiographical' in his title, neither here, nor anywhere else in Keenan's article is there any mention of the historical evidence from a variety of disciplines that has been brought to bear on the problem of the early chronology. This includes archaeological evidence (stratigraphy, <sup>14</sup>C dating, ceramic and bronze vessel typologies, paleography, etc.) as well as extensive historiographical evidence (ancient histories, chronicles, inscriptional records, etc.), whose comprehensive analysis serves to narrow down the chronological range of benchmark dates to within just a few decades in some cases. In fact, the 'double-dawn' eclipse and the planetary conjunctions play supporting roles in this research enterprise, rather than being the principal pillars Keenan makes them out to be. This is not to say that the astronomical evidence is unimportant, but rather that the *Project's* overall chronology does not stand or fall based on that evidence. In a comprehensive discussion and evaluation of all aspects of the *Project* scientists' methodology (including evaluation of <sup>14</sup>C dating techniques) Yun Kuen Lee (2002: 30) characterized the collaborative effort this way:

A noteworthy point is that the thorough investigation of these data requires expertise in several different

fields and a number of skills that are almost impossible for any single individual to fully comprehend. It is only through the collaborative effort of specialists in different fields that such a high quality chronological scheme can be achieved.

The astronomical evidence is important in pinning down certain benchmark dates, especially the precise date of the Zhou Conquest of Shang in mid-11<sup>th</sup> century BCE, so it is Keenan's discussion of that evidence that I will mainly focus on. Liu Ciyuan, the astronomer responsible for coordinating and evaluating the astronomical research for the *Chronology Project*, has already responded to Keenan's critique of the analysis of the 'double-dawn' solar eclipse (Liu, 2002a; 2002b; also Liu, Liu & Ma, 2003), so I need not take up that issue here.

### 2 FIVE-PLANET CONJUNCTIONS

Apart from solar eclipses, Keenan's discussion focuses on the records of three planetary massings and a lunar eclipse, which have been discovered in ancient Chinese sources. Let me cite some of the key points in Keenan's critique by way of illustration. Following are quotations from Keenan's article, to which my own discussion and corrections are appended. Insertions in brackets are my own, provided where necessary to clarify the context.

#### 2.1 First Quotation

It is unclear how close planets would have to be in order for the ancient Chinese to have considered them to be in conjunction ... some researchers have suggested that the planets only had to be within an arc of 30° (i.e., spanning 30° of the sky). Conjunctions of all five planets that span  $\leq 30^\circ$  occur, on average, every 40 years. Thus, if the suggestion is correct, conjunctions would tend not to be useful in chronology. There are seven historical texts from after the Han 漢 period (ended AD 220) that record five-planet conjunctions: three of these refer to occasions when the planets spanned  $>30^\circ$ . There is no evidence that ancient observers considered differently from Han ones. (Keenan, 2002: 63).

Keenan's source for these arguments is Huang Yilong (1990). However, Huang's assumption that pre-Han Chinese considered the operative definition of *wu xing ju yu yi she* 五星聚于一舍 "... the five planets gathered in one lodge ..." to be within an arc of 30° is, in fact, nothing more than a guess. Huang assumes that if *yi she* can refer to an army's progress of 30 Chinese *li* on the ground, then by analogy it ought to denote 30°

in the sky. But this presumption is based on no pre-Han astronomical source, or even post-Han source, for that matter. Indeed, it is directly contradicted by those sources. There exists another conventional term for the stages of an army's march—*ci* 次—which was borrowed to denote the so-called 'Jupiter stations' *sui ci* 岁次 of 30°, which correspond roughly to that planet's annual progress through the lunar mansions. But *ci* and *she* are not the same. Keenan, following Huang, ignores the textual evidence from the early 2<sup>nd</sup> century BCE *Mawangdui* silk ms. *wu xing zhan* 五星占 "Prognostications of the five planets" that directly contradicts Huang's assumption as to the operative definition of *yi she*. In that early Han Dynasty silk manuscript, *yi she* "one lodge" is used to express the range in longitude, for example, of Venus's retrograde motion of ~15° degrees (*ni xing yi she* 逆行一舍). This is consistent with the conventional practice in period texts of using *she* "lodging" as a synonym for *su/xiu* 宿 "lodge for the night; lunar lodge" to refer to the moon's daily progress of about 13°. For example, in Ho Peng-yoke's discussion of specialized terminology in the astronomical treatise of the *Jin shu* (ca. 635), he has the following to say in regard to planetary groupings:

The term *chü* 聚 (assembly) refers to celestial bodies found within the same lunar mansion ... and according to Li Shun-feng at least three celestial bodies must be involved before the term is applicable ... When the rays of the celestial bodies concerned seem to extend towards each other, the condition is described by the term *hui* 會 (meet) ... (Ho, 1966: 38).

So here we have a very early excavated manuscript as well as the most authoritative source for early astronomy, the *Jin shu*, and both explicitly refute Huang's supposition as well as Keenan's assertion that "...there is no evidence ..." The *Mawangdui* ms. evidence is discussed in detail in Pankenier (1995: 123), which Keenan cites as his source for research on planetary conjunctions in Chinese history. In the same location in that article, I also point out that, "... when this narrower definition is applied, only four of twenty-four clusters from the first two millennia BC computed by Huang are found to qualify, for an average of one every 500 years." In fact, the spectacular massings of 1953 and 1059 BC were much denser, spanning about 4° and 7°, respectively.

Apart from the conjunction records under discussion it is not known how early the ancient Chinese began paying attention to the movements of the planets, though there is suggestive evidence from the Shang divination records that the planets were considered spirit minions of the high god. However, a solar observation platform was recently discovered at the late Neolithic site of Taosi in Shanxi, which was used to observe the rising sun at certain dates during the year, including the solstices (Liu et al., 2005). The site dates from about 2100 BCE. According to the preliminary analysis, sightlines pointing to the Sun's rising points would have permitted construction of a calendar based on horizon observations, a method hitherto unknown from early China. More relevant to the present discussion is that if regular sunrise observations were being conducted this early, whether for ritual or calendrical purposes, it is unlikely those astrologer-priests could have missed the spectacular pre-dawn planetary massing of 1953 BCE, which

persisted for days. This discovery also places in a new light recent analysis pointing to the even greater antiquity of the Chinese lunar lodge system (Schaefer, 1999).

## 2.2 Second Quotation

There was, however, no five-planet conjunction in 1576 BC, only a four-planet conjunction: at the time of the 'conjunction,' Venus was over 40° away from the other four planets ... attempts to promote the [chronological] proposals have essentially ignored this. (Keenan, 2002: 63).

And in the caption to Figure 1: "... the claim of a conjunction is false." (Keenan, 2002: 63).

Keenan's criticism misrepresents the case. In referring to this planetary event, Pankenier (1995: 132) says:

With the help of the *Bamboo Annals* relative date placing the Shang founding 517 years before the Zhou event [*i.e.* 1059 BCE conjunction], the curious behavior of the planets recorded at that juncture, *wu xing cuo xing* 五星错行, became comprehensible as a description of planetary behavior in the fall of 1576 as the planets reversed horizons and times of visibility from dusk to dawn and dawn to dusk.

Nowhere is the claim made that this event qualifies as a five-planet 'conjunction' by the same definition as those of 1953 and 1059 BCE, nor does the original text record it as a conjunction. In addition to ignoring the chronological context in which all three planetary events are embedded (see below), Keenan also disregards the lengthy discussion in another article he cites (Pankenier, 1981-1982: 19), which marshalls linguistic evidence to show that the term *cuo* 錯, in *wu xing cuo xing* "the five planets criss-crossed," in the Shang Dynasty language probably originally referred to the Sun's nightly disappearance in the west and reappearance in the east, so that its use in this planetary context is strikingly apt. The lapse is all the more inexplicable in that Keenan actually corresponded with me about this very event, and in a response to his August, 1998 e-mail I wrote:

Your last question still confuses me a bit, but the attached charts should clarify ... No. 1 shows four of the planets (excl. Venus) clustered above the SE horizon at 5:31 local time in Xi'an on 20 Dec 1576 BCE. No. 2 shows the location of the planets at the same hour in relation to the sun's position. The planets were just emerging after being invisible, in some cases for many weeks, while located within the 15° circle surrounding the sun. They would have last been observed after sunset just above the NW horizon, rather than just before dawn in the SE.

I then referred him to Pankenier (1981-1982) for detailed discussion of this 1576 BCE phenomenon and the linguistic analysis of *wu xing cuo xing*.

## 2.3 Third Quotation

The above text is like the main text cited as recording a 'conjunction in 1576 BC,' and the proposals adduce this likeness as demonstrating that the two texts record like events. (Keenan, 2002: 64).

Keenan is confused. The 'text' he refers to is from *Mozhi* 墨子 (4<sup>th</sup> century BCE) and relates the myth of the founding of the Xia Dynasty. The likeness asserted in regard to this passage is between the accounts of the conjunctions of 1059 and 1953 BCE, *not* 1576 and

1953 (Pankenier, 1995: 132ff). The passage in *Mozi* is of particular interest precisely because it is the earliest to refer to both major conjunctions (the two densest massings in the past 5,000 years) using imagistic language to describe the supernatural means by which the transfer of Heaven's mandate was accomplished. The literature on cultural astronomy is replete with similar examples of myths and legends that encode astronomical information from around the world. Indeed, the first hexagram in the *Book of Changes* (*Yijing: qian gua*), encodes in its six line texts the seasonal behavior of the huge Dragon constellation (Virgo to Scorpius) in precisely the same kind of imagistic language.

In *Mozi*, on both occasions the auspices are said to have occurred in the form of a marvelous bird or bird-like creature, which conferred a jade scepter of authority on the dynastic founder. The term for the jade scepter *gui* or *gui zhang*, refers not to just any jade ornament, but to one that symbolized the delegation of authority in the archaic period. In the later of the two accounts in *Mozi* the scepter is said to have carried the actual text of the appointment. In that case, in 1059 BCE, the parallel account of the behavior of the Red Bird in the *Bamboo Annals* differs only in being conjoined with explicit mention of *wu xing ju* 五星聚 "... the five planets gathered." When the location of the actual conjunction at its densest is plotted, this is found to be just west of the reference star that traditionally marked the 'beak' of the huge Vermilion Bird constellation (Pankenier, 1995). It has also been shown (Pankenier, 1981-1982: 12) how in late May of 1059 BCE the Bird constellation with the planetary formation at its beak would have set in the northwest in the direction of the Zhou ancestral homeland at Zhouyuan, as seen from King Wen's location at the eastern end of the Wei River valley in Shaanxi. This corresponds to the account in the *Bamboo Annals* "... clasping a jade scepter (in its beak) it alighted on the Zhou altar to the soil ..." which altar was located among the ancestral temples at Zhouyuan. The date of this event is deeply embedded in the *Bamboo Annals* relative chronology for the Dynastic founding period, since we know from other textual evidence that it must have occurred in the founder, King Wen's, 41<sup>st</sup> year. This historiographical evidence and the constraining chronological context, as well as the <sup>14</sup>C results that confirm this dating in the *Project's* preliminary report, Keenan does not mention.

#### 2.4 Fourth Quotation

Records of a five-planet conjunction that have been proposed to refer to the conjunction in 1059 BC ... claim that the conjunction occurred at the time of the succession of the long-lived Zhou 周 dynasty (the succession is usually dated to 1200-1000 BC). Five-planet conjunctions were believed to portend very beneficial times, so the veracity of the records should be considered inherently doubtful. That the conjunction is recorded as occurring in the lodge of *Fang* has been attributed to 'portentological revisionism.' Such revisionism, though, would seem to be at least as likely to affect the conjunction's recorded historical timing as its location in the sky. As to the supposed record of a lunar eclipse, it is from a text that is suspected of being fabricated. (Keenan, 2002: 66).

First, Keenan does not mention the series of five lunar eclipses in the Shang divination records, which have

been dated to a brief span from 1201-1181 BCE during the reigns of the first two kings of the late-Shang. Eight more kings followed before the Dynasty's fall. The eclipses are discussed in the *Project* report (*Xia Shang Zhou duandai gongcheng*, 2000: 55). Prior to the *Xia-Shang-Zhou Chronology Project*, proposed dates for the Shang-Zhou Dynastic transition meriting serious consideration ranged between 1122-1027 BCE, although 1122 has been thought to be too early for many years. As a result of the refined <sup>14</sup>C and new stratigraphical analyses of important Western Zhou sites completed by the *Project*, that window was narrowed to between 1050-1020 BCE (*Xia Shang Zhou duandai gongcheng*, 2000: 43-44; Lee, 2002: 33). Since Keenan cites the preliminary report on the *Project's* results as a principle source, he should know this. Concerned with sowing doubt, Keenan proposes a 200-year window for the date of the Zhou Conquest for which there is no support in authoritative historical or archaeological research on the period, and which would leave no room for the last eight kings of the Shang Dynasty. Then, too, there is also the fact that even the supposedly unreliable *Bamboo Annals* chronology is only off by four years in dating the Zhou Conquest to 1050, and by only twelve years in dating the planetary conjunction to 1071 BCE. Analysis has shown this relatively minor misdating arises from understandable errors on the part of the scholars who reconstructed the damaged bamboo slips after their recovery from a tomb in the 3<sup>rd</sup> century CE (Pankenier, 1992a; 1992b).

Second: five-planet conjunctions as signs of heavenly approbation became *de rigueur* first in the early imperial period in the late 3<sup>rd</sup> century BCE after reunification of China's warring kingdoms. Of course, such a portent was highly beneficial only to the usurper, not to the incumbent Dynasty. This is why, beginning with the founding of the Han Dynasty in 206 BCE, the need to prove the new Dynasty's legitimacy made it inevitable subsequently that less impressive groupings of planets (like that of May 205 BCE) might occasionally be pressed into service, qualified sometimes as instances of the five planets appearing 'like linked pearls' rather than 'gathering'. Records of massings of the five planets in the imperial period are comparatively rare, but rarer still are the actual instances officially recognized as having Dynastic implications such as occurred in 750, 967, 1006 and 1524 CE. Even though by the Ming Dynasty astrology had long been domesticated, and despite the conjunction's being unobservable, the 1524 CE massing caused a stir at court precisely because it appeared rather ominously in mid-Dynasty (Pankenier, 1995: 512).

The *Bamboo Annals*, whose record of the 1059 BCE conjunction is embedded in a year-by-year chronology for the Conquest period, was buried in a tomb in the early 3<sup>rd</sup> century BCE and only rediscovered about 281 CE, six centuries later (Nivison, 1993). In the interim, during the mid-Han Dynasty, astrological and portentological speculation based on five-phases/*yin-yang* correlations came into vogue. In the process, the elemental force (phase) thought to govern the Han Dynasty was officially changed, with the result that the phase and official color governing the preceding Qin and Zhou Dynasties also had to be revised, in the case of the Zhou from Fire/Red to Wood/Green. As a

consequence of the change of the official color of Zhou to Green, and by the logic of the correlative cosmology of the time, the Zhou Dynasty's correlated quadrant in the heavens of necessity had also to change from summer (Red Bird) to spring (Green Dragon). These revisions came about in mid-Han Dynasty and were institutionalized in the very influential scholar Liu Xin's (d. 23 CE) new chronological and calendrical scheme. The evidence documenting this transformation is overwhelming and indisputable (Wang, 2000: 137), as is the evidence that Zhou had previously been identified with Red and the Red (or Vermilion) Bird. The astronomical location of the 1059 BCE conjunction (near Alpha Hydrae) encoded by implication in the reference to the Red Bird (i.e., red ~ summer ~ summer solstice palace dominated by that constellation), being no longer recognized for what it was but taken simply as a reference to the auspicious phoenix, there was no obstacle to placing the Zhou Dynastic portent in lunar lodge *Fang* 'House' in Scorpius at the heart of the Green Dragon constellation. Indeed, not only was there no obstacle, astrological imperatives would have dictated that it must be so! We now know this introduced an obvious contradiction into the recorded location of the phenomenon, but the 3<sup>rd</sup> century CE court scholars who reconstructed the *Bamboo Annals* did not know, and so they 'helpfully' introduced this new location *yu fang* 于房 "in Room" into the reassembled text of the annals, possibly as an interlinear note which, as so often happened, subsequently became incorporated into the main text by a copyist.

Third: as regards the record of the lunar eclipse, the source text comes from chapter 23, *Xiaokai* 小開, one of the 'core' chapters of the *Yi Zhou shu*, which date from the late 4<sup>th</sup> or early 3<sup>rd</sup> century BCE (Shaughnessy, 1993). It is impossible to come away from a reading of the discussion of this work in the authoritative bibliography *Early Chinese Texts* with the impression that the scholarly consensus is that the *Xiaokai* chapter "... is suspected of being fabricated."

Fourth: the best approximation for Jupiter's period achieved in the mid-Han Dynasty was 11.92 years (present figure = 11.86 years), and for Jupiter-Saturn conjunctions was 20 years (actually 19.53 years). It is a simple matter to demonstrate using either of those figures that it would have been utterly impossible at a remove of some eight to ten centuries to retrospectively compute the location of an 11<sup>th</sup> century BCE conjunction of planets with sufficient accuracy to place it in the correct location in the sky. For example, for every supposed 11.92-year Jupiter cycle the computed result would be long by 0.6 years per cycle. Retrospectively computing over 1,000 years, or eighty-three cycles, would produce a cumulative error of some 5 years. On this point, consider the remarks by astronomer Zhang Peiyu (2002: 350):

It is particularly important to point out that starting from the circulation of the *Santongli* 三统历 calendar, compiled in the first century AD, ancient scholars began to show great interest in the retro-calculation of the exact dates and cycle of planetary conjunctions. However, the computation of planetary trajectories is a complex exercise, and so those early computations contain many inaccuracies: calculating the exact locations of conjunctions of over 1,000 years in the past would have been unthinkable for those early astrono-

mers. Because of this difficulty, I would argue that it would not have been possible for scholars of the Warring States or Han period (when the received classical texts containing reference to those astronomical events were first recorded) to have been able to accurately retro-calculate the exact time and location of the planetary conjunction that correlates to the Shang Conquest. Since this event can be shown by modern calculations to have actually occurred, and because it was recorded in the historical traditions, we can thus eliminate the possibility of a falsification of records of this conjunction by later hands.

The true location and absolute dates of the planetary phenomena are two sides of the same coin, neither could possibly have been generated during the Eastern Han Dynasty when portentological speculation and outright fabrication of omens (mainly contemporary and infrequently astral) were at their height. This is equally true of the *Bamboo Annals* relative chronology, which the planetary omens punctuate. Keenan does not attempt to explain how a motivated Han period or later forger accomplished the impossible by accurately computing the behavior of the planets a millennium (or two) earlier, not least the 1576 BCE planetary 'horizon-switching' phenomenon, or how said forger could have encoded the information in obscure language and then insinuated it into a well-known passage in the *Mozhi* already several centuries old, not to mention inserting the records of the planetary phenomena into exactly the right place in the erroneous *Bamboo Annals* chronology while it was buried in a tomb.

## 2.5 Fifth and Sixth Quotations

Additionally, there is supposedly a record of a lunar eclipse, near the time of the conjunction [of 1059 BCE], on (cyclic) day *bingzi* 丙子 in the first (lunar) month of the year, and there was a total lunar eclipse that matches this on 12 March 1065 BCE." (Keenan, 2002: 64).

The eclipse record reads thus: on day *bingzi* in the first month, at the ceremony paying homage to the full moon ... the king announced, 'The many ... eclipse(s) is/are untimely; you shall begin planning succession.' (Keenan, 2002: 67; "Excursus").

In both locations Keenan is at pains to show how common lunar eclipses are, how uncertain we are about when the day and the year were thought to begin at the time, concluding with anachronistic assertions about how many calendars might have potentially been operative. The one crucial fact he does not mention is that he has selectively quoted only a portion of the eclipse record from *Yi Zhou shu*. He failed to include the relative date in the reign of King Wen of Zhou that prefaces the reference to the lunar eclipse: "It was the King's 35<sup>th</sup> year ..." (Li, 1981: 21; Pankenier, 1981-1982: 7; Pankenier, 1995: 129). Given year, month, and precise day, we can be a great deal more confident about the dating of this eclipse than if only the month and day had appeared. In Keenan's own words in another context (Keenan, 2002: 66): "That an actual eclipse would match the record's date just by chance is very improbable." Note that if 1065 BCE was King Wen's 35<sup>th</sup> year, then 1059 BCE, the year of the conjunction of the five planets, would have been King Wen's 41<sup>st</sup> year, precisely the result referred to above which derives from completely independent historical evidence. So the records of two astronomical pheno-

mena and a variety of independent textual sources corroborate each other, incidentally also fixing the absolute dates of King Wen's reign.

### 3 CONCLUDING REMARKS

I could go on, but the above examples should suffice to make the point that Keenan's critique of "astro-historiographic chronologies" is not to be relied upon.

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