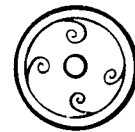


# Early China



# Astronomical Dates in Shang and Western Zhou

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Ever since the people first came into being, has there ever been a time when sovereigns, generation after generation, did not observe the sun, moon, planets, and constellations?

Sima Qian

## INTRODUCTION

Professional astronomers have strongly criticized recent sensational theories about the baleful influence of planetary alignments on the earth. Their criticism has focused on the lack of scientific evidence to support the contention that the planets, either singly or in concert, have a significant physical influence on us or on the earth. The psychological effects of celestial phenomena, on the other hand, raise questions of a different order. Today, dire predictions of impending catastrophe are more cause for amusement than alarm, yet not so very long ago certain heavenly phenomena aroused considerable anxiety among large numbers of thinking people. Witness the apprehension that the earth would be poisoned by passing through the tail of Comet Halley on its last appearance in 1910. Somewhat earlier, a conjunction involving Jupiter, Saturn, and Mars in Aquarius in the year 1524 was widely believed in Europe to foretell a great deluge. Johannes Kepler (1571-1630), the father of modern celestial mechanics, even speculated that a similar event in Pisces in February of 6 B.C. may have been the famous "Star of Bethlehem." Recent discoveries of the earliest recorded and verifiable observations of planetary phenomena in China indicate that such events also profoundly influenced the political history of the second millennium B.C. in that country.<sup>1</sup>

About two years ago I became interested in the problem of establishing the chronology of the early Western Zhou period (mid-11th century to 771 B.C.), and specifically the events leading up to the successful conquest campaign against the last Shang king, Zhou Xin 紂辛.<sup>2</sup> The question has vexed historians since well before the time of Sima Qian 司馬遷, who already in 100 B.C. despaired of reconciling all the conflicting evidence. Up to now more than twenty dates have been suggested for the conquest, the two most widely accepted being Liu Xin's 劉歆 (d. A.D. 23) "long chronology" calculations which yielded the result of 1122 B.C., and Karlgren's suggestion of 1027 B.C.<sup>3</sup> All this is familiar territory.

Most recent attempts by scholars to reconstruct the chronology of the period have had to rely on extrapolation of the sexagenary cycle of day-dates back in time from the comparatively secure date of 841 B.C., the first year of the Gong He 共和 interregnum. This method involves the reconstruction of the reign lengths of the kings of Western Zhou by assigning bronze inscriptions bearing full dates (by which is meant reign year, month, lunar phase, ganzhi day) to the proper year of the correct king. In order to accomplish this, stylistic and epigraphic typologies as well as internal historical evidence must be called into play. This method, more the product of necessity

than choice, has its problems. Few scholars agree on the dating assignments of the majority of bronze inscriptions; the actual meaning of the lunar phase terms chuji 初吉, jishengba 既生霸, jiwang 既望, and jisiba 既死霸, is still hotly debated;<sup>4</sup> we know next to nothing about the mechanics of intercalation in the early Zhou calendar or even whether the various inscriptions actually employ the same calendrical conventions. The problems are thus complex, involving numerous disciplines from archaeology and astronomy to metallurgy and philology. Despite the considerable ingenuity which dozens of scholars, both Chinese and Western, have brought to bear over the centuries, the number of uncertainties has hardly diminished.<sup>5</sup> It is not without some trepidation, therefore, that I propose a new approach which circumvents the problems I have outlined above.

What piqued my interest when I began to study the problem two years ago was the account in Guoyu 國語: "Zhouyu" 周語 in the 23rd year of King Jing 景王 (522 B.C.) containing a record of what appear to be actual astronomical observations made at the time the conquest campaign was mounted: "Formerly, when King Wu attacked Yin, Jupiter was in Quail Fire; the moon was in Heavenly Quadriga; the sun was in the Ford that Separates Wood; the new moon was in the Handle of the [Southern] Dipper; Mercury was in the Heavenly Turtle; the locations of Mercury, sun, and new moon were all in the north[-east] corner...Jupiter was in the region of the Heavens allotted to us, the Zhou"<sup>6</sup> 昔武王伐殷,歲在鶉火,月在天駟,日在析木之津,辰在斗柄,星在天龜,星與日辰之位皆在北維...歲之所在則我有周之分野. Observations of this type, if they can be demonstrated to be accurate, would be particularly helpful in identifying the astronomical date of the event, since their analysis is not contingent on the solution to the calendrical difficulties outlined above. In other words, if analysis of these astronomical observations confirms that they accurately describe the situation in the heavens in a year which has otherwise been identified to be the one in question, then we may be quite certain--given the inability of pre-Han or Han astronomers to calculate these celestial movements accurately<sup>7</sup>--that the Guoyu account not only contains genuine data but also that we have finally solved the problem of the absolute date of the conquest. Since, however, these indications could potentially be true at intervals of twelve years (when Jupiter, the slowest moving body, returns to the same location among the stars), we must first isolate a likely range of years in the 11th century B.C. In attempting to do just that, I made a surprising discovery--the "Mandate of Heaven" was revealed by a general conjunction of planets.

In the analysis which follows I rely heavily on the Bamboo Annals 竹書紀年,<sup>8</sup> or 汲冢紀年 Annals from the Tomb in Jixian, as the work was traditionally known. I do so not out of ignorance of the doubtful repute from which the chronicle suffers, but because I believe it possible to prove that there is much to be found in it which is quite



genuine and of great historical value. The bamboo slips on which the text was written were discovered in A.D. 281 in the tomb of a Wei 魏 ruler who died in 296 B.C. The chronicle provides a terse account of events from the time of the legendary five emperors through the Xia, Shang and Western Zhou dynasties. Thereafter the annals recount the history of the state of Jin 晉, and after its partitioning, the state of Wei, concluding in the year 299 B.C.

The work survives in two versions, a jinben 今本 or "current" version of uncertain provenance and a guben 古本 or "genuine" version reconstructed from quotations in pre-Song works by Zhu Youzeng 朱右曾<sup>9</sup> and Wang Guowei 王國維.<sup>10</sup> The former version, although more detailed and complete, is generally held by scholars to be a post-Song fabrication, while the latter, at best, is thought to contain a heterogeneous mixture of Eastern Zhou materials that display signs of later tampering.<sup>11</sup> As far as their account of events down to the Eastern Zhou is concerned, both works have been largely discounted as unreliable and have consequently been relegated to the limbo of "dubious historicity," in spite of recent research on the chronology of Shang and Western Zhou which tends to support the Bamboo Annals' mid-11th century date for the founding of Zhou.<sup>12</sup>

One major distinction between the two versions of the Bamboo Annals of particular interest to this study is the relative paucity of astronomical records in the "genuine" version of the text in comparison with the less well authenticated "current" version. The latter is replete with records of comets, eclipses, meteor showers, planetary conjunctions, etc., all of which are firmly located in a coherent chronological context. Given the relative accuracy of the "current" Bamboo Annals date of 1050 B.C. for the Zhou conquest of Shang, the possibility of verifying or disproving strategically located reports of astronomical events presented itself. It occurred to me that this would demonstrate conclusively whether the Bamboo Annals dates have any historical validity or whether the astronomical records were fabricated to conform with the expectations of the judicial astrology of a later period. As in the case of Guoyu, if the record should prove correct, this would not only vindicate the much maligned Bamboo Annals but would also provide the first true astronomical dates for events in this early period. These dates, in turn, could then serve as benchmarks for the eventual reconstruction of the chronology of Shang and Western Zhou.

#### Part 1

#### The Conjunction of 1059 B.C.

The "current" Bamboo Annals<sup>13</sup> record a conjunction of all five naked-eye planets in Scorpius (lunar lodge Fang 房 or "House" #4) in 1071 B.C. According to the Bamboo Annals chronology this was twenty-one years before the conquest of Shang in 1050 B.C. The phenomenon is recorded in the 32nd year of Di Xin 帝辛, or Shang Zhou 商紂, and by deduction from this and other sources we know that this ought to have been the 41st year of King Wen's reign.<sup>14</sup>

In his Diwang shiji "Genealogies of Kings" 帝王世紀,<sup>15</sup> for example, Huangfu Mi 皇甫謐 (A.D. 215-282) wrote: "King Wen was at Feng. The lords of the Nine Regions all came. The five planets gathered in lodge House #4. In the 42nd year of King Wen, Jupiter was in Quail Fire, therefore King Wen changed it to the First Year of Receipt of the Mandate and began to style himself 'King'" 文王在豐,九州之諸侯咸至,五星聚於房。文王即位四十二年,歲在鶉火。文王於是更為受命之元年,始稱王矣。 Here King Wen is portrayed as having taken advantage of an unusual celestial event to declare his designs on the royal throne by demonstratively styling himself "King" and by promulgating a new calendar proclaiming the new era. In addition, the location of the planet Jupiter in station Quail Fire, the region of the heavens associated with the Zhou in ancient astrology, is emphasized as being of particular significance. But there is more to the Bamboo Annals report about this incident; the chronicle also goes on to add that "a Red Crow perched on the Zhou altar to the soil" 有赤鳥集於周社, so that the account clearly juxtaposes two quite distinct phenomena. On the one hand we have a straightforward report of a highly unusual astronomical event, a general conjunction of the planets. On the other hand, there is an account of the sort of augury familiar to us from apocryphal literature and poetic traditions that recount

the exploits of the early heroes. The Red Crow 赤鳥, or sun-bird, is of course reminiscent of the Phoenix, that harbinger of dynastic change whose appearance presages the arising of a virtuous ruler. Its alighting on the Zhou altar to the soil in the ancestral homeland, together with its red color (favored in ritual sacrifices by the Zhou), symbolizes the imminent transfer of the Heavenly Mandate to the Zhou ruler Chang, Earl of the West 西伯昌 (alias King Wen).<sup>16</sup>

In other late Zhou and Han sources the augury becomes more explicit and even more mythical in depicting the behavior of this avian messenger. In Mozi we are told: "A Red Crow grasping a jade gui in its beak descended onto the Zhou altar to the soil at Qi[-yang] saying, 'Heaven commands King Wen to attack Yin and take possession of the State.'" 赤鳥銜珪降周之岐社曰「天命周文王伐殷有國」.<sup>17</sup> In Lüshi chunqiu we read: "Whenever a true King is about to arise Heaven will first display an auspicious omen to the people... In the time of King Wen Heaven first manifested a fire. A Great Red Crow grasping a Cinnabar Writing in its beak perched on the Zhou altar to the soil"

凡帝王者之將興也,天必先見祥乎下民... 及文王之時天先見火,赤鳥銜丹書集於周社。<sup>18</sup>

This is not the only appearance of the Red Bird during the transitional period from Shang to Zhou. In all, the Red Bird or Phoenix makes three well-documented appearances. The first was in

conjunction with the actual conferral of the Mandate on King Wen, as I have indicated. The second, reported in the "Taishi" chapter of Shangshu,<sup>19</sup> Chunqiu fanlu,<sup>20</sup> the "Zhou benji" section of Shiji, Han shu (quoting Shangshu),<sup>21</sup> Yilin,<sup>22</sup> Lunheng,<sup>23</sup> Songshu,<sup>24</sup> etc., was in connection with the conquest campaign led by King Wu after his father's death. In these accounts, the Red Bird manifested itself to King Wu

at Mengjin 盟津, the ford on the Yellow River where the troops converged to be harangued.<sup>25</sup> In one of the most interesting accounts, the Han work Yilin, it states: "Heaven commanded the Red Crow to come round at the appointed time together with the troops and to attack [the one] lacking the Way. Jizi<sup>26</sup> took

to roaming" 天命赤鳥，與兵徵期，征伐無道，箕子遊。 The third appearance, reported in the Bamboo Annals, the Song shu monograph on auguries and talismans, and the Han dynasty apocryphal Shangshu chapter "Zhonghou luoshi mou," explicitly refers to the fenghuang or Phoenix which appeared in the year the government was restored to King Cheng in the new city of Luo, after the seven-year regency of the Duke of Zhou:<sup>27</sup> "When King Wu died King Cheng was still a minor. Dan, Duke of Zhou, acted as regent for seven years, made the rites and created the music. The miraculous bird, the Phoenix, appeared. The yingjia plant sprouted. Thereupon [the Duke of Zhou] accompanied King Cheng to present himself at the Yellow and Luo Rivers and submerge a jade ring. When the rites were completed the King retired to wait. By the time the sun was lowering Dazzling Brightness<sup>28</sup> came out with it and together they

canopied the Yellow River..." 武王沒成王少，周公旦攝政七年，制禮作樂，神鳥鳳皇見，萼莢生，乃與成王觀於河洛，禮畢王退矣，至于日昃榮光並出幕河...

What is behind all this imagery? However unlikely it may seem at first glance, as we shall see, all these manifestations of the Red Bird also refer to astronomical events.

The grouping of the five planets to which the Bamboo Annals refer is a very rare phenomenon. Jupiter, Saturn, and Mars, the three slowest moving planets, have a mean conjunction period of 516.33 years.<sup>29</sup> If conditions are favorable the faster moving Venus and Mercury may briefly join them in a cluster, but this is by no means certain. In addition, if Mercury is included, the conjunction must occur relatively near the sun. But unless this planet is at an angular distance of some 15° from the sun (their maximum separation never exceeds 28°) the phenomenon is likely to be unimpressive, if observable at all, due to the brightness of the sky. Such a rare planetary occurrence as a general conjunction of all five naked-eye planets in the 11th century B.C. could hardly have failed to influence the early Chinese, who as a people hold many of the records for the earliest and most accurate reporting of meteor showers, comets, novae, and the like.

A search of the computer-generated tables of solar and planetary longitudes for the mid-11th century B.C. revealed the historical basis of the Bamboo Annals account of the conjunction of the five planets.<sup>30</sup> Not surprisingly, nothing of consequence occurred in the year 1071, the cyclical date assigned

to the event in the Bamboo Annals, but there was indeed a conjunction of all five planets toward the end of May in 1059 B.C., which was quite spectacular. I have reproduced below the table of ecliptic longitudes of the sun and planets in May and June of 1059 B.C.:

	Sun	Me	Ve	Ma	Ju	Sa
May 7	36°	57°	58°	63°	74°	81°
17	45	70	70	69	76	82
27	55	79	82	76	78	83
June 6	64	79	94	82	80	84
16	74	73	106	88	82	85

What occurred in that year was precisely the fortunate combination of circumstances described above. A Triple Conjunction of Jupiter, Saturn, and Mars was joined briefly by Mercury and Venus

in the constellation Cancer (i.e., 輿鬼 or Carriaga, Ghost #23), which is shown to the right in Figure 1.<sup>31</sup> All this took place at a sufficient distance from the sun (21° or more) to be clearly visible an hour or so after sunset at the latitude of Xian for at least fourteen days at the end of May. This grouping of the planets must have dominated its surroundings for many days, particularly in view of the dimness of the stars in Cancer (+4 magnitude or less). At their closest approach to each other, however, on the evening of May 28 all five planets would have been concentrated in an area measuring only 30m in right ascension by 3° in declination, a patch of sky easily covered by a clenched fist held at arm's length. Anyone who has observed even a modest alignment such as that of Jupiter, Saturn, and Mars which took place during the spring of 1982 can appreciate what an imposing sight this must have presented. In addition, according to Tung Tso-pin's chronological tables,<sup>32</sup>

May 28, 1059 B.C. also happened to be day jiazi 甲子, the first in the series of sexagenary designations. This coincidence suggests that the choice of the day jiazi for the decisive battle at Muye, which, as we shall see, occurred twelve and a half years later, has resonances not previously recognized.<sup>33</sup>

### 1.1: The Absolute Dates of King Wen's Reign

Determining the astronomical date of one event in the reign of King Wen as recorded in the Bamboo Annals does not conclusively establish the chronology for the period. We need to get a second fix on a date in his reign in order to confirm his dates. Through an extraordinary stroke of good fortune, a fragment survives in Yi Zhoushu<sup>34</sup> that records the occurrence of an "untimely" eclipse of the moon in King Wen's 35th year: "It being the King's 35th ritual cycle, First month, bingzi (day 13), at the ceremony paying homage to the full moon. The King announced: 'The many...eclipse[s] is/are untimely.

You shall begin planning the succession" 維三十有五祀正月丙子拜望。王念曰多...食無時，汝開后嗣謀。 If our previous deduction (and that of Huangfu Mi) is correct, namely that the conjunction of 1059 took place in King Wen's

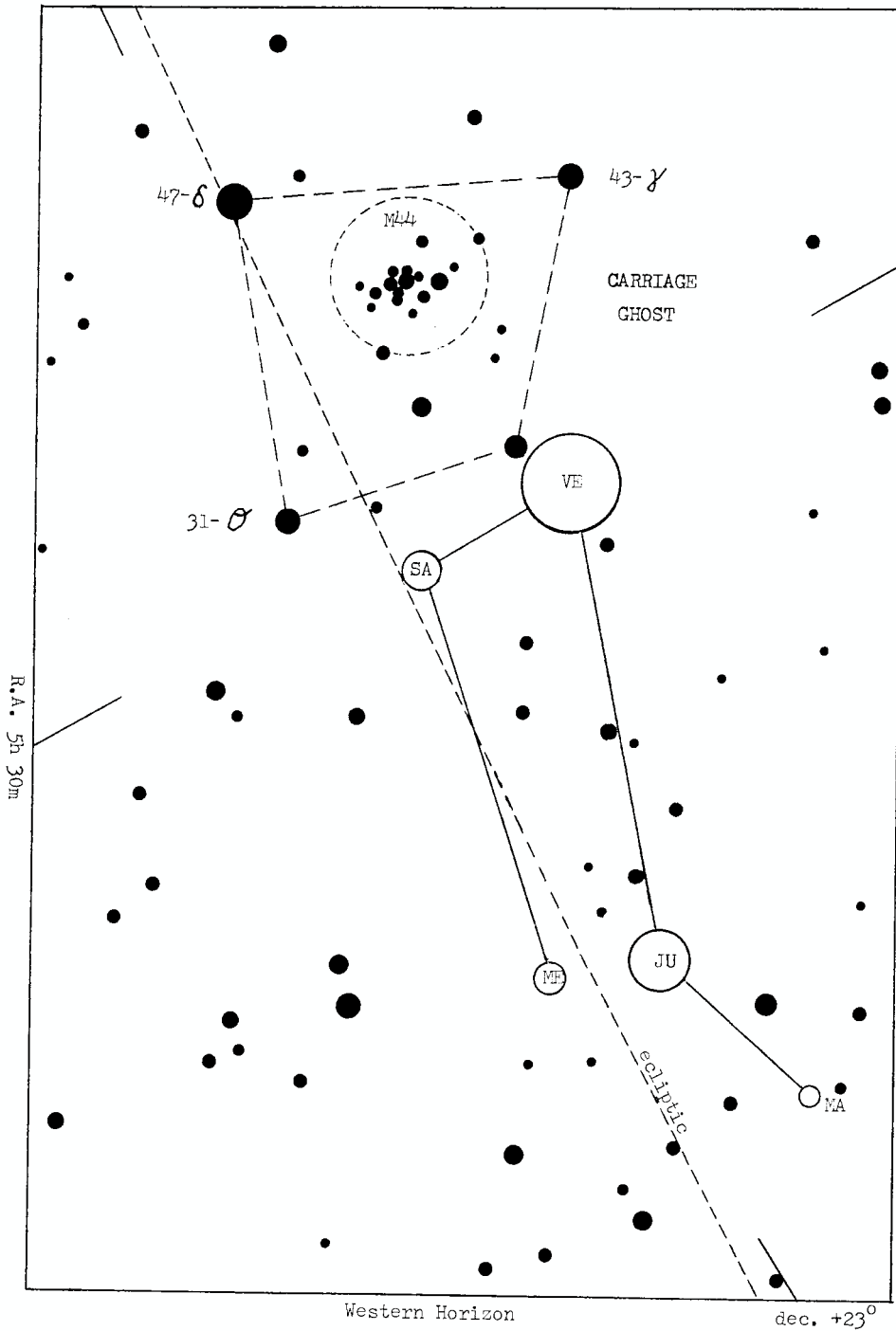


Figure 1. The conjunction of May 28, 1059 B.C. in Cancer ("Carriage Ghost"). Sizes of the discs reflect the relative visual magnitudes of the planets only, they are not in the same scale as the stars. At midnight on May 28 (JDN 133 4771.5) the locations were as follows: Mercury - 5h 11m 37.713s, +22° 46' 17.44"; Venus - 5h 28m 23.563s, +25° 12' 54.67"; Mars - 5h 00m 40.034s, +24° 11' 51.17"; Jupiter - 5h 09m 22.879s, +23° 35' 14.48"; Saturn - 5h 28m 37.104s, +23° 34' 33.97".

41st year, then 1065 B.C. must have been the 35th year of his reign. According to Tung Tso-pin's chronological tables, the full moon day of the third month in that year was bingzi (day 13), or 1065 B.C. March 12, JD 133 2503. That night at 2:35 a.m. local time in Qishan (i.e., in the early morning hours of March 13) there was a total eclipse of the moon lasting more than ninety minutes.<sup>35</sup> From this we may conclude that 1059 B.C. was in fact King Wen's 41st year on the throne of Zhou. Therefore he acceded to the throne in 1099 B.C. and died in 1050 B.C. The accuracy of Tung Tso-pin's cyclical day-dates for the period is confirmed by astronomical observations, thus justifying the extrapolation of the ganzhi back into the 11th century, at least as far as Zhou calendrical usage is concerned. Moreover, there is a distinct possibility zheng 正 in the date may be an error for san 三 which would make the year begin with the first lunation after the solstice, i.e., consistent with Shang practice. Otherwise, the identification of March as the first month suggests that the calendar in use in Zhou at the time followed the Xia convention which began the year with the second lunation after the solstitial month.

## Part 2

### Great Fire and Quail Fire in Zhou Astrology

Although the compilers of the Bamboo Annals clearly did not invent the account of the Mandate conjunction, the date assigned to it in the chronicle (1071 B.C.) is wrong by 12 years. Not only is the date wrong, the location indicated for the event in Scorpius is also off by more than 110°. <sup>36</sup> The conjunction did not take place in Lodge House #4 at the

center of Jupiter station Great Fire 大火 but on the boundary between the two lodges Eastern Well #22 東井 and Carriage Ghost #23, near the western edge of the Jupiter station known as Quail Fire. The question thus arises as to why the Bamboo Annals correctly record the phenomenon but not the time and place. The obvious implication is that at some point an unsuccessful attempt was made to determine the date (and thereby the location) of the conjunction; this result was then incorporated into the Bamboo Annals sometime after its compilation in early Eastern Zhou.

One might at first be led to conclude that whoever was responsible for assigning the location Scorpius to the conjunction simply did what Lei Xueqi 雷學淇 did in the early 19th century. In a comment on the entry concerning the conjunction in Zhushu jinian yizheng<sup>37</sup> he remarked: "Extrapolating on the basis of Jupiter's location in Quail Fire in King Wu's 12th year, in this year Jupiter was in the station Great Fire" 以武王十二年伐紂歲在鶉火推之,是年歲星正在大火之次. Lei has thus followed the venerable tradition recorded in Guoyu that Jupiter was in Quail Fire during the conquest campaign, added 12 years of King Wu's reign to 10 years of King Wen's reign (i.e., years 41 to 50 inclusive) to arrive at the total 22. Counting backward through the twelve Jupiter stations starting

with Quail Fire yields the location Great Fire, at whose center lies lodge House #4. But this explanation is misleading insofar as it downplays the role of Jupiter station Great Fire. This adjustment in the chronology for the period can be explained by the late Zhou preference for the tradition that implied that the star Great Fire would seal the fate of Shang; its authors remained unconvinced by another tradition that implied that the attack occurred in the 12th year of the Mandate rather than the 12th year of King Wu.<sup>38</sup>

According to the Zhou tradition, the Shang people coordinated both ritual and agricultural practices with the seasonal locations of Great Fire and Quail Fire. When the star Quail Fire first culminated on the meridian in spring they knew it was time to transport the hearth fires into the fields and to begin the agricultural season. In the same way, when Great Fire was on the western horizon at sunset in mid-autumn, they knew it was time to carry in the hearth fires and prepare for the rigors of winter. On this point a conversation in Zuo zhuan about a disastrous fire in the state of Song between the Marksman of Jin, Duke

Dao 悼公, and a certain Shi Ruo 士弱, is particularly informative. "The Marksman of Jin asked Shi Ruo, 'I have heard that in this instance it is known that Heaven was responsible for the disaster in Song. Why is that?' Shi Ruo replied, 'In ancient times, after his death the Regulator of Fire received sacrifices either at the time of the (asterism) Heart (i.e., Great Fire or Antares) or at the time of the (asterism) Beak (marked by Delta Hydrae in Quail Fire), when the people [first] brought out and carried in the fire. For this reason the Beak is called Quail Fire and the Heart is called Great Fire. In the time of Tao Tang (i.e., Yao) the Regulator of Fire, E Bo (son of Gao Xin), lived at Shangqiu and sacrificed to the (asterism) Great Fire, regulating the times when the people should light and extinguish the fires. Xiang Tu (grandson of Xie and father of the Shang people) succeeded him and continued in like manner. That is why the Shang principally offered to the asterism Great Fire. The Shang observed that their calamities and defeats invariably had their inception in Fire. Thus, because of the date (of the disaster in spring) it is known that Heaven was responsible.' The Duke asked, 'Can one be certain?' Shi Ruo replied, 'It depends on Heaven. If the State is disordered no omens appear in the skies, one cannot know for sure'"<sup>39</sup>

晉侯問於士弱曰，吾聞之，宋災，於是乎，知有天道，何故。對曰，古之火正，或食於心，或食於味，以出內火。是故味為鶉火，心為大火。陶唐氏之火正閼伯居商丘，祀大火而火紀時焉。相土因之。故商主大火。商人聞其禍敗之釁，必始於火。是以日知其有天道也。公曰，可必乎。對曰，在道國亂，無象，不可知也。

There are several things worthy of note in this fascinating passage. The first is the role of Great Fire and Quail Fire as seasonal markers, a subject to which we shall return presently. More important for the question at hand is the ambivalent relationship between the Shang people and Great Fire, the symbol



of a natural force, fire, at once feared and revered. The cause of the conflagration in Song is ascribed to heavenly chastisement of disorder because the disaster occurred at the time of year when Great Fire, i.e., the influence of fire, was in the ascendant.<sup>40</sup> It is also suggested that this correlation between calamities befalling the Shang (and their descendants, the rulers of Song) and the influence of Fire is one of long standing, dating back to the dynastic experience of the Shang people. This impression is confirmed by a laconic remark in Guoyu,<sup>41</sup> "Great Fire is the star of E Bo; this [star] in fact marked the period of the Shang people "

大火，閔伯之星也實紀商人。Wei Zhao 韋昭 comments that this indicates that the asterism marked not only calamities which befell the Shang but also good fortune bestowed on them. Liu Xin also understood the tradition in this way and asserted that Jupiter was in Great Fire when Cheng Tang, the dynastic founder, defeated Xia Jie, last "decadent" ruler of the Xia dynasty. Liu in fact attempted to calculate the location of Jupiter in Great Fire at the time in question.<sup>42</sup> Before we are through we will also be in a position to evaluate the validity of this interpretation. For the moment, however, we need only note that this tradition regarding the astrological role of the asterism Great Fire, or Antares in Scorpius, undoubtedly influenced the identification in the Bamboo Annals of the location of the conjunction which deprived Shang of the Mandate.

We have seen that Huangfu Mi already gave an account of the conjunction and its location in House #4 before the discovery of the text of the Bamboo Annals in A.D. 281. The Han apocryphal work Chunqiu yuanningbao also reports the Mandate-conferring conjunction and the same location.<sup>43</sup> We know too that

Liu Xin and his father Liu Xiang 劉向 (77-6 B.C.) were well acquainted with the chronology for the period of the Zhou conquest of Shang which we now find in the Bamboo Annals. In particular, Liu Xin knew of the traditional date (in his time) of 1050 B.C. for the conquest; he knew that King Wu was supposed to have reigned six years from this date and that King Cheng's first year was supposed to be 1044 B.C.<sup>44</sup> In addition, by the late Zhou and Han periods it had come to be widely believed that the conquest had occurred in King Wu's 12th year, just as we find in the Bamboo Annals. Hence, it is evident that the chronology from the supposed conjunction in 1071 B.C. to King Cheng's accession in 1044 B.C. was already current in the former Han dynasty. The trouble with this chronology, as Liu Xin pointed out in his alternative analysis (which Ban Gu 班固, A.D. 32-92, sanctioned by copying it into the "Treatise on Harmonics and Calendrical Astronomy" in Han shu) is that it confuses King Wu's year count with that begun with the First Year of the Mandate.<sup>45</sup>

One of the aims of this paper will be to show how this confusion came about as a direct consequence of two systematic errors which were separately introduced into the Bamboo Annals--the first, in early Eastern Zhou, resulting in a four-year backdating of the entire chronology for Shang and Western Zhou

(which I shall discuss in Part 6) and the second, in late Zhou times, resulting in an additional eight-year backdating of the Mandate conjunction to 1071 B.C. As we have seen, this latter error derives from the mistaken identification of Great Fire, rather than Quail Fire, as the location of the Mandate conferring conjunction. The two stations are eight years apart in the sequence. As a consequence of these cumulative errors, the span of time between the conjunction and the conquest was expanded by a total of eight years, from thirteen to twenty-one years, Di Xin's reign was lengthened by a total of twelve years, from forty to fifty-two years, and the period of King Wu's reign between his accession in Zhou and the conquest was expanded by eight years, from four to twelve years. The coincidence of this last figure with the date of the successful campaign against Shang in the Mandate calendar and the fact that campaigns began in the 11th year in both systems led to the confusion of the two. To understand the systematic errors in the chronology, however, it is necessary to elaborate on the astronomical analysis that led to their detection. First of all, this analysis showed that in reality, as we shall see, only one complete Jupiter cycle, from Quail Fire to Quail Fire, elapsed between the Mandate and the conquest.

## 2.1: The Identification of Quail Fire and the Red Bird

What is Quail Fire? Briefly, as a starry space it is functionally identical with that part of the asterism known as the Vermilion (or Red) Bird in which the summer solstice occurred in Shang and early Western Zhou times. How do we know? First, it is so defined in every pre-Han and Han source dealing with astrology or calendrical astronomy. One of the most concise statements of the significance of Quail Fire is a fragment of 5th century B.C. astrological lore, presumably from Shi Shen's 石申 Canon of Luminaries 星經, the influential work on Zhou astrology and astronomy which Sima Qian and Ban Gu extensively quote in their treatises on astrology. This statement is found on the Dunhuang manuscript copy of the colored star map of Qian Lezhi 錢樂之 originally constructed in mid-5th century A.D.<sup>46</sup> The caption on the section of the star map depicting the station Quail Fire reads: "From 90 in Willow, #24, to 170 in Spread, #26, the chronogram wu, is Quail Fire. 'The Southern Quarter is Fire' means to say that in the 5th lunar month when the yang influence (i.e., heat, light, fire, etc.) first reaches its peak, the Fire Star culminates at dusk. Seven Stars, #25, is the location of the Vermilion Bird, therefore it is referred to as 'Quail Fire.' It is the allotment of Zhou" 自柳九度至張十七度，於辰在午為鶉火。南方為火，言五月之時陽氣始盛，火星昏中，七星朱鳥之處，故曰鶉火周之分也。Although the degree figures represent the standardization introduced in the Han dynasty after the Tai Chu calendar reform of 104 B.C., this definition is clearly very ancient because by the mid-5th century B.C. when Shi Shen was active the summer solstice had already shifted out of the bird asterism and was located near

the western edge of Carriage Ghost #23, as we see in Figure 2.<sup>47</sup> This was a result of the westward precession of the equinoxes by approximately 1° every 72 years. The fact that this star map dating from about A.D. 940 perpetuates an identification of the summer solstice location already obsolete by the 9th century B.C. bears eloquent witness to the resistance of astrological traditions to change long after calendrical astronomers recognized the need for reform. At nightfall on summer evenings around the solstice in early Western Zhou, the Fire Star, Antares, would have been on the meridian. At the same time the center of the portion of the bird asterism known as Quail Fire, marked by the star Alpha Hydrae at the western edge of lodge Seven Stars #25, would have hovered on the western horizon. The name Quail Fire is thus a kind of mnemonic device for denoting this relationship between Great Fire and the Quail when the fiery yang force reached its height. For

example, the Han work Shangshuwei kaolingyao 尚書緯考靈曜 says: "The Bird Star is a token of spring, the Fire Star is the mark of summertime. As concentrations of yang force [they] mutually assist one another, [being] of the same essence [they] stimulate and respond [to each other]" 鳥星為春候, 火星為夏期。專陽相助, 同精感待。<sup>48</sup>

Second, the three lodges--Willow #24 柳, Seven Stars #25 七星, and Spread #26 張, which comprise Quail Fire are consistently referred to in astrological contexts in Zuozhuan, Shiji,<sup>49</sup> Han shu,<sup>50</sup> Erya<sup>51</sup> and elsewhere as "Beak" 喙, "Neck" 頸, and "Crop" 嗉, respectively, a clear indication of the ancient identification of this portion of the constellation Hydra as the body of a bird, as we see in Figure 3 on page 11. That these terms required glossing in Erya suggests that they were already considered rare or archaic in the Han dynasty.

Third, the name Bird Star (as well as Fire Star) occurs in Shang oracle bones from the reign of King Wu Ding (ca. 13th century B.C.).<sup>52</sup>

Fourth, both the Bird Star and Fire Star figure prominently in the "stars and seasons" fragment preserved in the "Canon of Yao" chapter of Shangshu, where their culmination at dusk is said to identify the medial months of spring and summer, that is, the vernal equinox and summer solstice. In his evaluation of this fragment, Zhu Kezhen 竺可楨 confirmed the identification of Alpha Scorpii or Antares as the Fire Star (R.A. 13h 35m in 1059 B.C.) and Alpha Hydrae as the Bird Star (R.A. 6h 55m in 1059 B.C.) and confirmed also that both would have accurately performed the function described in the 11th century B.C. or early Western Zhou.<sup>53</sup> It is a simple matter to check his results using the time of evening civil twilight at the latitude of Xian on the vernal equinox and summer solstice, together with the computed locations of the stars for the period in question.<sup>54</sup>

As we know from our own tradition, astrology is an extremely conservative science, particularly in regard to its terminology. The zodiac we still

recognize today ceased to have any validity in calendrical astronomy many centuries ago. The patterns we perceive among the stars near the ecliptic have not changed appreciably since the Greeks first identified them as figures from their own mythology. Astronomers and navigators still refer to the vernal equinox, or zero hours right ascension, as the "First Point of Aries," a designation which was astronomically correct in the time of Ptolemy. Hence, although the series of twelve names for the Jupiter stations in use in Shi Shen's time are, with the exception of Great Fire, unattested in the 11th century B.C., we can be confident at this point that the portion of the Bird asterism identified as Quail Fire by Shi Shen's time did in fact contain the summer solstice in early Western Zhou and was almost certainly known as the Red Bird, symbol of the sun.<sup>55</sup>

## 2.2: The Astronomical Significance of the First Red Bird Augury

We are now in a position to interpret the mythic language used in the sources quoted above to describe what the early Zhou people witnessed. In 1059 B.C. the portion of the Vermilion Bird asterism identified as Beak, Neck, and Crop occupied the range 5h 50m to 8h 46m in right ascension. On May 28 of that year the planets were gathered in the range 5h 01m to 5h 29m near the determinative star of Carriage Ghost #23, namely Theta Cancri at 5h 33m, and only 20m from the star marking the Beak of the Red Bird. A comparison of the azimuth of setting on the western horizon behind Qishan of the determinative stars in the Beak and Neck of the Red Bird, as we see in Figure 4, page 12, the reported observation of a Great Red Bird descending on Qishan, and the configuration of the five planets on that evening, confirms the identification of the planetary event near Quail Fire with the Red Bird augury. The jade sceptre or *gui* clasped in the beak of the Bird as it settled on Qishan was none other than the beveled blade-like shape formed by the five planets on that evening, shown in Figure 1. This was the famous "Luo Writing" (discussed in n. 18) that was displayed to King Wen prompting him to set his sights on the royal throne. We do not know for certain whether this particular part of the sky was already associated with the Zhou people in Shang astrology. We can be certain, however, that from this time forward not only the region of the heavens known as Quail Fire but also the color red, summer, and yang in the ascendant would be most intimately associated with the rise of Zhou.<sup>56</sup>

## 2.3: The Role of Jupiter in Zhou Astrology

Judging from the mid- to late-Zhou traditions the planet Jupiter played the central role in the Red Bird auguries by "energizing" this asterism through its presence there. The most concise statement of Jupiter's portentous resonances is found in the astrological commentary in the "Treatise on Astrology" in Jin shu (ca. A.D. 646), which draws heavily on the tradition of Shi Shen: "Predictions made by Jupiter as it advances or retrogrades refer



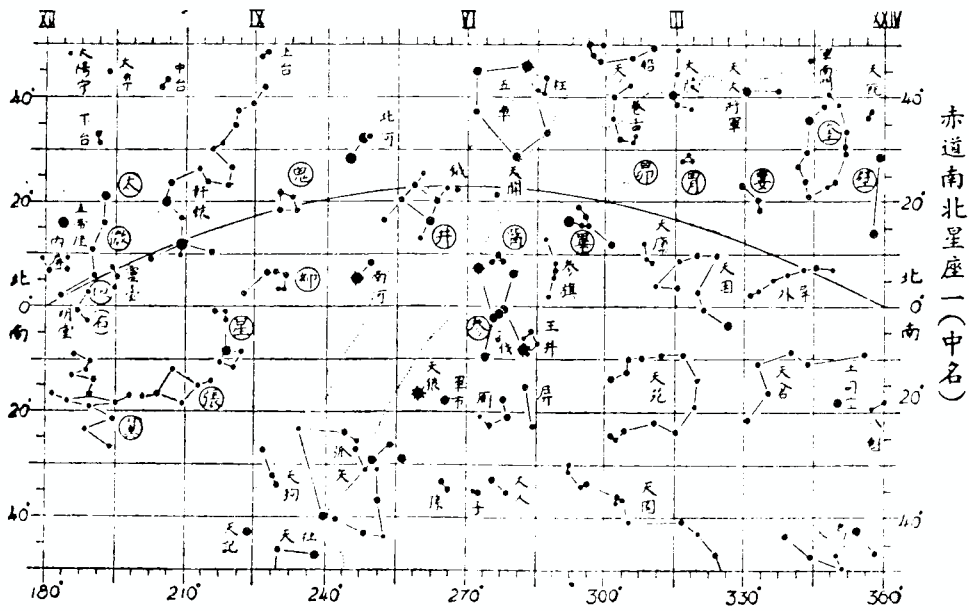
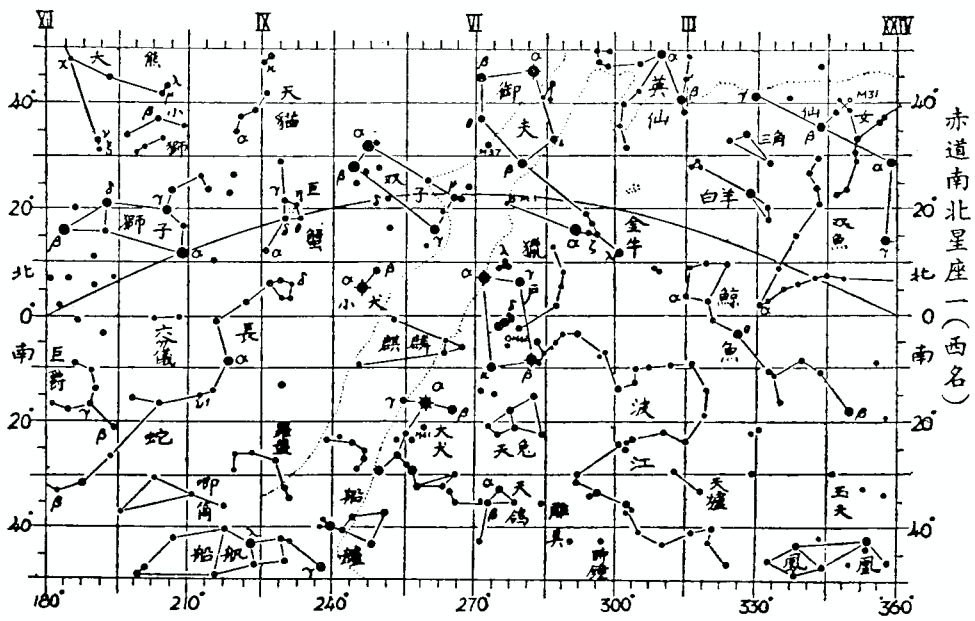


Figure 3. Comparison of Western (above) and Chinese (below) constellation configurations

The Vermilion Bird is located between long. 180° and 240° (Chinese system) in the lower chart, corresponding to the constellation Hydra or Changshe in the upper chart. Carriage Ghost straddles the ecliptic just above Willow, the "Beak" of the bird.



# Wei Ho Plain and Vicinity

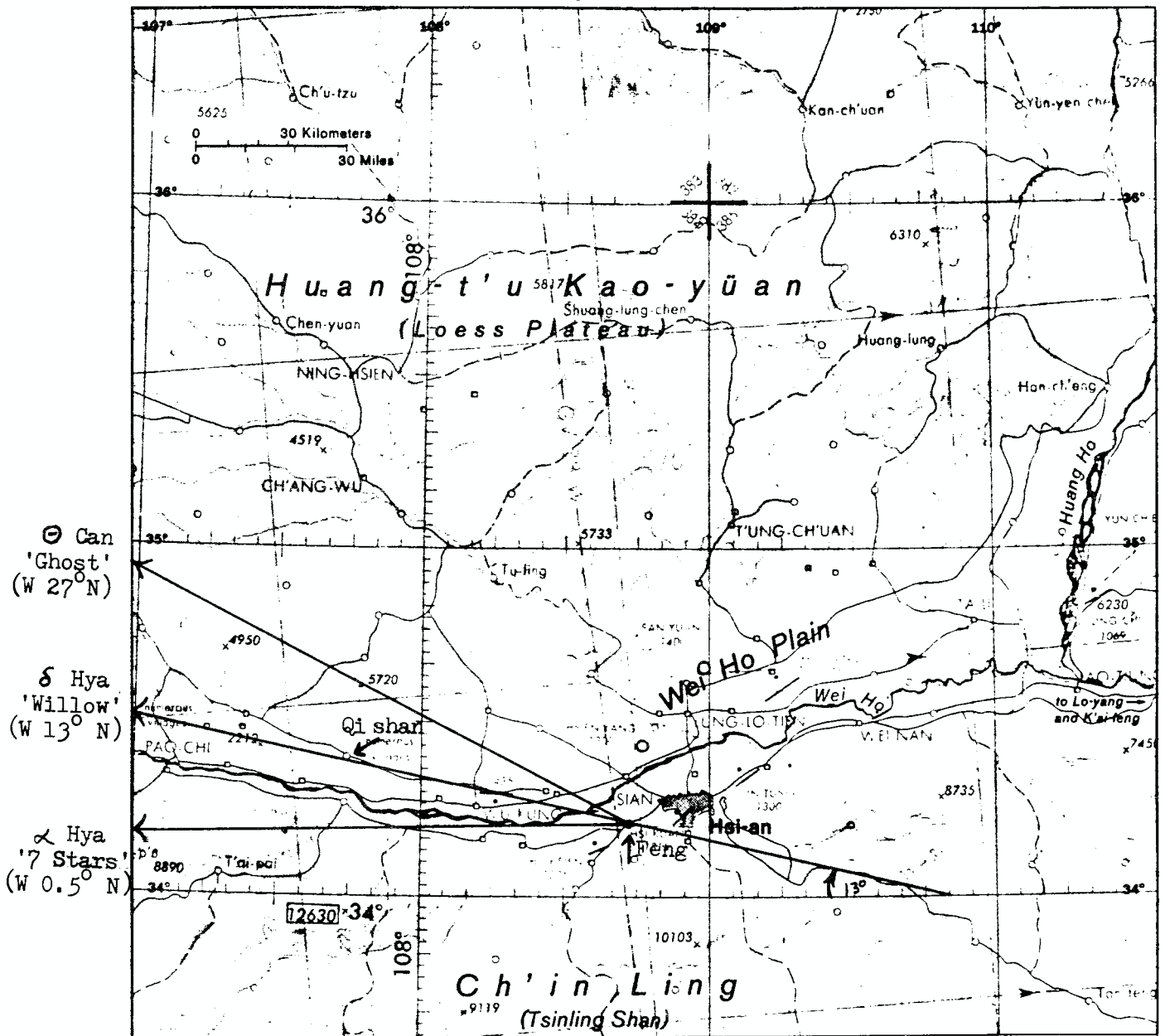


Figure 4. Locations on the western horizon where the conjunction in Carriage Ghost, "Beak", and the "Neck" of the Red Bird would have set May 28, 1059 B.C.

To an observer SE of Qishan, (e.g., in Qiyang, Fufeng, Feng, etc.) the asterism would have appeared to set or "alight" on the mountain.

to the State represented by the constellation it occupies. When Jupiter remains in a (particular) group it manifests the virtues of the State shown by that constellation, and a rich harvest can be expected. To wage war on this state would be fatal because disaster will fall upon its enemy. Happy tidings are foretold when Jupiter remains undisturbed in its path. When it advances or retrogrades and fails to observe the usual stages in its cycle, disaster will fall upon the State concerned. When this happens, launch no important projects and avoid using the army.... Jupiter also has the following functions: it governs transgressions of the official astronomers, the lesser Feudal Princes and the lords of men, and the harvest of the five grains.<sup>57</sup> That Jupiter was thought to govern the harvest is also the central theme of a fragment of the Jinzi 計倪子 book (ca. 4th century B.C.) which specifically identifies the three-year "seasons" of the Great Year, or 12-year Jupiter cycle, as determining the quality of the harvest by virtue of the particular influence (wood, water, fire or metal) associated with the quadrant occupied by

Jupiter's invisible correlate Taiyin 太陰.<sup>58</sup> This additional "agricultural" significance of Jupiter's presence in the Red Bird asterism is alluded to in one account of the augury witnessed by King Wu. Dong Zhongshu 董仲舒 (180-115 B.C.),<sup>59</sup> quoting from Shangshu dazhuan in his Chungiu fanlu, wrote: "When Zhou was about to arise a Great Red Crow clasping seeds of grain in its beak alighted on top of the King's abode. King Wu was delighted. The Great Officers were all delighted, and the Duke of Zhou exclaimed, 'Excellent! Excellent! Heaven has manifested this in order to encourage him (i.e., King Wu)'" 尚書傳言周將興之時有大赤鳥銜穀之種而集王屋之上者，武王喜，諸大夫皆喜，周公曰，「茂哉茂哉，天之見此以勸之也」。

We know from the mid-Zhou conventions documented in Shi Shen's Canon of Luminaries that it was the heliacal rising of Jupiter (i.e., just before the sun at dawn in the east) after conjunction with the sun that was the principal criterion in identifying the planet's location during the next 12 months of visibility.<sup>60</sup> This has been confirmed as the actual practice of late Zhou astrologers by the discovery of accurate ephemerides of Jupiter for the period 246-177 B.C. preserved in the Mawangdui manuscript entitled "Prognostications of the Five Planets."<sup>61</sup> The modern value for the synodic period of Jupiter (i.e., between successive conjunctions with the sun) is 398.884 days. For about 33 of these days the planet is actually invisible in the glare of the sun just before and after their annual conjunction. This means that from its first appearance at dawn in the east to its disappearance at dusk in the west 365+ days elapse. It is probable that the ancient designation of Jupiter as the "year star" suixing derives from this coincidence. The chronogram with which each of the 12 Jupiter stations was identified (e.g., Quail Fire with wu, the 5th lunar month) in practice indicated the month in which the conjunction of Jupiter with the sun occurred in a sui bearing that designation. In the case of Quail Fire it was the month containing the summer solstice. Since Jupiter's synodic period is slightly more than one month longer than the solar year, and since the planet progresses an average of 0.08° per day, Jupiter

in successive years will reappear one month later and roughly 32° farther along, that is, in the next chronogram. Because the planet's sidereal period is 11.86 years rather than 12 exactly, the Jupiter "clock" runs about 1.2% fast by comparison with the solar one. Consequently, Jupiter will gain about 4-1/4° for each circuit of the heavens (in geocentric terms) producing an eastward drift clearly noticeable in relation to the "stationary" lunar lodges which nominally identified the stations (Figure 2). This phenomenon of "station drift" was not clearly understood until Liu Xin's time, when he introduced a "leap chronogram" 超辰 every 144 years in an attempt to compensate. The correct figure is actually 83 years. The failure of Jupiter to play more than a nominal role in Zhou and later calendrical science was doubtless a result of this problem. According to Nathan Sivin, "Liu Xin's...short-lived innovation...amounted to no less than defining the mean year as 1/12 of the sidereal period of Jupiter (or its invisible counter-rotating correlate the Year Star 太歲)--that is, the interval required for the planet to pass through one duodecimal Jupiter Station 次--rather than as the interval between passages of the sun through the winter solstice."<sup>62</sup> This system soon proved unworkable and was rejected in A.D. 50 when Jupiter failed to "leap" one station as predicted.

This point is significant because it explains why the traditional astrological identifications of the Jupiter stations remained unchanged despite advances in calendrical science brought about by the effects of precession of the equinoxes. The planet was all the more important in judicial astrology, however, as Edward H. Schafer has pointed out: "The 'year star' Jupiter loomed magnificently over the astrologers of China from the earliest times--sometimes helpfully, sometimes frightfully. As a simple chronometer he had the virtue of measuring out, year by year, with fair precision, the 12 zodiacal positions occupied by the sun in successive months--reinforcing the solar cycle, as it were, at a slower pace....In the more theoretical parts of astrology Jupiter played a formidable role. The great year star was a concentration of power which irradiated the asterisms through which it passed with productive energy, but it detracted from the fulfillment of their potentialities when it failed to make timely appearances among its encampments (tz'u 次 'stages of an army's march'). Jupiter, then, was a mighty lord--but his whims could pass as divine law and his movements were those of a Juggernaut."<sup>63</sup>

## 2.4: Periodic Appearances of the Red Bird

Based on the Zhou conventions and the orbital characteristics of Jupiter, it is clear that the twelve months following Jupiter's heliacal rising after the conjunction of 1059 B.C. would have been identified as a typical Quail Fire sui. This is the case because after disappearing behind the sun in June of 1059, Jupiter reappeared at dawn in mid-July at 5h 56m in right ascension, just within the "Beak" of the Vermilion Bird asterism (Figure 2). This confirms Huangfu Mi's assertion that King Wen's 42nd

year was a Quail Fire year. Jupiter's appearance in Quail Fire was then repeated at 12-year intervals, in 1047 B.C. and 1035 B.C., since the sidereal period of Jupiter is 11.86 years. Even without considering the chronology of events, these two years immediately suggest themselves as likely candidates for the two subsequent theophanies of the Red Bird, the first when the campaign against Shang was launched by King Wu, and the second when King Cheng assumed the royal prerogatives and began to rule in his own right. Analysis of the Guoyu account quoted above reporting astronomical observations at the time the campaign against Shang was launched has now shown that the locations of Jupiter, Mercury, sun, and moon in late 1047 B.C. correspond satisfactorily to the critical conditions stipulated in Guoyu. By their very nature these observations, which appear to have had a seasonal significance, would necessarily have been made in the pre-dawn hours with Jupiter near the meridian and almost dead center in Quail Fire, the precise region of the sky that became astrologically associated with the Zhou. The location of Jupiter alone is sufficient to establish that the date lies between July of 1047 and July of 1046 B.C. Given the accuracy of the other observations, I believe the account preserved in Guoyu uniquely describes the situation in the heavens in late November and early December of 1047 B.C.<sup>64</sup>

### Part 3

#### The Red Bird at Luo and the Two Campaigns

With regard to the third appearance of the Red Bird in the year 1035 B.C., Leopold de Saussure<sup>65</sup> was one of the first to show that the dates contained in the "Luogao" and "Shaogao" Chapters of Shangshu for events in the seventh and last year of the Duke of Zhou's regency conform to the ganzhi extrapolated for the year 1036 B.C. This would identify the following year 1035 B.C. as the first year of King Cheng's personal rule. As indicated on the chart of ephemerides of Jupiter in Figure 2, Jupiter reappeared in the Red Bird in July of that year. At that time Venus was approaching maximum eastern elongation from the sun (43° on July 30) and would have been clearly visible well before sunset in the west, "canopying the Yellow River in company with the sun," as recounted in Songshu. Given the profound implications of the conjunction of 1059 B.C. and the intimate association of the Red Bird with the prodigy, it is not in the least surprising that both the conquest campaign and the assumption of the royal prerogatives by King Cheng should have been timed to coincide in some way with Jupiter's reappearance in this asterism.

But this is not all the evidence the astronomical analysis has to offer. One of the most puzzling problems relating to the conquest campaign against Shang is that there were in fact campaigns in two successive years. Before discussing this problem, however, a comparison of the account

of the conquest in Shiji with that in Han shu will be helpful.

#### 3.1: Liu Xin vs. Sima Qian

In view of Sima Qian's complaint about contradictory sources it is not surprising that Shiji should contain several non sequiturs in connection with the events of the conquest period. In the "Basic Annals of Zhou,"<sup>66</sup> for example, the victorious campaign is represented as beginning in the autumn of King Wu's 11th year and culminating in the victory on day ji in the 12th year, 2nd month. An earlier "show of the troops" is assigned to a 9th year. In the chapters on the genealogy of the houses of Lu and Qi,<sup>67</sup> however, Sima Qian is quite explicit that these are years in King Wu's reign, i.e., his 9th and 11th as ruler of Zhou, and that the Battle of Muye took place in the 1st month of the 11th year. This was perhaps supported by the "Preface" to Shangshu which gives the date as 11th year, 1st month, wuwu (day 55) when the troops forded the Yellow River at Mengjin. But then Sima Qian adduces the date wuwu in the "Basic Annals" where he makes it the 12th month of the 11th year. In the "Annals" Sima Qian also implies that the "9th year" expedition followed King Wen's death by two years; hence, the year count he is using could not possibly refer to King Wu's reign in Zhou, since that would mean that part of King Wen's reign was included. In addition, the "Taishi" or "Great Harangue" is associated with the convocation at Mengjin 2 years before the conquest in the genealogical chapter on the House of Qi, in the "Annals," however, the same oration is quoted at length and said to have been delivered after the allied troops forded the Yellow River at Mengjin just days before the successful assault on Shang.

As we saw above, it was commonly believed in late Zhou and Han times that the victory came in King Wu's 12th year. Nevertheless, Sima Qian was well aware of the tradition which held that King Wu carried on in his father's name and on his authority after the latter's death, since he consistently portrays King Wu in this light, which is discussed in Part 3.2. There is also little doubt that the historian was familiar with the tradition recorded in Shangshu dazhuan<sup>68</sup> that begins a new enumeration of King Wen's reign years with the year following the conferral of the Mandate. This new calendar is referred to as shouming yinian, ernian, etc., the first event recorded being King Wen's adjudication of the dispute between Yu 虞 and Rui 芮, shown in Table 2. Apparently, Sima Qian could not reconcile this Mandate calendar, which, in fact, is the correct one, with the other traditions, so that in his review of the same series of exploits he simply omitted the ordinals and wrote "next year . . . , next year . . ." In a summation at the very end of King Wen's reign, which he liberally salted with qualifying gai's "evidently," Sima reported what he must have considered somewhat less than trustworthy (or at least irreconcilable) traditions about the period.<sup>69</sup> There we read that King Wen expanded the Changes to 64 hexagrams, that as tradition has it he reigned 50 years, and finally that "evidently, in the year he received the Mandate he styled himself 'King' and resolved the dispute between Yu and Rui. Seven years later (although one version has 10) he died and was

posthumously given the honorific 'Gentle King.' He reformed the rules and measures and inaugurated a new calendar...."<sup>70</sup>

蓋受命之年稱王而斷  
虞芮之訟。后七年而崩，謚為文王，改法度，  
制正朔矣。

The version of *Shangshu dazhuan* on which Sima Qian relied undoubtedly had "7 years later he died," since this is how the text still reads, and since Sima Qian implicitly relied on this figure in constructing the account in the "Basic Annals" where the first attack on Shang takes place in a 9th year, 2 years after King Wen's burial at Bi. As I implied above, Sima Qian seems to be saying two things at once, namely, that the events of years 7 and 9 belong to the Mandate calendar, while the campaigns in the 9th and 11th years also belong to the enumeration of King Wu's reign. This contradiction undoubtedly caused the Grand Historian to sigh in resignation, but, true to form, he refrained from substituting his own construction for the facts as he saw them. He must have thought it the most reasonable course in his discussion of Wen's reign to suppress the year count of the new Mandate calendar and the report of King Wen's death in a "7th year" and to save them for a final comment on traditions of questionable historicity at the very end of the section summarizing King Wen's exploits.

As for the figure "7 years" for the length of time King Wen enjoyed the Mandate, it now appears almost certain that this is a construction traceable to the 4th century B.C. Yinli "solution" to the chronology problem to which I alluded in Note 4. In this scheme 1083 B.C. was the year King Wen received the Mandate and 1070 B.C. the year of the conquest. The year 1076 B.C. was calculated to be the first year of King Wu's reign, which means that King Wen would necessarily have died in the 7th year of the Mandate. Moreover, the account in the "Basic Annals" is contradicted by the "Wu Cheng" chapter of *Shang shu*<sup>72</sup> and *Yi Zhoushu* as quoted by Huangfu Mi in his *Diwang shiji*,<sup>73</sup> both of which clearly represent King Wen as alive in the 9th year. (We now recognize this to have been the 9th year of the Mandate calendar begun in 1058 B.C., as shown in Table 2.)

In addition to the above there is an even more fundamental disagreement between Liu Xin's account of the two campaigns and that found in *Shiji*. In the latter, Sima Qian is quite explicit that the two campaigns took place 2 years apart. However, *Shiji* takes no account of the sources dating the conquest to the 13th year, nor does Sima Qian give any indication that he was aware of the significance of Quail Fire or the 12-year cycle of Jupiter. As I pointed out, the campaign sequence in the "Basic Annals" is as follows: 1st campaign, 9th year; 2nd campaign, 74 11th year; conquest, 12th year, 2nd month. Liu Xin, on the other hand, is obviously attempting an astronomical analysis of the same events based on the crucial insight that one complete Jupiter cycle from Quail Fire to Quail Fire elapsed between the 1st year of the Mandate and the conquest. In his view King Wen died early in the 9th year of the Mandate; then, after 27 months of mourning (discussed in note 75) King Wu began marching the troops to Mengjin in the middle of the 11th year, only to decamp not long

after arriving. Liu then says: "[King Wu] withdrew and returned [to Zhou] for 2 years; thereupon he attacked [Shang] Zhou and conquered Yin; taking

Jizi [with him] he returned in the 13th year"  
還歸二年，乃遂伐紂克殷，以箕子歸，十三年也。

This he supports with a 13th year date from the "Hong Fan" Chapter of *Shangshu*, after which he states: "From King Wen's receipt of the Mandate to this was 13 years, Jupiter was again in Quail Fire...." From his subsequent discussion of the *Guoyu* astronomical data it is clear that Liu took the date of the successful campaign to be the autumn of the 12th year, the year after the aborted campaign. Hence, when he says King Wu withdrew for 2 years and then attacked (12th year in fall) and conquered (13th year, 2nd month) he was probably deliberately ambiguous because he knew he was contradicting *Shiji*. The figure "2 years" can be understood either as an inclusive count of 11 to 12 or as an exclusive count of 11 to 13. I believe he intended the former because there are several examples in the same con-

text where he invariably specifies "later" 后 so-and-so many days or years when he intends the figure to be taken exclusively (e.g., three days "later" from day 25 is day 28). Only once does he violate this practice because he has no choice when confronted with a passage from "Shaogao" which specifies a day (#32) "six days after" a full moon which Liu has calculated to have been day #27. Otherwise, he says 9 plus 4 years "later" equals 13; 5 plus 2 years "later" equals 7, etc. Although Liu Xin's faith in his calendrical formulas was certainly misplaced, I believe that he has been unjustly criticized for attempting what deserves to be characterized as a scientific analysis of the data available to him. My own research confirms that he was on the right track about the role of Quail Fire and in assigning the two campaigns to succeeding years.

### 3.2: The Aborted Campaign

We have already identified the astronomical date of the second successful campaign in 1047 B.C. which culminated in the victory at Muye on day *jiazi* of the 1st (or 2nd) lunar month of 1046 B.C. But what of the campaign the previous year? According to both *Shiji* and *Han shu*, King Wu unexpectedly met up with the various lords some 2 years after King Wen's demise, and inspected and harangued the troops at the ford of Mengjin a mere 120 km. from the Shang capital, only to turn around and retreat 460 km. to his own territory. Why? The "Basic Annals of Zhou" where it paraphrases the *Shangshu dazhuan* relates the events of this aborted campaign: "King Wu went up to sacrifice at Bi.<sup>75</sup> He marched east in a show of the troops as far as Mengjin. He fashioned the ancestral tablet of King Wen and transported it in a chariot amidst the army. King Wu, not daring to act on his own authority, styled himself 'Heir Apparent Fa' and said he was obeying the command of King Wen in attacking....He crossed the Yellow River. In midstream a white fish leapt into the King's boat, at which King Wu bent and retrieved it for the sacrifice.<sup>76</sup> After [the king] had crossed the river, a flame came down from above and reached the King's pavilion where it descended as a crow. Its



color was red, its cry gentle. At this juncture, before the appointed time, the 800 lords all met at Mengjin. All said, '[Shang] Zhou may be attacked!' But the King said, 'You do not know the Mandate of Heaven. It may not yet be done.' Thereupon he

withdrew the army and went home" 武王上祭于畢。東觀兵至于盟津。為文王木主，載以車，中軍。武王自稱太子發，言奉文王以伐，不敢自尊。武王渡河，中流，白魚躍入王舟中，武王俯取以祭。既渡，有火自上復于下，至于王屋，流為鳥，其色赤，其聲魄云。是時，諸侯不期而會盟津者八百諸侯。諸侯皆曰：「紂可伐矣。」武王曰：「女未知天命，未可也。」乃還師歸。

From all appearances this should have been a propitious time to launch an attack, yet King Wu is portrayed as dissuading his eager allies and suggesting that they could not interpret the will of Heaven. As a result, what must have been an arduous expedition came to nothing. What could have happened to cause the campaign to be aborted in such an abrupt fashion so near the objective? The tables of planetary longitudes provide us with a possible explanation. We have seen that the location of Jupiter had great astrological significance. This was particularly true in connection with military campaigns. The point is stressed in Zhou and Han astrological texts that "the state wherein Jupiter is located may not be attacked, but it may attack others" 歲星所在之國不可伐，可以伐人。<sup>77</sup> This refers of course to the correspondence between the terrestrial and celestial regions, just as we saw in *Guoyu* where Quail Fire is identified as the region associated with the Zhou for astrological purposes. After the death of King Wen and the completion of the prescribed mourning period, King Wu doubtless found himself obliged to wait until Jupiter moved into favorable position to launch such a momentous undertaking as the assault on Shang. In other words, he needed a sign from Heaven. He thought it had come when Jupiter was seen to advance steadily toward the "Beak" of the Vermilion Bird throughout the summer and early autumn of 1048 B.C. By late July it had reached 70°, only 7° from the location of the very conjunction that had conferred the Mandate of Heaven on his father in 1059 B.C. As the autumn military season approached the armies were mobilized and eventually marched to the staging area at Mengjin, on the south bank of the Yellow River. Support was hastily mustered from the lords of the western regions who rallied to the cause and converged on the ford on the Yellow River.<sup>78</sup>

What happened then must have placed King Wu in a desperate dilemma, for Jupiter suddenly failed to cooperate. For months the planet had steadily progressed eastward towards the asterism known as the Red Bird, and by October 6 it was at 78° (R.A. 5h 12m), the precise location of the conjunction 11 years earlier. At this point Jupiter stopped and refused to proceed for a full month, doubtless to the Zhou leaders' great consternation.<sup>79</sup> They must have realized that when the planet again began to move (after November 5, 1048 B.C.) it would not continue in the direction of the Red Bird, but, as always after stationary episodes, would begin to retrograde toward the west. It would not actually return to

enter the asterism Red Bird or Quail Fire until July of 1047 B.C., the following year. Interpreting the retrogradation of Jupiter away from the vicinity of Quail Fire as a sign to withdraw would be consistent with what is known of later practice. In Shi Shen's *Canon* we read: "When Jupiter retrogrades its state may not raise troops. When the planet progresses troops properly advance, when it retrogrades troops properly retreat" 歲星逆行其國不可以興兵。星順兵宜進，星逆兵宜退。<sup>80</sup> But for the massed armies under the nominal leadership of King Wu this must have been an extremely disconcerting turn of events. One can imagine what powers of persuasion King Wu would have been called upon to muster to keep such an uneasy coalition of forces under control. If this interpretation is correct, it provides another forceful demonstration of the powerful influence of planetary events on the political and military developments in early Western Zhou.

#### Part 4

#### Jupiter, Conjunctions, and Chronology

It is apparent from the reconstructed chronology of the period seen in Table 2 that in the minds of the Zhou people the *de jure* conclusion of the Shang dynasty came in 1059 B.C. with the transfer of the Mandate of Heaven to King Wen. This was signified by the promulgation of a new calendar reckoning the years of the new dynasty from the First Year of the Mandate, 1058 B.C. It is also quite evident that the *de facto* overthrow of the Shang at Muye came on January 20, 1046 B.C. (JD 133 9391), the next *jiazi* day after the astronomical observations recorded in *Guoyu* were made, some seven weeks earlier. Just as Liu Xin and Huangfu Mi correctly deduced, only one complete Jupiter cycle elapsed between the Mandate and Conquest.

It is curious that neither Sima Qian nor Liu Xin actually mentions the planetary conjunction associated with the conferral of the Mandate. It is almost certain that they had heard of it since Huan Tan 桓譚 (33 B.C.–A.D. 39), a contemporary of Liu's, clearly had, even though he collapsed the general conjunction on day *jiazi* and the Battle of Muye on day *jiazi* into a single event: "In the fourth month Heir Apparent Fa went up to sacrifice at Bi. Then he went down as far as Mengjin. At this time King Wu had already completed the three-year mourning period and desired to complete his father's enterprise. When he rode the boat and caught the fish it was Earth's sign to him. When the smoke of the sacrifice brought down the crow it was Heaven's sign to him. Within 2 years he heard that [Shang] Zhou had killed Bi Gan and imprisoned Jizi. The Grand Master and Lesser Master [of Shang] fled to Zhou carrying the musical instruments. On day *jiazi* the sun and moon were like connected bi jades, the five planets like strung pearls. In the twilight hour King Wu arrived at dawn at the southern suburb of Muye, following [the command] of Heaven to punish [Shang] Zhou. Therefore the blades of the weapons were not bloodied and the Empire was pacified"<sup>81</sup> 維四月太子發上祭于畢，下至盟津之上。此武王已畢三年之喪，欲卒父業。升舟而得魚，

則地應也。燬祭降為天應也。二年閏紂殺比于囚箕子。太師少師抱樂器奔周。甲子日月若連璧五星若連珠。昧爽武王朝至于南郊牧野，從天以討紂。故兵不血刃而定天下。

Liu Xin probably discounted the tradition because his Triple Concordance System led him to the conclusion that such momentous events could occur only at intervals of 138,240 years.<sup>82</sup> He also ignored the gathering of planets in 205 B.C. at the very beginning of the Han dynasty, which was recorded in *Shiji*,<sup>83</sup> probably for the same reason. Preoccupation with grandiose numerological schemes seems to have prevented Chinese mathematical astronomers from bridging the discontinuity between their cyclical theories and observed phenomena, particularly planetary conjunctions, which continued to be unpredicted and therefore ominous even in the Tang dynasty. Conjunctions of the planets were regularly and accurately reported in the histories, but no account appears to have been taken of them in the construction of calendrical systems.

The period of Jupiter is another story, however. Almost without exception, every attempt to establish the date of the Zhou conquest since Eastern Zhou times has made use of what was currently supposed to be the sidereal period of that planet. Lin Xin, for example, was five years early in calculating 1123-22 B.C. to have been a Quail Fire *sui*. This is demonstrably the result of his use of the figure 11.92 years for the sidereal period of Jupiter, which while an improvement on the crude Zhou figure of 12 years still produced a substantial error at a remove of 1,000 years. (The modern figure for Jupiter's sidereal period is 11.86 years as indicated above.) Despite consistent improvement in knowledge

of the periods of the planets, Yi Xing 一行 (fl. ca. A.D. 721), one of the foremost calendrical astronomers of the Tang period, hardly disagreed with Liu as far as the location of Jupiter was concerned. He merely moved the date of the conquest down one Jupiter cycle to 1111 B.C. In fact, Yi Xing actually believed that Jupiter speeded up by some 30 per cent between the Shang and Warring States periods.<sup>84</sup> Given such handicaps, neither he nor Liu Xin would have been capable of fabricating the astronomical accounts we have been considering.

## Part 5

### The Mandate of Shang

Attempting to determine the periodicity of planetary events such as the conjunction of the five planets in 1059 B.C. I discovered that this phenomenon is properly defined as a Triple Conjunction of Jupiter, Saturn, and Mars and that the presence of Mercury and Venus in the immediate vicinity was coincidental. As I indicated earlier, the Triple Conjunction period has a mean value of 516.33 years, precisely 26 times the 19.859 year period of the heliocentric conjunction of Jupiter and Saturn. This means that the event of A.D. 1524 in Aquarius referred to in the Introduction belongs to the same series as that of 1059 B.C. It occurred to me that there may indeed be some foundation to the suggestion by Herbert Chatley that there is a connection between this period and that given in Mencius for the

appearance of sages.<sup>85</sup> Mencius<sup>86</sup> believed that "slightly more than 500 years" 五百有餘歲

separated Yao 堯 from Tang 湯, Tang from Wen, and Wen from Confucius. In fact, 508 years separated the Mandate-conferring conjunction of 1059 B.C. from the birth of Confucius in 551 B.C. (According to the *Bamboo Annals* chronology, however, this span would have been 520 years, due to the 12-year error in dating the Mandate conjunction to 1071 rather than 1059 B.C.)

In addition to the Triple Conjunction period of 516.33 years, however, Chatley has also noted that Jupiter, Saturn, and Mars have a close approach every 178.74 years (i.e., 9 times 19.859).<sup>87</sup> Although not as impressive as the conjunction of 1059 B.C.

such a "gathering" 聚 or alignment would have been astrologically indistinguishable from the event associated with the founding of Zhou because of the lack of detailed records of the earlier occurrence. A gathering in May of 205 B.C. in which the planets were spread over more than 30° in longitude was thought to confer legitimacy on the founding of the Han dynasty.<sup>88</sup> Triple Conjunctions at intervals of 516 years occurred in 27 B.C. and 543 B.C. The first was recorded in detail in *Han shu*, together with astrological commentary.<sup>89</sup> Records of the conjunction of 543 B.C. on the other hand are nowhere to be found. They are not even in the *Bamboo Annals* where one might expect to find such a record if the 516-year period had been recognized by a later interpolator. There was one more conjunction of planets recorded in the early Spring and Autumn period; it will be convenient, however, to discuss it in another connection below.

When we pursue this line of inquiry and examine the records of astronomical phenomena in the *Bamboo Annals* for the period before the Zhou conquest the result is astonishing. In unmistakable language and in exactly the right year in terms of its own internally consistent chronology, the *Bamboo Annals*<sup>90</sup> give an account of the Triple Conjunction 517 years before that witnessed by King Wen in 1059 B.C. In the 10th year of Jie 桀, last ruler of the Xia dynasty, we read the following: "The five planets progressed 'criss-cross' fashion.

In the middle of night the stars fell like rain"

五星錯行。夜中星隕如雨。

According to the *Bamboo Annals*, after this portent Jie's dissolute reign endured 21 more years before being terminated by Cheng Tang, founder of the Shang dynasty. Thereafter, according to a comment appended to the last entry in the annals of Shang in both "current" and "genuine" versions of the *Bamboo Annals*, Shang endured for 496 years: "From Tang's annihilating Xia down to Zhou [Xin] there were 29 kings and 496 years" 湯滅夏以至于受二十九王用歲四百

九十六年. The same figure of 496 years for the duration of the Shang dynasty is found in the Han apocryphal work *Yiwei jilantu*.<sup>91</sup> In addition, as both Chen Mengjia 陳夢家<sup>92</sup> and Tung Tso-pin<sup>93</sup> have pointed out, the figure 496 years for the period of the Shang dynasty down to the Receipt of the Mandate

by Zhou forms an integral part in the reconstruction of the early chronology by the so-called Yinli 殷歷家 School of calendrical astronomy which was very influential from the 4th century B.C. until the later Han period. As Wang Guowei<sup>94</sup> has noted, the sum 496 years is irreconcilable with the total of the reign lengths in the Bamboo Annals of each of the kings of Shang (508 years) reckoned from Tang's succession in his 18th year as lord of Shang down to Shang Zhou's defeat in his 52nd year. Notice, however, that 496 years as the total length of the Shang dynasty plus the 21 years remaining to Xia Jie after the planetary event in his 10th year equals 517 years--precisely the period of the Triple Conjunction. This means that the comment containing the figure 496 years has reference to the de jure conclusion of the Shang dynasty signified by the transfer of the Mandate<sup>95</sup> in 1059 B.C., not to the de facto conclusion in 1047 B.C. The period it indirectly identifies is that from Mandate conjunction to Mandate conjunction --1059 + 517 = 1576 B.C., in which year the tables of planetary longitudes do indeed record a Triple Conjunction again joined, as luck would have it, by Mercury and Venus. This event occurred in Sagittarius in November and December of 1576 B.C., but it was no ordinary conjunction because the sun marched right through the middle of the cluster of planets while it was taking place. The observable result was that the planets successively vanished from the western horizon where they had been visible at dusk, only to reappear successively near the eastern horizon at dawn four weeks later. The curious phrase 五星錯行

(discussed below) undoubtedly represents an attempt to describe this strange phenomenon. Moreover, the month of December now boasts two prominent meteor showers, the Geminids and the Beta Ursids, which reach their peaks on December 14 and 20 respectively (early November in 1576 B.C.).<sup>96</sup>

Besides being a component of the equation  $496 + 21 = 517$  years, we also notice that the sum of the reigns of the Shang kings in the Bamboo Annals also equals 496 years--that is, 508 years, minus the 12 years we have already ascertained to have separated the conjunction of 1059 B.C. from the de facto last year of Shang, 1047 B.C. All of this adds up to the compelling suggestion that these figures must derive from authentic Western Zhou (and ultimately Shang dynasty) sources. The annals in whose chronology they acted as benchmarks must have been compiled at a time in early Eastern Zhou when the relation between the equations  $496 + 21 = 517$  and  $496 + 12 = 508$  and the astronomical phenomena of 1059 and 1576 B.C. was still understood. (As we shall see, the 4-year error in the date assigned to the Conquest--1050 B.C. vs. 1046 B.C.--in the Bamboo Annals also dates from the same period, not long after the collapse of Western Zhou and the sack of its capital in 771 B.C.) The significance of the figure 496 years, still dimly understood by the Yinli chronologists, was lost on Liu Xin.<sup>97</sup> In spite of the comment containing this vital piece of information in the Bamboo Annals, its role in the chronology was consistently misunderstood even after the recovery and reconstruction of the chronicle in A.D. 281. As we saw above in Huan Tan's account of the year of the Zhou Conquest, one tendency was to collapse the two events, Receipt of the Mandate and the decisive

battle, into one, thus confusing the important distinction between the portent preceding the dynastic change, i.e., the de jure conclusion, and the physical destruction of the last ruler, the de facto end of the dynasty.<sup>98</sup> This basic error, in one form or another, has bedeviled almost every attempt to reconstruct the chronology until now.

## 5.1: The Conjunction of 1576 B.C.

In addition to the planetary phenomenon there are reports of numerous disasters during Xia Jie's reign. The Bamboo Annals record an earthquake in Jie's 10th year and the fact that the Yi 伊 and Luo 洛 Rivers ran dry (presumably as a result of the tremor). Later, in the 29th year we read that "two suns simultaneously appeared" 二日並出 and elsewhere that "two suns contested [which would be] eclipsed" 兩日鬪蝕.<sup>99</sup> Other sources expand and embroider on these and other eerie signs of disruption of the natural order such as extremes of weather, crop failures, etc., all of which are attributed to the dissolute behavior of Jie. Some of them may ultimately be attributed to the planetary alignment,<sup>100</sup> however, as recent research seems to indicate.

The event described by the phrase wuxing cuoxing which I have provisionally rendered "the 5 planets progressed in 'criss-cross' fashion" was not recognized as a conjunction by commentators because of the peculiar term cuoxing used to convey the motion of the planets. Although cuo has a basic meaning of "to inlay," "to place something between or amongst others," "to interpose," by extension it has also come to mean "in succession," "mixed up," "confused," and "at cross-purposes" as well. Interpreters of the account clearly took the term cuoxing in the latter sense. For example Riyue wuxing tu<sup>101</sup> 日月五星圖 has: "In the last year[s] of Jie the five planets criss-crossed, curved arrows descended, and the Spirit of Fire appeared" 桀末年五星交錯, 枉矢流, 火神見. If we were to interpret "criss-crossed" to mean "interchanged" or "switched places," which is within the realm of the physically possible, the event described would appear to be no more than the perfectly ordinary overtaking of the slower outer planets, Jupiter, Saturn, and Mars, by the swifter Venus and Mercury. This commonplace sight is hardly the sort of rare observation one would expect to inspire forebodings of dire consequences. One suspects that a vital element is missing from the explanation, something that was lost on the subsequent chroniclers and commentators. This something has turned out to be the behavior of the sun during the conjunction, to which I alluded above. The relevant portion of the tables of planetary longitudes is reproduced below:



1576 B.C.	Sun	Me	Ve	Ma	Ju	Sa
Nov 7	213°	227°	224°	206°	227°	234°
17	223	242	237	213	229	236
27	233	252	250	221	231	237
Dec 7	243	248	262	228	234	238
17	253	236	275	236	236	239

From the tabulated longitudes it is clear that all five planets, with the exception of Mars, would have been visible in close proximity to one another in the evening twilight in early November of 1576 B.C., since all were three-quarters of an hour or more east of the sun. By about the third week of November, Mars was still invisible near the sun and Jupiter and Saturn were about to be overtaken and disappear in the sunset. Venus and Mercury were still clearly visible as evening stars, although Mercury would soon begin to retrograde and vanish from the western horizon. By the end of the first week in December, Jupiter and Saturn were both overtaken but still invisible in the glare of the sun. Mars was already rising an hour or so before dawn on the eastern horizon. Mercury had begun to retrograde and was too near the sun to be visible, while Venus continued to make steady progress in advance of the sun and remained an evening star. Shortly before dawn on the eastern horizon on December 17, Mercury, Mars, and Jupiter were all in conjunction with Saturn, a mere 3° east. At their first reappearance they would have thus been seen to emerge on the eastern bank of the Heavenly River at the Ford in Separated Wood, as we see in Figure 5. Venus, the metal star 金星, remained aloof as an evening star throughout, setting approximately 1-1/2 hours after the sun.

The behavior of four of the five planets, which mimicked the sun's daily disappearance in the west and reappearance in the east, is perfectly ordinary as an individual phenomenon but not as a group performance. A proper understanding of what actually took place in the skies that winter yields powerful insights into the astronomical aptitude and cosmological beliefs of those early Chinese observers when we examine the language used to describe the events. The etymonic element xi 昔 of the character cuo 錯 in its earliest form in the oracle bones is written 𠄎 or 𠄏, comprising "sun" 日 and an expanse of water 𠄎. In the oracle bone inscriptions xi consistently has the meaning "the past," as opposed to the present, and refers indiscriminately to any time from one to several days (later even years) in the past.<sup>102</sup> For example, we find these texts at S161.3:

(後上 28.3) 丁亥卜, 般貞昔乙酉籛旋  
 𠄎 𠄎 𠄎 大甲祖乙百鬯百羌 卯三百 𠄎

"Crack on dinghai (day 24), Que divining: 'On the preceding yiyou (day 22) fuxuan (ritual?); perform exorcism to...Taijia and Ancestor Yi offering one hundred measures of aromatic liquor and one hundred Qiang captives, and mao-sacrifice three hundred....'"

(前 4.27.3) 癸未卜, 貞昔丁丑....

"Crack on guiwei (day 20), divining: 'On the preceding dingchou (day 14)....'"

(菁 5.1) 四日庚申亦有來媿自北。子誓告曰「昔甲辰方征于蚩俘人十又五人。五日戊申方亦征俘人十又六人」。六月在囚

"On the fourth day gengshen (day 57) again there came trouble from the north. Prince 誓 announced, 'On the preceding jiachen (day 41) Fang (people) attacked You and took fifteen captives. On the fifth day wushen (day 45) Fang again attacked and took sixteen captives.' In the sixth month, at...."

In later usage 昔 (GSR 798 sjǎk), which is cognate with xi 夕 (GSR 796 dzjǎk), frequently means "yesterday," "night," as well as the more general "previously," or "formerly." For example, in Chungiu<sup>103</sup> we read, "Xinmao (day 28). Last night the fixed stars did not appear" 辛卯, 昔恒星不見; in Zuozhuan,<sup>104</sup> "the space of one night" 一昔之期; Mengzi,<sup>105</sup> "Yesterday I was ill, today I am better" 昔者疾今日愈; Zhuangzi,<sup>106</sup> "That is like going to Yue today and arriving there yesterday" 是今日適越而昔至也.

From the usage reflected in these and other passages<sup>107</sup> I believe we may conclude that the basic concept which the oracle bone graph 𠄎 is intended to represent is a passage of the sun through the watery void beneath the earth, that is, the sun's "gloomy night journey back to the east."<sup>108</sup> The most recent occurrence of this phenomenon, "last night," thus constituted a convenient natural demarcation between "today" and, not simply yesterday, but all past time. In other words, the distinction drawn by the early Chinese was between today and "before today." In this the function of xi closely parallels that of yi 翌 "next day" and lai 來 "the coming," although it is not nearly as common. This explains why xi in later usage could mean anything from "last night," "yesterday" to "formerly," or "anciently."

If this interpretation of the root meaning of xi is correct, then the original account of the conjunction of 1576 B.C. was an extraordinarily apt characterization of this planetary event: "The five planets regressed (like the sun from west to east) through the watery void." The subsequent addition of the metal signfic 金 to form cuo 錯 appears only to have obscured the original meaning. Once the phenomenon described is recovered, something the commentators were unable to do, the precise sense in which cuo 錯 "contrariwise" is to be taken becomes apparent.

When Mercury, Mars, Saturn, and Jupiter re-emerged west of the sun, as I pointed out above, they could have been observed just before dawn near the eastern bank of the Milky Way. At the same time they would have been thought to have just completed the watery transit of the void from west to east. Venus, on the contrary, did not accompany the others but continued to put more and more distance between it and the setting sun. As in the case of the augury



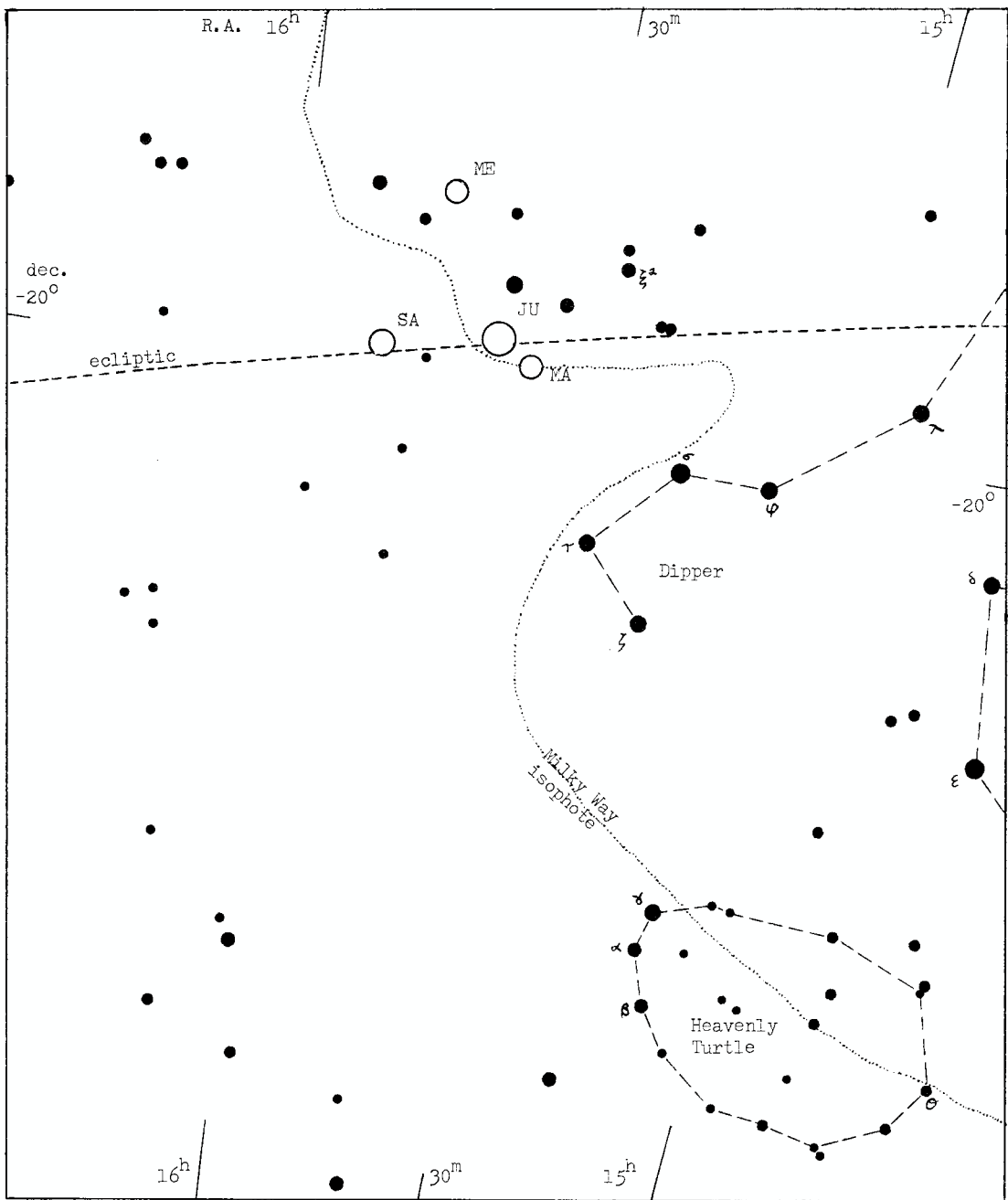


Figure 5. Configuration of Mercury, Mars, Jupiter, and Saturn on December 16, 1576 B.C., shortly after becoming visible in the pre-dawn sky

The locations were as follows: Mercury, R.A. 15h 45m, dec. -16°; Mars, R.A. 15h 34m, dec. -20°; Jupiter, R.A. 15h 39m, dec. -19.5°; Saturn, R.A. 15h 51m, dec. -20°.

witnessed by King Wen, Lüshi chungiu<sup>109</sup> again has preserved a striking account, albeit couched in oracular language. We read that "in the time of Tang, Heaven first displayed a metal blade emerging from the water. Tang observed, 'The influence of metal has achieved supremacy.' Therefore as his color he favored white and in his undertakings he emulated metal" 及湯之時天先見金刃生於水。湯曰「金氣勝故其色尚白其事則金。

By recalling now that Venus is the Metal Star, we see that it is possible that this represents the astrological interpretation of the planetary events we have been discussing. Just as in the case of the conjunction of 1059 B.C., two accounts of the event have survived, one a straightforward description of the phenomenon in "technical" language and the other the stuff of which myths are made.

At first reading I was tempted to interpret this portent and commentary as a description of the configuration of the 4 planets as they emerged from the Heavenly River (Figure 5), that is, along more or less the same lines as the Red Bird augury associated with the Mandate of King Wen. It was not at all clear, however, what sort of "metal blade" the court astrologer had in mind. Then I reflected a bit more on what the early Shang people had actually witnessed. The conjunction of planets is an unusual enough phenomenon in itself, yet what took place was noted by the recorder in almost matter-of-fact language in the Bamboo Annals. Why Venus, brightest of the five, was not overcome and immersed in the watery void like the others, on the other hand, must have really set the astrologers to thinking. This "enigma within an anomaly," the unique item that stands out from an already extraordinary background, may be the kernel of fact behind the astrological pronouncement. For this reason I prefer to interpret the metal blade emerging from the water to refer to Venus, the Metal Star, as it outpaced the other planets and rose higher and higher above the western horizon at sunset all the while the others were disappearing in the void. But however one chooses to interpret the portent, the association of the color white and the element metal with the Shang is just as clear as that of red and fire with the Zhou in the Red Bird augury reported in the same context. If, as I have suggested, these statements represent the astrological and cosmological explication of the two Mandate conjunctions, then "five phases" speculation based on planetary phenomena appears to have had a much longer history than previously recognized. In my view, given our present knowledge of the Mandate conjunctions, it seems hardly likely that the portent texts in Lüshi chungiu could have been fashioned from whole cloth many centuries after the events they purport to describe.

5.2

## 5.2: Great Fire and the Founding of Shang

As I pointed out above, Guoyu and Zuozhuan both preserve accounts of a tradition according to which the Shang people had a special relation to Great Fire or Antares, the symbol of a powerful natural force whose influence was believed to have been instrumental in delimiting the term of the dynasty. We have already seen how this tradition induced the

late Zhou chroniclers to locate the conjunction of 1059 B.C. mistakenly in lodge House in station Great Fire. Now that we have established the competence of the early Shang people as observational astronomers in the mid-2nd millennium B.C., it will perhaps come as no great surprise that the tradition about Great Fire is also correct.

According to the Bamboo Annals the final defeat of Xia Jie came with his exile in his 31st year, 21 years after the planetary event in 1576 B.C. (dated to 1580 in the Bamboo Annals). The decisive battle is said to have been fought at Mingtiao 鳴條, during a violent thunderstorm in what must have been the year 1555 B.C. Perhaps not coincidentally, Jupiter and Saturn met again in August of that year in their regular 19.859-year heliocentric conjunction. The following year, 1554 B.C., Cheng Tang's 18th as lord of Shang, he "completed" 成 the transfer of the Mandate begun during the reign of his father Shi Gui 示癸 and founded the Shang dynasty. The Jupiter sui from October of 1554 to October of 1553 B.C., during which time the planet was visible in the range 11h 56m to 13h 36m, was an unambiguous Great Fire sui, even by 6th century B.C. definitions. Antares's heliacal rising in that year occurred on or about October 26 (at latitude 35° N), only one week after Jupiter would have appeared at dawn in the east.<sup>110</sup> During most of the 12 months that followed Jupiter was very close to the Fire Star; in fact, from late January to late March of 1553 B.C. Jupiter was stationary at a location less than 10m in right ascension and 6° in declination from Antares.

The passage from Riyue wuxing tu cited above associated the "criss-crossing planets," "falling arrows" (i.e., the meteor shower), and the appearance of the "Spirit of Fire" (which I take to mean Antares "energized" by Jupiter's proximity) with each other in Xia Jie's "last" year[s]. Although this confirms the association of Great Fire with the founding of Shang, the language is too ambiguous to allow us conclusively to identify the Great Fire sui 1554-1553 as the one in question. All the portentous events may have been collapsed into one momentous occasion, just as we saw in Huan Tan's account of the founding of Zhou. It is worth noting too that Guoyu does not say Jupiter was in Great Fire as in the case of the Zhou conquest but simply that Great Fire "marked the period of the Shang people." There is insufficient evidence to suggest that a regular system of duodecimal Jupiter stations existed at this early date. Hence, although the tradition associating Great Fire with the founding of Shang is correct, at present the evidence cannot be considered to corroborate conclusively the Bamboo Annals chronology. Lacking such independent confirmation we can provisionally accept the date 1554 B.C. for the founding of Shang as indicated by the relative chronology preserved in the Bamboo Annals.

Part 6

## The Date of Compilation of the Bamboo Annals

Now that we have established the date of the bestowal of the Mandate on both Shang and Zhou, as well as the absolute dates of certain events accompanying the Zhou conquest, it is possible to compare the chronology

of the Bamboo Annals with what I take to be the true dates. Thus far I have discussed all but one early account of planetary conjunctions. Now I should like to consider this last report of a "gathering" of all five planets in connection with the rise to prominence of Duke Huan of Qi as Hegemon. The earliest record of this event is found in the Song shu "Treatise on Astrology"<sup>111</sup> (completed in A.D. 489) in which Shen Yue stated that "when Duke Huan of Qi was about to become Hegemon the five planets gathered in Basket"

齊桓公將霸五星聚箕。 Duke Huan acceded to the throne of Qi in 685 B.C. and was acknowledged Hegemon by a convocation of feudal lords in 679 B.C., six years later. The gathering of the five planets in Basket (Epsilon Sgr at 15h 28m to Zeta Sgr at 16h 09m at the time) must, however, refer to the planetary alignment in mid-November of 722 B.C. in the range 15h 24m to 17h 36m. (Mercury became visible before dawn in late November at 15h 24m as the last two planets, Mars and Jupiter, were leaving the range of Basket.) Hence, the portent in this case preceded the event it foretold by some forty years, quite a substantial lead time in comparison with the two earlier Mandate conjunctions which preceded the founding of Shang and Zhou by 21 and 13 years, respectively. The year 722 B.C. is also familiar to us as the first year of Duke Yin of Lu and the traditional date of the beginning of the Spring and Autumn period.

According to our earlier hypothesis on page 7, this is the period during which the Bamboo Annals account of the Shang and Western Zhou chronology was most likely compiled. It may even be that the alignment of planets in 722 B.C. served as a benchmark from which astrologers alive at the time sought to derive the date of the Zhou conquest. A comparison of the two chronologies in Table 1 reveals that the Bamboo Annals dates from the 1050 B.C. date of the conquest back to the 1580 B.C. date for the planetary conjunction in Xia Jie's reign are systematically wrong on two counts. First of all, the eight-year distortion of the time span between King Wen's Mandate and the conquest--i.e., 1071-1050 or 21 years vs. 1059-1046 or 13 years--has already been discussed and set right in Part 2. The second, which the reader will already have noticed, is a consistent discrepancy of four years throughout the entire pre-conquest period. In other words, the Bamboo Annals chronology is consistently four years early by comparison with that based on true astronomical dates. We saw above how the eight-year relative error derived from an astronomical misconception locating the Mandate-conferring conjunction of 1059 B.C. in Jupiter station Great Fire. It is now possible to show that the systematic four-year error was also astronomically determined. If, as I have suggested, the attempt was made in the eighth century B.C. to reconstruct the dates of events in the early period, which resulted in the Bamboo Annals chronology as it appears in Table 1 to the right, this undertaking may actually have been inspired by the alignment of 722 B.C. Traditions concerning the conjunction during King Wen's reign and the alleged position of Jupiter in Quail Fire during the conquest campaign would surely have been well known to the compilers. This is also true for the totals of 496 years for the Shang dynasty and 275 years for Western Zhou, which are found as comments in the Bamboo Annals.<sup>112</sup> If the attempt had

been made to establish the precise date of the conquest by extrapolation based on the 12-year period of Jupiter, the inaccuracy of that figure would have led the chronologists to err in just the way Liu Xin was led astray many centuries later. In 722 B.C. Jupiter was actually in Jupiter station Separated Wood, hence 726 B.C. was a Quail Fire year. Simple arithmetic would have told the chronologists that the date they had for the conquest--namely, the correct one, 1046 B.C.--could not be accurate, but that 1050 B.C. could.<sup>113</sup> In other words, 1050 minus 726 leaves 324, which when divided by 12 yields 27 cycles exactly. This means that Jupiter would have been thought to have been in the same location in 1050 as in 726 B.C., and like Liu Xin, the compilers of the Bamboo Annals in the eighth century B.C. were seduced by their faith in the "numbers of Heaven." They rejected the tradition and accepted the computation. Because Jupiter continually gained one station every 83 years throughout the Zhou dynasty by comparison with an extrapolation based on the true locations in mid-11th century B.C., this error of precisely four years could only have been made in a narrow range of 83 years in the 8th-7th centuries B.C. Here I believe we have the explanation for the four-year absolute error in the Bamboo Annals date for the conquest and in the entire Shang chronology reconstructed using this baseline. It was at this stage that the date of the Zhou Mandate conjunction was initially backdated four years to 1063 B.C. Only later was this error compounded by the additional 8-year backdating to 1071 B.C. which we now find in the Bamboo Annals.

Although the chronology of events from King Wu's death through the regency of the Duke of Zhou and the reign of King Cheng is particularly complex and uncorroborated, certain facts have emerged which suggest that the four-year backdating of events in the Bamboo Annals continued through this period. As I point out in note 27, the "settling of the cauldrons" at Luo is found in the Bamboo Annals in King Cheng's eighteenth year, or 1027 B.C. in that system. I also suggested that later traditions had a tendency to identify this event with developments in the eighth year, when King Cheng reached majority and began his own rule. Following de Saussure, I accepted the identification of 1035 B.C. as the year of Cheng's accession since the astronomical evidence confirmed the accuracy of planetary portents associated with the events in that year. However, in the Bamboo Annals<sup>114</sup> we also read that "in the 10th year the King invested Tang Shuyu as Marksman [of Jin]" 十年王命唐叔虞為侯. According to the Bamboo Annals chronology this should have been in 1035 B.C. (counting from the 1044 B.C. succession year). But in Guoyu<sup>115</sup> we are told that "when Jin was first enfeoffed, Jupiter was in Great Fire" 晉之始封也歲在大火. We have already ascertained that 1035-34 B.C. was a Quail Fire sui, so that we must move down to 1031 B.C. to find the next Great Fire year. (Jupiter was in Great Fire from October of 1032 to October of 1031 B.C.)

If 1031 B.C. was indeed the actual year of the founding of Jin, then 1040 must have been the true succession year of King Cheng. If, moreover, 1040 B.C. is considered to have been the first year of Cheng's reign, then his 18th year becomes not 1027, as in the Bamboo Annals, but 1023. Not surprisingly,

TABLE 1

Bamboo Annals Chronology

Actual Chronology

Jie 10th year/ stars "cross"	1580	-4-	1576	Jie 10th year/ Triple Conjunction
Tang 1st year	1575	-4-	1571	Tang 1st year
	21		21	
Jie 31st year/ exiled	1559	-4-	1555	Jie 31st year/ exiled
Tang accedes as Tianzi in his 18th year--Shang dynasty begins	1558	-4-	1554	Tang accedes as king in his 18th year--Shang dynasty begins
King Wen 1st year	1111	-12-	1099	King Wen 1st year
	496		496 517	
Mandate Conjunction	1071	-12	1059	Mandate/ Triple Conjunction
	1063			
King Wen dies	1062	-12-	1050	King Wen dies
			508	
King Wu 1st year	1061	-12-	1049	King Wu 1st year
	508			
Retreat from Mengjin	1052	-4-	1048	Retreat from Mengjin
Zhou "first" attacks Shang	1051	-4-	1047	Zhou marches on Shang
Conquest at Muye	1050	-4-	1046	Conquest at Muye
	292			
King Wu dies	1045	-4-	1041	King Wu dies
King Cheng 1st year	1044	-4-	1040	King Cheng 1st year
			275	
Cauldrons settled at Luo	1027	-4-	1023	Cauldrons settled at Luo
	257			
King You last year	771	-	771	King You last year

Jupiter again entered Quail Fire in July of that year and remained there through July of 1022 B.C. Therefore, if the 18th-year dating of the "settling of the cauldrons" in the Bamboo Annals is accurate, the pattern of association between significant political developments and the appearance of Jupiter in the Red Bird is repeated, this time in connection with the ceremonial symbolizing the establishment of Luo as the seat of government. We may reasonably assume that the confusion about the portents and events of the 8th and 18th years which we noted above stems in part from the misleading identification of the "return of government" year as Cheng's 8th, since it followed the 7-year regency of the Duke of Zhou. Had it been identified as his 6th year, the resulting association of a third 12-year cycle with appearances of the Phoenix might have attracted attention. These three astronomically derived dates in King Cheng's reign, namely, 1040, 1031, and 1023 B.C., are particularly noteworthy because they are all exactly 4 years later than their counterparts in the Bamboo Annals. Thus, there is good reason to suppose that the 4-year systematic error in the Bamboo Annals chronology continues through the Western Zhou period, even though the details of the chronology of the transitional period from King Wu to King Cheng remain uncorroborated. This supposition is confirmed by the remark in the biography of Shu Xi 束皙 (A.D. 261-303) in Jin shu that, according to the newly discovered Bamboo Annals which he personally examined, "From Zhou's receipt of the Mandate to King Mu was 100 years" 自周受命至穆王百年<sup>116</sup>. We now know that the date of the receipt of the Mandate was 1058 B.C., the first year of the new order promulgated by King Wen. This makes King Mu's first year 958 B.C. According to the Bamboo Annals, as indicated in note 112, his first year was 962 B.C., exactly 4 years earlier.

## Part 7

### Conclusion

After discovering the fact of the conjunction of 1059 B.C. in the tables of planetary longitudes, I immediately began looking for material on planetary cycles and knowledge of their periodicities in China to determine whether Han astrologers would have been capable of retroactively calculating the date of such an event. As it turned out, they could not have. During the course of my sleuthing, however, I came across Herbert Chatley's review<sup>117</sup> of Leopold de Saussure's analysis of the chronology of early Zhou in T'oung Pao.<sup>118</sup> In his review Chatley remarks that de Saussure had overlooked "the portentous conjunction of the five planets which is stated in the Bamboo Books to have occurred in the 32nd year of Chou Hsin, 20/21 years prior to the founding of the dynasty." Since, as Chatley points out, "in actual fact the 20 year period conjunctions of the slow moving planets Jupiter and Saturn occurred in 1079 ± 1 B.C. and 1059 ± 1 B.C., which would correspond to the dates of 1059 and 1039 for the founding of the dynasty," de Saussure's 1044 B.C. date for the founding was open to question. Chatley then reveals that he had asked Dr. J. K. Fotheringham, Reader in Chronology at Oxford, to compute the planetary conditions in 1079 ± 1 B.C. and reports that there was no close approach of

all five planets during that conjunction. From this he concludes that "the conjunction of 1059 ± 1 B.C. seem a little more probable, but it may well be that the conjunction is not historical and has been computed backwards in later times to suit the Chinese astrological theory of the influence of multiple conjunctions." Joseph Needham<sup>119</sup> later repeated this opinion in a discussion of planetary periods.

Unless I miss my guess, Herbert Chatley refrained from asking Dr. Fotheringham to compute the planetary conditions in 1059 B.C. because of the tediousness of the calculations and the dubious historicity of the account in the Bamboo Annals. Had he done so he would doubtless have been as amazed as I was when I was able to confirm the veracity of the much abused Bamboo Annals and one of the most ancient of Chinese traditions.

In some ways the very regularity of the astronomical phenomena I have described suggested answers to questions which I had not yet thought to ask. More such correspondences will undoubtedly be discovered, both in the earliest period of Chinese history as well as the post-classical era. I have not attempted here a comprehensive solution to the early chronology, but the establishment of strategic footholds based on astronomical fact. On the basis of these footholds it should be possible to investigate more reliably the difficult questions relating to the calendar and to dating notations, in particular the lunar phase terms, which I found it advisable to defer. Many more questions have been raised by the astronomical facts I have presented and by my analysis of their role in Shang and Western Zhou history and chronology. Some of my conclusions will no doubt be controversial, especially with regard to the cosmological interpretation of the earliest planetary observations. Indeed, the astronomy and chronology of the early period as a whole are such controversial subjects that few, if any, hypotheses in either field have gone unchallenged for long.

But for now, I believe that we have the dates of the phenomena that were probably understood to signal the transfer of the Mandate of Heaven both in 1576 and 1059 B.C., the former event constituting the earliest confirmed date in Chinese history and one which bears importantly on the historicity of the Xia dynasty. In addition, we also now have a probable date for the founding of Shang--1554 B.C.--which agrees remarkably well with the cluster of radiocarbon dates for the so-called "Middle Shang" sites at Zhengzhou. This new finding would strongly support the identification of Zhengzhou as a Shang dynastic capital, perhaps even Cheng Tang's capital of Bo 亳 as some scholars have speculated.<sup>120</sup> Further, my investigation has indicated the dates of King Wen's reign to have been 1099 to 1050 B.C., and it suggests that the timing of the Zhou conquest of Shang, as well as other politically significant events, was influenced by the location of Jupiter, the decisive Battle of Muye having taken place on January 20, 1046 B.C.

Equally noteworthy, in my view, is the realization that traditions about the Mandate of Heaven and



theophanies involving the Phoenix, ideas whose implications of "royal accountability" had a profound effect on the moral philosophy and political psychology of the Shang and Zhou periods, are likely to have had their beginnings in particularly impressive celestial phenomena. Although he was unaware of the role played by the planets, Confucius was moved enough by the tradition to

lament that "the Phoenix does not come; the River gives forth no chart. It is finished with me!"<sup>121</sup> He probably suspected that the Mandate of Heaven was a fact of history and not merely the invention of early Zhou propagandists. Just what sort of fact it was had to await the advent of computer-generated tables of planetary longitudes to be rediscovered.

#### NOTES

1. The present article is an expanded and revised English version of a paper in Chinese entitled "Auspicious Omens Pre-saging the Conferral of the Mandate on King Wen of Zhou and the Conquest of Yin by King Wu" 周文王受命與文王克殷之瑞徵 which is forthcoming in Chinese Paleography 古文字研究.

2. My interest in this topic grew out of my participation in Professor David S. Nivison's seminars on archaic Chinese inscriptions at Stanford University in 1979 and 1980. In research on the problem of dating Western Zhou bronze inscriptions and the founding of Zhou which Professor Nivison presented to his seminar in 1979, he argued that the Bamboo Annals is not a late forgery, and that it deserves to be taken seriously as a source for the history of the period. In papers presented to the American Oriental Society in San Francisco in April, 1980, and to the New York Metropolitan Museum's Symposium on the Great Bronze Age of China in June, 1980, Professor Nivison used clues in the Annals and inscriptions to argue that the Conquest occurred in 1045, a view he still holds. In his seminar in the autumn of 1980, he presented arguments that Wen Wang claimed the Mandate in 1058, and that this was his 42nd year; and that he died in 1050; and further, that Wu Wang's first campaign was in 1048. At the same time, he called attention to the conjunction recorded in the Annals under 1071, and tried unsuccessfully to date it.

I am in an unusual position in respect to this work of Professor Nivison's. I was dependent on it for getting started in my studies of Zhou chronology and astronomy, though my subsequent work is wholly my own and depends on clues in the literature available to anyone; most notably, Wang Guowei's interlinear comments on the Annals, Liu Xin's analysis of the astronomical observations in Guoyu, and Herbert Chatley's study of planetary cycles. At first I accepted Professor Nivison's Conquest date and his arguments; I soon came to doubt the arguments; and finally, to doubt the date, concluding on the basis of my own discoveries that it must have been 1046, not 1045. From the first, I have accepted his reevaluation of the Bamboo Annals, though not without certain reservations about some of his main original arguments for this reevaluation (which depend indirectly on Wang Guowei's analysis of lunar phase terms). I did not at first accept Professor Nivison's dates 1058, 1050 and 1048, though I do accept them now, having found them to be consistent with my own reconstruction based on the astronomical record. In regard to the chronology of the conquest period, the main conclusion we disagree about is whether the final campaign started in late 1047 (the year after the first campaign--my own view), or in late 1046 (two years after--Professor Nivison's view).

Although we do not always agree, I have benefitted greatly from Professor Nivison's studies of the chronology of Western Zhou, and from his perceptive criticism of my own work. My conclusions and opinions are my own, however, and for them I bear sole responsibility. Finally, I would like to thank Dr. Gordon Emslie, Lecturer in Astronomy at Stanford University, for his help in writing the computer program used in calculating the stellar coordinates, and Dr. E. Myles Standish of the Jet Propulsion Laboratory at the California Institute of Technology, for recomputing the locations of the planets in 1059 B.C. using the JPL Long Export Ephemeris.

3. The latter date is based on a quotation from the Bamboo Annals in Pei Yin's 裴駟 (ca. A.D. 420) commentary Shiji

史記集解: "From King Wu's extinguishing Yin down to King You was a total of 257 years" 自武王滅殷以至幽王凡二百五十七年. See Shiji (Beijing, 1982), ch. 4, p. 149. The total 257 years for Western Zhou when added to the last year of King You, 771 B.C., yields 1027 B.C., counting inclusively, as the date of the Conquest.

4. At least three of the communications presented at the Fourth Annual Conference on Chinese Paleography (September 14-23, 1981) in Taiyuan 太原, Shanxi 山西, either directly or indirectly concerned this issue. Liu Qiyi 刘啓益 presented a paper entitled 西周金文中的月相共和宣幽紀年銅器 "Lunar Phases in Western Zhou Bronze Inscriptions and Dated Bronzes of the Gong He, King Xuan and King You Periods" in which he reiterated his arguments for interpreting each lunar phase term as referring to a particular day. Ma Chengyuan 馬承源 read a paper entitled 金文中月相的研究 "Researches on the Lunar Phases in Bronze Inscriptions" in which he interpreted them as periods of several days. David S. Nivison presented a comprehensive review of his researches on Zhou chronology entitled 西周年曆 "The Dates of Western Zhou" in which he adapted the interpretation of Wang Guowei who identified the four terms as lunar quarters. Scholars are roughly divided into two schools of thought. Both schools essentially agree that ba or po 魄 (the preferred form in jinwen texts) refers to the bright area of the moon; there, however, the agreement ends. The view championed by Liu Xin 劉歆, which is quoted in Han shu (Beijing, 1962) ch. 21B, p. 1915, based on the "genuine" month, lunar phase, and gan 干 dates for the year of the Zhou Conquest from the GD text version of the "Wu Cheng" chapter of Shang shu, maintained that siba "dying brightness" referred to the shuo 朔 or new moon and shengba "growing brightness" referred to the full moon. By and large this has been the orthodox view

ever since. In this interpretation, 既 "after" implied completion (盡) of the process, i.e., when the moon is completely dark or full. The opposing view, for which there is also considerable evidence in literary sources, holds that "growing brightness" refers to the first appearance of the new moon crescent and that "dying brightness" denotes the detectable waning of the full moon. In this interpretation 既 "after" clearly implies "after beginning" the process of decline or growth, so that here we have the crucial difference. Because he favored the symmetry of a four quarter interpretation and his own dating of certain vessels, some of which are still in dispute, Wang Guowei identified jishengba as the 8th or 9th of the month (i.e., the 1st quarter) and jisiba as the 23rd of the month (i.e., the 3rd quarter). He also argued that the terms occasionally denoted the period of 6-7 days following these days of the month. See his Guantang jilin 觀堂集林

ch. 1. In addition to the evident contradictions between the two basic interpretations, the confidence invested by some scholars in the authenticity of the "Wu Cheng" dates may be misplaced. Most adherents of the "four quarter" interpretation of Wang Guowei tend to dismiss out of hand Liu Xin's definitions of the lunar phases. As Tung Tso-pin pointed out in Yinli pu 殷曆譜 (Sichuan, 1945), vol. 1, 4.2a-4b, however, his extensive research on the chronological problem revealed that at least as early as the 4th century B.C. the so-called

"Yin calendar school" 殷曆家 had already calculated 1070 B.C. to have been the date of the Conquest "on the basis" of the same ganzhi dates and lunar phase definitions as Liu Xin. Because Tung accepted Liu's definitions, he himself failed to see that the dating assignments in the Yinli chronology may have been determined by other means and that, for this reason, the possibility exists that the "Wu Cheng" day dates and/or the lunar phase notations (examples like jipangshengqiao 既旁生魄 are unattested in bronze inscriptions) could be Yinli constructions. There is strong evidence that the Yinli date of 1083 B.C. for the beginning of the Zhou Mandate was astronomically determined by using the late Zhou approximation of 20 years for the Jupiter-Saturn conjunction period and 24 years for the Jupiter-Venus conjunction period. (A full discussion of the Yinli chronology will be the subject of another paper.) Given this date, the year 1070 B.C. for the Conquest may simply have been derived on the basis of the "13th year" Conquest tradition, which I shall discuss more fully below. When the "Wu Cheng" dates are tested on the calendar for 1070 B.C. they fit exactly, if one assumes (with Liu Xin) an intercalary month between the 2nd and 4th months, a two-day error in calculating the dates of new moons due to the 1/4 day per 76 year error which the formulas then in use are known to have generated, and the same lunar phase definitions employed by Liu Xin. Although the evidence is not conclusive, it seems to me sufficiently worrisome that, given a choice, one would be well advised not to rely on the "Wu Cheng" dates as solid evidence. There are doubtless those who would disagree. However, until such lingering doubts are resolved I prefer not to accept the "Wu Cheng" dates as genuine.

5. For a general review of the literature and problems in the chronology of the early period, see Herlee G. Cree1, The Origins of Statecraft in Ancient China, "Appendix B: Problems of Chronology" (Chicago, 1970), vol. 1, pp. 487-92. See also Noel Barnard's exhaustive study of chronology, "[Book Review of] Chou Hung-hsiang, Shang-yin ti-wang pen-chi," in Monumenta Serica 19 (1960):488-515, Chou Fa-kao, "Chronology of the Western Chou Dynasty," Journal of the Institute of the Chinese University of Hong Kong 4.1 (1971):173-205, and Kwang Chih-chang, Shang Civilization (New Haven, 1980), pp. 322-329. More recently, David S. Nivison has done extensive research in the dating of Western Zhou bronze inscriptions and the chronology of the entire period. His "Dates of Western Chou" is forthcoming in the Harvard Journal of Asiatic Studies. For a review and criticism of the scholarship in Chinese and Japanese to 1960, which encompasses seventeen different "solutions" to the problems of the early chronology, see Tung Tso-pin, Zhongguo nianli zongpu 中國年曆綜譜 (Hong Kong, 1960), vol. 1, pp. 22-42. The most recent studies in Chinese concerning the founding of Zhou, interpretation of lunar phase terms, and general methodology include Zhao Guangxian 趙光賢, "Deducing the Date of King Wu's Attack on [Shang] Zhou from Celestial Phenomena," 從天象上推斷武王伐紂之年, Lishi yanjiu 歷史研究 1980.10:56-61; Rong Mengyuan 榮孟源, "A Tentative Discussion of the Chronology of Western Zhou," 試談西周紀年, Zhonghua wenshi luncong 中華文史論叢 1980.1:1-21; He Youqi 何幼琦, "The Problem of the Date of King Wu of Zhou's Attack on [Shang] Zhou," 周武王伐紂的年代問題, Zhongshan daxue xuebao 中山大學學報 1981.1:64-70; Huang Baoquan and Chen Yuaxin 黃寶權和陳華新, "An Investigation into the Date of King Wu of Zhou's Defeat of Yin" 周武王克殷年代考, Zhongguo lishi wenxian yanjiu jikan 中國歷史文獻研究集刊 1980.1:125-28; Zhang Yuzhe 張鈺哲, "Evolutionary Trends in the Orbit of Halley's Comet and Their Ancient History" 哈雷彗星的軌道演變的趨勢和它的古代歷史, Tianwen xuebao 天文學報, 19.1 (1978):109-118. (The dates assigned to the Conquest in the last five studies are 1057, 1055, 1039, 1029, and 1057, respectively.) This list is by no means exhaustive. Other studies are cited elsewhere in the notes.

6. SSPY ed., 3.18a. The astronomical record is adduced by the Musicologist Zhoujiu 伶州鳩 in a rambling reply to King Jing's questions about the success of a new casting of a set of bells, which evidently was a failure. Zhoujiu's lecture on the calendar and harmonics is actually a homily on the theme of "harmony" 和, the lack of which is implied as the cause of the failed casting. As an example of the theory of correspondences, Zhoujiu quotes the astronomical record and discusses the pitchpipe tones associated with the timing of the Conquest campaign. His interpretation of the astronomical record focuses on the supposed connection between the asterisms concerned and the Zhou heritage; however, his zeal for "categorizing" in terms of the "five phases" appears to have led him to misconstrue the record at several points.

7. Prediction of the precise locations of the planets even over a relatively short term requires detailed knowledge of variations in their orbits. There is no indication that the Han Chinese astronomers possessed such knowledge, as Nathan Sivin has pointed out in Cosmos and Computation in Early Chinese Mathematical Astronomy (Leiden, 1969), p. 24. Mean values for the planetary periods arrived at by the later Han dynasty were quite accurate; nevertheless, Liu Xin miscalculated the location of Jupiter in 1123-22 B.C. by five years --to take just one example--as a result of the 0.5% error in the constant he used (11.92 years) for the sidereal period of Jupiter. The modern value is 11.86 years. The Mawangdui ms. incorporating the ephemerides of Jupiter for the 3rd to 2nd centuries B.C., which I discuss in Part 2.3, still employed the relatively crude figure of 12 years. Neglecting the effects of secular acceleration on the motions of the sun, moon, Mercury, Venus, and Mars will also introduce significant error in calculations over several centuries in the past. The secular acceleration of the moon, first discovered by Edmund Halley in 1693, if not taken into account will produce an error on the order of -5° in 2,000 years. In the case of Mercury, the error will be -1.5° in 1,000 years. See Paul Ahnert, Astronomisch-chronologische Tafeln für Sonne, Mond und Planeten (Leipzig, 1960), pp. 7-8. Therefore, given sufficiently precise observations of lunar and planetary positions in ancient texts, particularly when two or more bodies are involved, modern verification of their accuracy should remove any doubt as to their authenticity. See my discussion in Part 4.

8. Unless otherwise indicated, references to the Bamboo Annals will be to the Yiwen yinshuguan edition of Wan Guowei's Jinben zhushu jinian shuzheng 今本竹書紀年疏証 (Taipei, 1974).

9. Zhu Youzheng, Jizhong jinian cunzhen 汲冢紀年存真 (1846; reprint ed. Taipei, 1959).

10. Wang Guowei, Guben zhushu jinian jijiao 古本竹書紀年輯校, Yiwen ed. (Taipei, 1974). This edition, reprinted in a single volume with the "current" version of the Bamboo Annals, although very convenient, contains occasional misprints and should be used with caution. These deficiencies have been remedied in Fang Shiming 方詩銘 and Wang Xiuling 王修齡, Guben zhushu jinian jizheng 古本竹書紀年輯証, (Shanghai, 1981), which also contains Wang Guowei's Jinben zhushu jinian shuzheng.

11. See David N. Keightley, "The Bamboo Annals and Shang-Chou Chronology," Harvard Journal of Asiatic Studies 38 (1978): 423-38. This study raises questions that anyone contemplating working with the Bamboo Annals needs to consider. In what follows I endeavor to provide the sort of "touchstones" necessary to establish the veracity of the Bamboo Annals which Professor Keightley found lacking in the text.

12. One noteworthy exception to the consensus on the Bamboo Annals is Aleksy Debnicki who accepts the Bamboo Annals as a credible source for the history of the Xia, Shang, and Zhou. See his "Chu-shu-Chi-nien" as a Source to the Social History of Ancient China (1956; reprint ed., Westport, 1981), pp. 40-53. On the date of the Zhou Conquest see David N. Keightley, Sources of Shang History (Berkeley, 1978), pp. 171-76; David S.

Nivison, "The Dates of Western Zhou" 西周之年曆, presented in mimeographed form at the Fourth Annual Meeting of the Chinese Paleography Association 中國古文字研究會 第四屆年會, Taiyuan, Shanxi, The People's Republic of China, September 14-23, 1981. (Revised version dated August 26, 1981 of a communication presented to the Symposium on the Bronze Age of Ancient China, Metropolitan Museum of Art New York in June, 1980).

13. Wang Guowei, Jinben zhushu jinian, p. 83.

14. "Zhou benji" (Shiji, ch. 4, p. 119) and "Wuyi" 無逸 Chapter of Shangshu both say King Wen reigned for 50 years. Lüshi chungiu 呂氏春秋 (SPPY ed., 6.7b) says King Wen reigned 8 + 43 = 51 years, which, counting inclusively, is actually 50 years. According to the Bamboo Annals, King Wen died in Zhou Xin's 41st year; therefore, Zhou Xin's 32nd year corresponds to the 41st year of King Wen.

15. Diwang shiji (Congshu jicheng ed.), p. 28.

16. An earlier entry in the Bamboo Annals (p. 81) associated with King Wen's accession to the throne in Zhou says that "a Phoenix alighted on Qishan" 有鳳集于岐山. The original comment to this entry identifies this as King Wen's First Year 元年. As we shall see, this augury and the one concerning the Red Crow refer to the same event, which occurred in the First Year of the Mandate. (The former entry was placed in its present location during reconstitution of the text as a result of a misreading of a passage in Shangshu; see notes 7 and 50 to Table 2.) In an article entitled "Der Beginn der Dschou-Zeit: Ein Beitrag zur Geistesgeschichte der Han-Zeit," which has been reprinted in Sternkunde und Weltbild im alten China (Taipei: Chinese Materials and Research Aids Service Center, 1970), p. 309, Wolfram Eberhard makes several important points with regard to the symbolism of the Red Bird. As I have translated it, Eberhard writes that "the accounts vary here, but it is clear that it is a question of a red crow. In addition, several ancient texts relate the preference of the Zhou for the color red. In the five element theory red is associated with the south and the sun, just as white is associated with the moon and the west, and the moon alone is further associated with the north. The crow is the sun animal, the three-legged Sun-crow frequently represented in Han relief sculpture. These lines of association indicate that the Zhou were related to the sun and that the Yin, in the same way, were brought into relation with the owl and the moon. Thus, this development was already nearly completed before the Han period; the struggle of the Zhou against the Yin became, in accordance with the thinking of the five elements theory, a struggle of the light against the darkness, the male against the female." In Pacing the Void (Berkeley, 1977), p. 163, Edward H. Schafer comments on the same bird: "A close cousin of the three-legged crow (no great figure in literature, unhappily) was the red crow, a lucky bird whose history goes back to classical pre-Han times. One such bird--described as 'essence of yang,' and plainly an authentic sunbird--delivered a sceptre to the future founder of the Chou dynasty.... Like the rather ludicrous three-legged crow, the handsome fire-red crow has turned up in reliable historical records from time to time. The most famous specimen turned up 'like a god or numen,' before the gratified eyes of Sun Ch'uan, ruler of Wu, in A.D. 238, in recognition of which the inauguration of a new cosmic era was declared, to which the name 'Red Crow' was given."

The Mu tianzi zhuan 穆天子傳 suggests that the Red Bird may have had a totemic significance for the royal Zhou lineage. In my translation from Rémi Mathieu's "Le Mu Tianzi Zhuan: Traduction annotée, étude critique," Mémoires de l'Institut des Hautes Études Chinoises 9 (Paris, 1978), pp. 33-34, we read that "on the day renshen, the Son of Heaven marched toward the west. On day jiawu, he arrived in the domain of Qi 齊, (chief) of the Chiuwu 赤烏 tribe. He (Qi) presented to the Son of Heaven 1000 measures of wine, 900 fine horses, 3000 cattle and sheep, and 100 carts of panicked millet.... The forefathers of the Chiuwu descend from the royal lineage of Zhou. Taiwang Danfu 大王單父 (grandfather of Keng Wen) first opened up these western regions...."

17. Mozi, Harvard-Yenching index ed. 33/19/44. Guoyu (SPPY ed., 1.11b) says, "When the Zhou arose, a Yuezhuo sang on Qishan 周之興也鸞鷲鳴於岐山. According to various commentators, yuezhuo is another name for the Phoenix.

See also ode #252 Juane 卷阿, an air in celebration of the receipt of the Mandate, in which the King is likened to a jade sceptre, in Bernhard Karlgren's The Book of Odes (Stockholm, 1950), p. 210: "You are great and high, like a kwei sceptre, like a chang sceptre, with good fame...fine to look at." Phoenixes also appear in #252 where they "sing on the high ridge" and "touch heaven" in their soaring flight. The simile of the jades becomes clearer in ode #254 Ban 板, p. 213: "Heaven's guiding the people is like an ocarina, like a flute, like a chang jade, like a kwei jade; it is like taking hold of them, like leading them by the hand and nothing more." Karlgren comments, p. 214, that "it is mildly persuasive, like guiding people by the sound of mild music or by the sight of fine insignia of authority--not by violence or force."

18. Lüshi chungiu (SPPY ed), 13.4a. Accounts of this and other auguries concerning this bird in Han apocrypha identify it as a kongque 孔雀 "peacock," or simply que--for example, Chungiu yuanmingbao 春秋元命苞, "fire came down in the form of a peacock" 火為孔雀, quoted in Ma Guohan 馮國翰, Yuhan shanfang jiyishu, 1871; reprint ed., Taipei: Wenhai chubanshe, n.d., vol. 4, p. 2113. The Liang dynasty astrological treatise Rui-ying tu 瑞應圖, quoted in Kaiyuan zhanjing (Siku zhenben siji ed), 115.2a, has the following: "As for the Red Peacock, when a true King moves Heaven to respond, then it comes clasping a Writing in its beak" 赤雀者,王者動應於天時則銜書來. According to a comment attributed to Zheng Xuan 鄭玄 (A.D. 127-200) on the Chungiu yuanmingbao passage cited above, the "Cinnabar Writing" and the famous "Luo Writing" are one and the same; see Maoshi zhenghi, Shisanjing zhushu, vol. 1, p. 503.2, subcommentary to "Wen Wang" 文王. The term "Cinnabar Writing" is particularly interesting since it calls to mind both the Shang practice of applying reddish pigment to display inscriptions and the Warring States custom of smearing inscribed texts of solemn obligations (so-called mengshu 盟書) with the blood of a sacrificial victim. This suggests that such writings all partake of the same contractual character involving the participation of unseen powers.

19. According to Yan Shigu 顏師古 (A.D. 581-645) in the Han shu, ch. 56, p. 2500, the passage containing the augury is from the new text version of the "Taishi" chapter of Shangshu. See also Shiji, ch. 4, p. 119.

20. Su Yu 蘇輿, Chungiu fanlu yizheng 春秋繁露義証 (Hunan, 1909; reprint ed. Taipei: Heluo tushu chubanshe, 1974), 13.6b.

21. "Biography of Dong Zhongshu" 董仲舒傳, ch. 56, p. 2500.

22. Quoted in Gu Jiegang 顧頡剛 ed., Gushi bian (1926-1933), vol. 3, p. 27.

23. Wang Chong 王充, Lunheng 論衡, passim.

24. Song shu: "Treatise on Talismans and Auguries" 符瑞志, ch. 27, p. 765.

25. The account of the event in Shiji associates the augury with the inconclusive campaign which preceded the successful attempt to overthrow Shang Zhou, as does Huan Tan's Xinlun. This is discussed in Part 4. Song shu (ch. 27, p. 765) very clearly identifies the appearance of the Red Bird with the fording of the Yellow River immediately before the victorious campaign. For an explanation of the confusion of these two expeditions, see Part 3.2.



26. Jizi was the virtuous minister of Shang Zhou whose remonstrances were rewarded with imprisonment. After Shang Zhou's defeat King Wu ordered his release (Shiji, ch. 4, p. 126), but Jizi refused to recognize Wu as anything but a usurper. Eventually, we are told, he was persuaded to impart the principles of good government embodied in the "Great Plan" 洪範 chapter of Shangshu to the new Son of Heaven. Here the augury is clearly associated with the victorious campaign.

27. Bamboo Annals, p. 93. The appearance of the Phoenix and the settling of the cauldrons at Luo is recorded under the 18th year of King Cheng. Shiji (ch. 4, p. 133) also mentions the installation of the nine cauldrons at Luo but, in this case, immediately after the government is restored to King Cheng. In addition, "Zhonghou luoshimou" 中候維師 謀 (Yuhan shanfang jiyishu, vol. 4, p. 1990), in its account of events surrounding the beginning of King Cheng's personal rule, also suggests that the appearance of the Phoenix and the ceremony at the Yellow River were contemporaneous with Cheng's assuming power. This would date the event in the 8th year of Cheng's reign rather than in his 18th. The evidence is inconclusive, however, so that I will not insist on identifying both events as having occurred in the same year.

28. Song shu, ch. 27, p. 765. I take 榮 (GSR 843d g'iwěng) "glorious" to be 榮 (GSR 843a g'iwěng) "dazzling," yingxing 榮星 being one of several designations for Venus. See Zhang Shoujie 張守節, Shiji zhengyi 史記正義, quoted in Shiji, ch. 27, p. 1322. In contrast, yinghuo 榮惑 "Sparkling Deluder" (to borrow Edward H. Schafer's term) refers to Mars. Mars is not visible before sunset, however.

29. Herbert Chatley, "The Cycles of Cathay," JRAS/NCB 65 (1934):36-54.

30. Stahlman, William D. and Gingerich, Owen, Solar and Planetary Longitudes for Years -2500 to +2000 by 10-day Intervals (Madison, 1963).

31. The "Ghost" in the "Carriage" is of course the open cluster M44, Praesepe, also known as the Beehive Cluster. It contains some 200+ stars with an aggregate visual magnitude of about +4.

32. Tung Tso-pin 董作賓, Zhongguo nianli zongpu 中國年 曆綜譜, 2 vols. (Hong Kong, 1960).

33. The account of the Conquest campaign in Lüshi chungiu (15.16b) has King Wu pressing his troops to the limit against the remonstrances of his officers in order to reach Muye by the date jiazi previously agreed upon. I am grateful to David Navison for quickly pointing out to me that May 28, 1059 B.C. was in fact a jiazi day. The recent dis-

covery of the Ligui 利簋 inscription, "When King Wu attacked Shang it was on day jiazi" 武王征商 隹甲子, has confirmed the traditional account identifying the date of the battle at Muye as day jiazi. See Wenwu 1977.8:1-12.

34. Zhu youzeng, Yi Zhoushu jixun jiaoshi 逸周書集訓 校釋 (1846; reprint ed. Taipei, 1962), p. 61. I am grateful to Professor David S. Navison for reminding me of this passage, whose veracity we both then verified using Annett's tables.

35. Liu Baolin's "Table of Lunar Eclipses B.C. 1500-B.C. 1000," Chinese Astronomy 3 (1979):179-96 gives for the time of maximum eclipse -1064 March 13 JDN 133 2504 dingchou (day 14), 3:01 local time at Anyang (2:35 at Qishan), which reduces to UT 19:24. R. R. Newton's Canon of Lunar Eclipses for the Years -1500 to -1000 with Conditions for Determining Visibility at Anyang, Research Report CP 054, The Johns Hopkins University (Laurel, 1977), p. 54 gives -1064 March 13 JDN 133 2504 dingchou (day 14), 3:52 local time at Anyang (3:26 at Qishan), which reduces to UT 20:15. The difference between the two

errors is explained by the more pessimistic estimate of the error coefficient used by Newton in extrapolating beyond the available data, i.e., for times before -600. Both Newton and Liu take Anyang time as reference standard and advance the Julian day number, calendar date, and ganzhi at midnight. Tung Tso-pin followed the older convention which took Greenwich time as reference standard and advanced JDN at Greenwich noon, calendar dates at midnight, and ganzhi at dawn. This explains why his figures are all one day earlier than Newton's and Liu's. The eclipse could not have been seen before midnight at Qishan; therefore the date given for the event in Yi Zhoushu, bingzi (day 13), should be understood to include the hours of darkness from sunset (on March 12) to sunrise (on March 13). This supports Tung Tso-pin's contention that the Shang (and pre-dynastic Zhou) counted one day from daybreak to daybreak, the so-called "Babylonian day."

36. The account in Song shu cited above in note 24 is particularly interesting in this respect. It states that "in the 6th 10-day week from (of?) early spring the five planets gathered in House #4). Later a Phoenix clasping a writing in its beak roamed about King Wen's capital" 孟春六旬, 五緯聚房, 后有鳳皇銜書游文王之都. Song shu is the only source I have been able to discover which actually dates the conjunction to the month. While most of the information in the "Treatise on Auguries and Talismans" on portents and prodigies was culled largely from Han apocryphal works--the present passage, minus the date, is from Chungiu yuanmingbao--and Jin dynasty astrological treatises, Shen Yue's source for the actual date of the event remains a mystery. We do know that Shen wrote a commentary on the Bamboo Annals, in which his remarks are prefaced by "[I, Shen] Yue, note"; however, neither here nor in the "Treatise on Astrology" does he attribute the Annals as his source for the material on planetary conjunctions. See note 111 below. This does not of course preclude the possibility that the Annals originally dated the event in the spring. Interestingly, the timing of the event in Song shu is precisely correct if one begins counting the days from the vernal equinox on March 31, 1059 rather than from the first day of the first month of spring (ideally) 45 days earlier. Nevertheless, a conjunction of all five planets in Scorpius one month before the summer solstice is a physical impossibility. The maximum angular separation of Mercury and Venus from the sun cannot exceed 28° and 46°, respectively, and the lodge House #4 was located at 197° in 1059 B.C. Since the sun would have been at about 60° one month before the solstice, the contradiction is apparent, or at least should have been. This confirms that the location House #4 assigned to the conjunction was not the result of any observation. Astrology played a role, however, as we shall see. One can only speculate as to how Shen Yue accounted for the evident contradiction.

37. 竹書紀年義証 (1810; reprint ed. Taipei: Yiwen yinshuguan, n.d.), vol. 1, p. 205.

38. Bamboo Annals, p. 89, and Lüshi chungiu, 14.7b-8a, both locate the Conquest in King Wu's 12th year. Liu Xin's analysis in Han shu, ch. 21B, p. 1015, has the victorious campaign beginning in the fall of the 12th year after the receipt of the Mandate and culminating in the Battle of Muye in the 13th year. Zhang Shoujie, quoted in Shiji, ch. 4, p. 120, cites the "Taishi" Chapter of Shangshu, which dates the Conquest in the 13th year. Liu Xin in Han shu, ch. 21B, p. 1015, also quotes the "Hong Fan" Chapter of Shangshu, which dates King Wu's interview with the newly liberated Jizi in the 13th year. There will be more to say about this confusion of dates in Parts 3 through 3.2, where the two campaigns are discussed. For the moment it is sufficient to note that by late Zhou and Han, not only was it unclear whose reign these years belonged to but also which alternative, 11th/12th years or 12th/13th years, for the final campaign was correct.

39. Xiang IX/564 B.C. translated by Seraphin Couvreur, Tch'ouen Ts'iou et Tso Tchouan: La Chronique de la Principauté de Lou (Paris, 1951), vol. 2, pp. 235-36. My translation is a modification of Couvreur's.

40. On the seasonal locations of the two asterisms see Part 2.1. According to Zuozhuan (Zhao XVII/525 B.C.), "when the Fire Star appears, it is the 3rd month

in the Xia calendar, it is the 4th month in the Shang calendar, it is the 5th month in the Zhou calendar. The Xia system accords with Heaven" 火出於夏為三月, 商為四月, 周為五月, 夏數得天.

41. Guoyu, 10.3a.

42. Han shu, ch. 21B, pp. 1013-14. The astronomer Yi Xing interpreted the tradition in the same manner in the Tang dynasty (Xin Tang shu, ch. 27B, p. 630).

43. 春秋元命苞 See Yuhan shanfang jiyishu, 4:2113.

44. As Léopold de Saussure conclusively demonstrated nearly fifty years ago in "La Chronologie chinoise et l'avènement des Tcheou," T'oung Pao 23 (1924):299-329, all this is quite obvious from the manipulations Liu Xin was obliged to perform on the reign lengths of the kings who ruled Zhou before 841 B.C. in order to push the date of the Conquest back to 1122. This was also how Liu derived the figure 46 years for the reign of Bo Qin 伯禽 (Han shu, ch. 21B, p. 1017), second Duke of Lu, since Sima Qian (Shiji, ch. 33, p. 1524ff.) only supplies enough figures to deduce that Bo Qin's last year must have been 999 B.C.

45. Han shu, ch. 21B, p. 1015. Although Liu Xin's calculation of the date of the Conquest was far off target, his understanding of the relative chronology of events surrounding the receipt of the Mandate and the Conquest was exactly right. From his assertion, "From King Wen's receiving the Mandate to this (i.e., the Conquest) was 13 years; Jupiter was again in Quail fire" 自文王受命而至此十三年; 歲亦在鷄火, it is evident that he had deduced that Jupiter was in Quail Fire 12 years before the Conquest and not in Great Fire.

46. This star map, dating from about A.D. 940, is in turn based on the map of stars and constellations, together with explanation and astrological commentary, made by Chen Zhuo 陳卓 (fl. ca. A.D. 310). According to Sui shu (ch. 19, p. 504) Chen based his work on the catalogues of stars of Shi Shen,

Gan De 甘德 and Wu Xian 巫咸, the great 4th and 5th century B.C. astronomers. For a discussion of the history of celestial cartography and a translation of the relevant passage from Sui shu, see Joseph Needham, Science and Civilization in China, vol. 3 (Cambridge, 1959), pp. 264-71. The Dunhuang ms. has been published in Wenwu 1966.3:27-38. The explanations accompanying each region of the sky are also found in Kaiyuan zhanjing 64.1a-11a.

47. A recent thorough study of the identifications and periodization of the determinative stars of the 28 lunar lodges by Pan Nai 潘孺, "An Investigation of Ancient Observations of Our Country's 28 Lunar Lodges and their Dates"

我國早期的二十八宿觀測及其時代考, Zhonghua wenshi luncong 中華文史論叢 3 (1979):137-82, has confirmed the 5th century B.C. date of the system of Shi Shen.

48. See Yuhan shanfang, 4:1998. When this precise location is not intended the asterism Red Bird as a whole (conventionally all 7 lodges from Well #22 through Axletree #28) is simply denoted "Quail." In Zuozhuan (Xi V/ 655 B.C.) both usages occur in a rhymed passage whose astronomical indications are reminiscent of the Guoyu passage quoted in the Introduction. In the one context in Zuozhuan the constellation is called "Quail," and the specific location in that asterism that culminated near dawn in late autumn, namely Quail Fire, is called "Fire." Given the role of the Red Bird asterism as a harbinger of spring and the returning yang force, the phonological similarity of 鷄 "quail" (GSR 464j qiw:n) and 春 "spring" (GSR 463a t'iw:n) suggests that the choice of "Quail" as another designation for the asterism is unlikely to have been purely coincidental.

49. Shiji, ch. 27, p. 1303. Pan Nai, on p. 166 of the article cited in note 47, points out that the name "Beak" (and perhaps

"Neck" and "Crop" as well) derives from the system of Gan De --i.e., the tradition of Qi--and that this nomenclature is preferred in astrological contexts in Shiji and Han shu.

50. Han shu, ch. 26, pp. 1277-78.

51. Erya, Congshu jicheng ed. vol. 2, p. 283, says that "Beak is called Willow" 喙謂之柳, and glosses liu as "flock together" 聚. Then it says that "Willow is "Quail Fire" 柳鷄火也.

52. David N. Keightley, Sources of Shang History, p. 88; Joseph Needham, Science and Civilization, vol. 3, pp. 242-44.

53. Zhu Kezhen, "A Discussion of the Use of Precession of the Equinoxes to Determine the Date of the Four Medial Asterisms in 'Yaodian' Chapter of Shangshu 論以歲差定尚書堯典四仲星之年代, Kexue 科學 11.12 (1927); reprint ed. in Zhu Kezhen wenji 竺可楨文集 (Beijing, 1979), pp. 100-107.

54. In 1059 B.C. the Fire Star, Alpha Scorpii, was located at R.A. 13h 35m as indicated. According to the Astronomical Almanac, civil twilight at the latitude of Xian (34° N) on the summer solstice occurs at 19:45. The location of the sun among the stars on that date may be calculated using the simple equation  $\alpha_s + H_s = \alpha_0 + H_0$ , where  $\alpha_s$  is the right ascension of the star,  $H_s$  is the hour angle of the star (the hour angle being reckoned west from the meridian or 0 hours),  $\alpha_0$  is the right ascension of the sun, which we wish to find, and  $H_0$  is the hour angle of the sun, i.e., hours west of the meridian or noon. The equation becomes this:  $13.58 + 0 = \alpha_0 + 7.75$  and  $\alpha_0 = 5.83$  or  $87.5^\circ$  in longitude. Thus if the Fire Star were observed to culminate on the meridian 1/2 hour after sunset it would identify the location of the sun at solstice ( $90^\circ$ ) to within  $2.5^\circ$  at the position of Delta Hydrae ( $87.5^\circ$  in 1059 B.C.), the determinative star of Willow #24 or "Beak." The same equation may be used to determine the location of the Bird Star which would have culminated at dusk on the vernal equinox (18:35) by assuming the right ascension of the star to be unknown and by supplying the other data. The equation becomes this:  $\alpha_s + 0 = 0 + 6.58$ , and  $\alpha_s$  is thus  $98.7^\circ$ . This is  $5.1^\circ$  from the computed location of Alpha Hydrae in 1059 B.C. ( $103.8^\circ$ ). Since 4 minutes variation in the time of observation will produce a  $1^\circ$  variation in the result, both solutions must be considered surprisingly accurate. In any case, we have "bracketed" the location of the portion of the Red Bird known as Quail Fire in the range  $87.5^\circ - 98.7^\circ$  approximately in mid-11th century B.C. The range occupied by Willow #24 or "Beak" in 1059 B.C. was  $87.5^\circ$  to  $103.8^\circ$ .

55. Edward H. Schafer in Pacing the Void, p. 163, has noted that "the ornithological associations of the glorious sun as it flies across the sky have seemed self-evident to many peoples. For the Greeks, the quail was the forerunner of the returning sun (Gk. ortyx "quail," hence Ortygia, where the bird's cult was celebrated), and its Sanskrit namesake vartika was also a solar emblem."

56. Many years ago, Léopold de Saussure pointed out the correlation between the line texts of the hexagram Qian 乾 in the Book of Changes and the appearance of the constellation Spring Dragon, a huge expanse from the "Horns" Arcturus and Spica to the "Tail" in Sagittarius, as it emerged from beneath the horizon and rose progressively higher in the evening sky through the spring and early summer. By the time Antares in the "Heart" of the Dragon (lodge #6) was on the meridian near the solstice, the dragon would have appeared to have taken wing, soaring full length into the sky. This is also the image evoked by the ruling and highly auspicious 5th line of the hexagram, in which the yang influence is said to achieve maximum expression. See Léopold de Saussure, "Les Origines de l'astronomie chinoise: la règle des cho-ti," T'oung Pao 12 (1912), p. 350; reprint ed. in Les Origines de l'astronomie chinoise (Paris, 1930), p. 378. See also Han shu, ch. 21A:961.

57. Ho Peng Yoke (He Bingyu) trans., *The Astronomical Chapters of the Jin Shu* (Paris, 1966), pp. 122-23.

58. See Joseph Needham, *op. cit.*, p. 402; Sima Qian makes the same point in *Shiji*, ch. 27, p. 1341.

59. *Chunqiu fanlu*, 13.6b.

60. This is evident from the discussion in *Han shu*, ch. 26, pp. 1289-90, in which Shi Shen and Gan De's systems are compared with the Han scheme. In all of them Jupiter is said to appear first at dawn in successive chronograms. See also *Shiji*, ch. 27, pp. 1313-16, and the discussion of the behavior of the planet in *Han shu*, ch. 21B, p. 998.

61. *Wenwu* 1974.11:28-39. The civil year which began after Jupiter's previous dawn appearance was given the same designation as the station in which the planet appeared. Because Jupiter *sui* or twelve month periods of visibility frequently straddle two civil years, the term Quail Fire year is not the same as Quail Fire *sui*. For example, the 7th year of Qin Shihuangdi (the civil year began in late October of 240 B.C.) was identified as a Quail Fire year after Jupiter was observed to reappear at about the longitude of Alpha Hydrae the preceding July.

62. *Cosmos and Computation*, pp. 15-16. There is evidence that this Jupiter/solar year conversion was still unknown at the time the Tai Chu calendar reform was promulgated in 104 B.C.

See Liu Tan 劉坦, *The Recording of Years According to Jupiter and the Year Star in Chinese Antiquity 中國古代之星歲紀年* (Beijing, 1957), pp. 25-26.

63. *Pacing the Void*, p. 216.

64. The results of this study were first presented in a paper entitled "Analysis of *Guoyu*: 'Zhouyu' Astronomical Record of the Conquest Campaign," prepared for the Western Conference of the Association for Asian Studies in Berkeley, California, November 6, 1981. For further discussion of the evidence bearing on the authenticity of this passage the reader is referred to David W. Pankenier, "Early Chinese Positional Astronomy: The *Guoyu* Astronomical Record," in *Archaeoastronomy, The Bulletin of the Center for Archaeoastronomy, University of Maryland*, 5.3 (1982). A detailed study of the passage and its context will be found in the author's dissertation "Early Chinese Astronomy and Cosmology: The 'Mandate of Heaven' as Epiphany" for the Department of Asian Languages, Stanford University (in preparation).

65. "La Chronologie chinoise (Pt. 2)," *TP* 29 (1932):312.

66. *Shiji*, ch. 4, p. 122.

67. *Shiji*, ch. 33, p. 1515; ch. 32, p. 1480.

68. SPTK ed., 2.6b, 4.5b.

69. On this passage see the instructive comment by Cui Shu 崔述 (1740-1816) quoted in *Shiji*, preface, p. 3.

70. *Shiji*, ch. 4, p. 119.

71. SPTK ed., 4.6a.

72. Quoted by Zhang Shoujie, *Shiji*, ch. 4, p. 120.

73. *Congshu jicheng* ed., p. 28; *Yi Zhoushu*, SPPY ed., 3.4b.

74. *Han shu*, ch. 21B, p. 1015.

75. *Shangshu*: "Zhonghou" Chapter (Yuhan shanfang jiyishu, 4:1989) dates the sacrifice to the 4th month. According to *Yi Zhoushu* (SPPY ed., 3.4b) King Wen died at the end of spring (actually 27 months) was observed, something that both Liu Xin and Sima Qian assume, then King Wu could have contemplated resuming his official duties by May or June of 1048 B.C., i.e., in the 6th month of that year. Since King Wen was buried at Bi the ceremony that took place there in the 4th month is

identifiable with the *da xiang* 大祥 sacrifice to which Liu Xin refers (*Han shu*, ch. 21B, p. 1015) marking the conclusion of 25 months of mourning.

76. I do not believe there is any astrological explanation for this "fish story." Its color (white) and associated element (water) are clearly intended to symbolize the Shang--so too is its use as a sacrificial offering to Heaven. The metaphysics of "five phase" theory evidently required some sort of earthly counterpart to the Red Bird omen sent by Heaven. See Huan Tan's account of the same events in Part 4. This conjecture is also supported by the fact that Han apocrypha contain stories about Tai Gong Wang (i.e., Lü

Shang) having fished a jade *huang* 璜 out of the Wei River, ostensibly in response to the Red Bird augury witnessed by King Wen. On the jade was a message that explicitly conferred the Mandate on the Ji lineage, just as the writing on the fish did in certain accounts. See, for example, "Zhonghou" Chapter of *Shangshu* in *Yuhan shanfang*, 4:1988-89.

77. *Shiji* (quoting Shi Shen), ch. 27, p. 1312. In *Zuozhuan* (Zhao 32/ 510 B.C.) we read that "Yue has the Year Star and [still] Wu attacks it. Wu will certainly suffer the evil consequences [of such action]" 越得歲而吳伐之必受其凶

78. According to Wang Chong 王充 (A.D. 27-97), the very name Mengjin 盟津 "Ford of Sworn Alliance" commemorates this event: "King Wu and 800 lords all made a pact of alliance there, therefore it is called 'Ford of Sworn Alliance'"

See *Zhongwen*

*da cidian*, 23553.8.

79. Several of the queries addressed to Heaven by Qu Yuan 屈原 (ca. 332-295 B.C.) in his *Tianwen* 天問 "Heaven Questioned" refer to this episode: In David Hawkes' translation in *Ch'u Tz'u: The Songs of the South* (London, 1959), p. 53, which I have modified, we read that "On the morning of the first day we took our oath. How did we all arrive in time? When the geese came flocking together, who was it made them gather? When [Shang] Zhou was attacked, uncle Dan (Duke of Zhou) disapproved. How did he plan, all by himself, to establish the rule of Zhou, so that King Fa sighed in admiration? When he was given the domain of Yin, how was his kingship bestowed?" In his commentary in *Chuci buzhu* 楚辭補注, SPPY ed., 3.19a-19b, Wang Yi quotes as follows from the lost "Liu tao" 六韜 Chapter of *Zhoushu*, which is possibly the same work referred to in *Zhuangzi* (H-Y index 65/24/8): "When King Wu went east to attack and reached the banks of the Yellow River, it rained heavily and thundered intensely. Dan, Duke of Zhou, came before the King and said, 'Heaven does not assist Zhou. The import is that my lord's virtue and comportment are not without flaw, the people are afflicted and complaining. Therefore Heaven sends down calamities on us. I request to withdraw the army.' Tai Gong (i.e., Lü Shang) said, 'You may not.' King Wu and the Duke of Zhou looked in the distance at the ranks of Zhou [Xin's] troops, drew up the army and halted [the advance]. Tai Gong asked, 'Sire, why do you not have them charge?' The Duke of Zhou said, 'The season of Heaven is not with us. Divination by tortoise and firebrand give no sign. The prognostication by milfoil is inauspicious; it is perverse and unfavorable; what is more, the changes in the stars are baleful. Therefore, [I] Dan halted them. How could they

[be allowed to] advance?" 武王東伐至於河上雨甚雷疾。周公旦進曰，「天不祐周矣。意者吾君德行未備，百姓疾怨邪。故天降吾災。請選師。」太公曰，「不可。武王與周公旦望紂之陣，引軍止之。太公曰，「君何不馬也。周公曰，「天時不順，龜燿不兆，占筮不吉，妖而不祥，星變又凶，固旦待之何可驅也。」 Given the tenor of many of Qu Yuan's questions about the Way of Heaven and fate, it is not surprising that the retreat from Mengjin would have fallen into this category of enigmatic events which piqued his curiosity. Perhaps we could give him a satisfactory answer now.

80. *Kaiyuan zhanjing*, 23.18a. Here, then, we have the explanation of the discrepancy in note 25 regarding the campaign with which the Red Bird augury (and the "Great Harangue") was actually associated. The true augury associated with Jupiter's entry into the Red Bird asterism actually occurred in late 1047 B.C. and not in the autumn of 1048. But according to the Mandate calendar, 1048 was the 11th year, the



year of the "Great Harangue" and the retreat from Mengjin. By the late Zhou, when the Mandate reckoning and King Wu's year count became confused, an 11th year campaign in the latter's reign would naturally have been taken to be the one that culminated in the victory at Muye early in the 12th year. By the former Han the confusion was so complete that Sima Qian was unable to present a coherent account of the events of the two campaigns, as we saw in Part 3.1. Once it is realized that King Wu's reign could have lasted no more than 9 years and that the events of the 11th, 12th, and 13th years are all dated using the Mandate calendar, the apparent contradictions are easily resolved. See Table 2.

81. Taiping yulan, 329.5a.

82. Sivin, op. cit., pp. 16-17.

83. Shiji, ch. 27, p. 1348; Han shu, ch. 26, pp. 1301-1302. See also Homer H. Dubs, trans., The History of the Former Han Dynasty by Pan Ku (Baltimore, 1938), vol. 1, pp. 151-53.

84. According to Yi Xing's Wuxing yi 五星議, as quoted in Xin Tang shu, ch. 27B, p. 628, the period of Jupiter was unique because it changed radically between the Shang and Han periods. In the earliest period he believed the "leap chronogram" interval (i.e., the time required for the planet to "gain" one chronogram in comparison with the nominal 12-year cycle) to have been 120+ years. Under the influence of political events Jupiter speeded up throughout the Warring States and early Han periods, finally settling down to a constant 84-year "leap chronogram" period after the Wang Mang interregnum.

85. Chatley, "The Cycles of Cathay," p. 38.

86. Mencius, 7B/38.

87. Chatley, "The Cycles of Cathay," p. 40.

88. See note 100.

89. Han shu, ch. 26, p. 1310.

90. Bamboo Annals, p. 85.

91. 易緯稽覽圖, Siku zhenben bieji ed., B.1b.

92. Yinxu buci zongshu 殷虛卜辭綜述 (Beijing, 1956), pp. 211-13.

93. Yinli pu, vol. 1, 4.2a-4b.

94. Bamboo Annals, p. 85.

95. This fact was also deduced by Chen Mengjia (Yinxu, p. 212) and Tung Iso-pin (Yinli pu, 1:4.3a) from the role of the figure 496 years as in the duration of the Shang dynasty in the Yinli chronology. The Yinli chronologists knew that the 496th year was the year before King Wen received the Mandate, however, they failed to distinguish Cheng Tang's 1st year as Xia Jie's successor from the transfer of the Mandate in Xia Jie's 10th year. As a result they identified 1579 as the 1st year of Shang and 1084 B.C. as its last.

96. This record of a meteor shower is the first of the 147 reports which ZhuangTianshan has collected from various sources; see "Ancient Chinese Records of Meteor Showers," Tianwen xuebao 14 (1966):37-58; reprint ed. Chinese Astronomy I (1977):197-220. Zhuang misconstrued the Bamboo Annals' "10th year, five stars/planets moved criss-cross" as "15th year, stars moved criss-cross," which explains how he came up with the date 1575 B.C. for the event despite his failure to identify either the planetary conjunction or the meteor shower.

97. Liu Xin put the length of the Shang dynasty at 629 years. See Han shu, ch. 21B., p. 1014.

98. As we have seen above, even when this important distinction was understood (by the Yinli chronologists, for example, who more or less correctly analyzed the relative chronology of the Zhou Conquest period), the parallel at the beginning of the Shang dynasty was overlooked.

99. The earliest account of the phenomenon involving the five planets and the "contest" between the two suns is the quotation from Diwang shiji in Beitang shuchao 北堂書鈔 (Yiwen ed.), p. 42.1b. The Bamboo Annals now has "three suns simultaneously appeared." Lin Chunpu 林春溥, however, demonstrates conclusively that "three" is an error; see Gu-shi jinian 古史紀年 (Beijing: Zhubo shanfang jiake ed., 1837): p. 4.17b.

100. Recent research on the effects of planetary alignments on the weather in China during the past 3000 years appears to show a significant correlation between unusual temperature changes and the seasons of the planetary alignments. In "A Controversial Theory of the Weather," The Wall Street Journal, Tuesday, March 9, 1982, Jonathan Kwitny cites "a 1980 paper, 'The Effect of Planet Movement on Changes in Climate,' by Ren Zhenqiu of the Peking Meteorological Institute and Liu Zhilin of the Astronomy Department of the Chinese Science Institute" in which 19 past alignments are studied and the calculation is made that during alignments "the radius of the earth's orbit around the mass center of the solar system is 1% longer than normal, extending one or another season according to formulas [provided]." Thus it seems that the ancient Chinese may have got the climatic consequences of a change of the Mandate right as well.

101. Quoted in Lin Chunpu, Gushi jinian, 4.10b.

102. See Chang Ping-Chün 張秉權, Hsiao-t'un ti erh-pen: Yin-hsu wen-tzu: ping-pien 小屯第二本殷虛文字: 丙編 (Taipei, 1957), vol. 1, Pt. 1, p. 459.

103. Zhuang VI/688 B.C.

104. Ai IV/ 491 B.C.

105. Mencius, 2B/2.

106. Zhuangqi, H-Y index, 93/33/73.

107. For additional examples with xiri 昔日 "yesterday" and xisui 昔歲 "last year," see W.A.C.H. Dobson, A Dictionary of the Chinese Particles (Toronto, 1976), p. 660.

108. Chu ci: "Dong jun" ("Lord of the East"), trans. Hawkes, Ch'u Tz'u, p. 42; c.f. Chuci buzhu, 2.17b.

109. Lüshi chunqiu, 13.4a.

110. Anthony F. Aveni, "Astronomical Tables Intended for Use in Astro-archaeological Studies," American Antiquity, 37.4 (1972):531-540.

111. Song shu, ch. 25, p. 735. Shen Yue gives as his source "surviving writings" 遺文

112. As I pointed out in note 3, Pei Yin quoted the Bamboo Annals as stating that from King Wu's destruction of Yin down to King You was 257 years. As Noel Barnard, op. cit., p. 501-15, and others have convincingly argued, this so-called "short chronology" is inconsistent with what is known about the reign lengths of the Dukes of Lu and the Western Zhou kings from other sources. Rong Mengyuan, op. cit., p. 19, Zhao Guangxian, op. cit., p. 59, and David S. Nivison, "Dates," p. 10, have all suggested that the figure "257" resulted from the transposition of the last two digits of the figure "275." It is now clear that this must be the correct explanation. At some point after the reconstruction of the Bamboo Annals the comment was rewritten to read that "when King Wu extinguished Yin the year was gengyin (i.e., 1051 B.C.); 24 years later the year was jiayin (1027 B.C.) and the tripods were settled at Luo. Down to King You it was 257 years; altogether it was 281 years. From King Wu's 1st year jimao (1062 B.C.) to King You genqiu (771 B.C.) it was 292 years" (p. 111). This construction seems to have come about in the following way: As a result of the two backdatings of the Zhou Mandate and Conquest, initially by 4 years (which I discuss below) and later by 8 more years, two rival chronologies of the Conquest period had been formulated by the former Han dynasty--leaving aside for the present the hybrid

Yinli School solution and subsequent Han dynasty calculations. The 8th-century B.C. revision of the Bamboo Annals chronology discussed below produced the dates 1580 for the Shang Mandate, 1558 for the 1st year of Shang, 1063 for the receipt of the Mandate by Zhou, and 1050 B.C. for the conquest of Shang. The original summation in the chronicle giving 496 years as the length of the Shang dynasty was unaffected by the "correction" and remained valid (1058 - 1063 = 496 inclusive). But the comment giving 275 as the duration of Western Zhou was rendered invalid because the last year of King You, 771 B.C., could not be moved back 4 years (1050 - 771 = 279). At this point the figure 275 years began to lose its significance and ultimately became garbled as 257 years.

The subsequent revision of the Bamboo Annals chronology, probably during the Late Warring States period before the text was interred, resulted in the additional 8-year back-dating of the Zhou Mandate to 1071 B.C. under the influence of the misapprehension that the conjunction witnessed by King Wen had occurred in Great Fire, as discussed in Part 2. As a result of this revision (and emendation of the text of the chronicle) the summary giving 496 years as the duration of the Shang dynasty became invalid. This latest version of the chronology appears to have been widely accepted in the Han dynasty, although the former was undoubtedly not forgotten.

When bamboo slips containing the text of the chronicle were discovered in A.D. 281, there was a concerted effort to restore the Bamboo Annals to their original state. Subsequently, scholars would have attempted to resolve the contradictions which had arisen between the reconstructed text and the end of dynasty summaries and other comments as a result of the repeated recalculation of the dates of the Zhou Mandate and Conquest. The rewritten "257-year" summary quoted above with its superfluous summations and interpolated cyclical year designations is a product of this effort. In addition, the attempt to reintegrate the by now incongruous "496 year" summary for the Shang dynasty necessarily led some scholars to reidentify the date of King Wu's accession as taking place one year earlier, making 1062 the 1st year of King Wu and 1051 B.C. "gengyin," now his 12th, the year of the Zhou Conquest. By reinterpreting 1062 B.C. as in some sense the 1st year of the Zhou (as had been the case in the 8th century B.C. version of the chronology), the figure 496 years for the duration of the Shang could once again be construed to identify the interval 1558 B.C., Cheng Tang's 1st year as King in Shang, to 1063 B.C. See Table 1.

This reinterpretation made it necessary to "rewrite" a second comment in the Bamboo Annals, p. 13 in the "genuine" version, which had survived intact the 8-year backdating and which stated that from the Receipt of the Mandate to King Mu was 100 years (the Bamboo Annals date for the beginning of his reign is 962 B.C.), in the following form: "From King Wu to King Mu [Zhou] ruled the state for 100 years ("current" Bamboo

Annals, p. 97). Here the now troublesome reference to the Mandate has been eliminated (or reinterpreted as its transfer to King Wu by virtue of his succession) and the figures 1062 - 100 = 962 agree. Needless to say, this well-intentioned editorial scheme is contradicted by the text of the chronicle which has King Wu succeeding his father in 1061, not 1062, and by the original "257 year" comment (quoted by Pei Yin) which explicitly states that the said figure identifies the year King Wu extinguished Yin and not the "settling of the tripods in Luo." In order to distinguish it from the basic chronology of the Bamboo Annals this "reconstruction" has been represented by broken lines in Table 1.

113. The logic of this argument owes much to Professor David S. Nivison's insight that the discrepancy between the Bamboo Annals date for the Conquest and the actual date of the event was probably the result of faulty calculation based on the nominal 12 year Jupiter cycle. My discovery of the record of the conjunction in 722 B.C. confirmed this hypothesis and pinpointed the most likely date for the "recalculation" of the date of the Zhou Conquest in the 8th century B.C.

114. Bamboo Annals, p. 92.

115. Guoyu, 10.3a.

116. Jin shu, ch. 51, p. 1432. This is the original version of the "rewritten" comment cited in note 112; for this reason, the latter is almost certainly a post-discovery construction. It is also worth noting that Shu Xi explicitly states that the Bamboo Annals began with the chronicle of the Xia dynasty. We may therefore assume that the earlier material now attached to the beginning of the Bamboo Annals dealing with the Five Emperors, including Yao and Shun, is the result of accretion.

117. "Sinological Notes," JRAS/NCB 65 (1934):187-88.

118. "La Chronologie chinoise et l'avènement des Tcheou," TP 23 (1924):287-346 and "La Chronologie chinoise et l'avènement des Tcheou (Pt. 2)," TP 29 (1932):276-386.

119. Science and Civilisation, 3:408.

120. The Zhengzhou samples in question--ZK-177, ZK-178--have yielded radiocarbon dates of 1573 ± 146 and 1598 ± 110. For a discussion of the issues involved see Kwang-chih Chang, Shang Civilization, pp. 270-71, 323, 343 and David N. Keightley, "Shang China is Coming of Age--A Review Article," in which Shang Civilization is reviewed, JAS 41.3 (1982):552.

121. Lunyu, 9/9.



TABLE 2: CHRONOLOGY OF KINGS WEN AND WU

Di Yi's Reign	B.C.	King Wen's Reign	Mandate	Description
		1		King Wen accedes to the throne of Zhou (probable age 9 sui), after King Wen Ding 文丁 of Shang kills Wen's father Jili 季歷.
1	1094	6		"King Wen ruled the state for 8 years; that year, in the 6th month, King Wen was confined to bed by illness for 5 days and the earth shook. To the east, west, north, and south [the tremor] did not go beyond the suburbs." <sup>2</sup>
3	1092	8		"[In Di Yi's] 3rd year...6th month, in summer, the earth shook in Zhou." <sup>3</sup>
Di Xin's Reign				
1 (17)	1086	14		Di Xin succeeds Di Yi after the latter's death in his 8th year.
22 (26)	1065	35		Total lunar eclipse, March 13, 1065 B.C. (JD 133 2503), at 2:35 a.m. Local time in Xian. Confirms 1059 B.C. as King Wen's 41st year. See Part 2.
28 (32)	1059	41		Triple Conjunction in Cancer, 5° from the "Beak" of the Vermilion Bird. Minimum separation achieved on May 28, 1059 B.C. (JD 133 4771), day <u>ji</u> azi. Mandate of Heaven conferred on King Wen. See Part 1.
29 (33)	1058	42	1	"In King Wen's 42nd year, Jupiter was in Quail Fire; therefore he changed it to the First Year of the Mandate and began to style himself 'King.' <sup>4</sup>
				"In King Wen's First Year [of the Mandate, he] adjudicated [the dispute between] Yu and Rui." <sup>5</sup>
				"Evidently, in the year he received the Mandate [King Wen] styled himself 'King' and adjudicated the suit between Yu and Rui. Seven/ten years later he died." <sup>6</sup>
				"King Wen received the Mandate in mid-life; he ruled the state for 50 years." <sup>7</sup>
31 (35)	1056	44	3	"In King Wen's 3rd year [of the Mandate, he] attacked Mixu." <sup>8</sup>
				"Next year (i.e., the 3rd), he attacked Mixu." <sup>9</sup>
32 (36)	1055	45	4	"The Kunyi barbarians fled. In the 4th year [we] attacked them. In one expedition, Nanzhong pacified the two brigand [tribes]." <sup>10</sup>
				"In King Wen's 4th year [of the Mandate, he] attacked the Quanyi [barbarians]." <sup>11</sup>
				"In [Di Xin's] 36th year, in spring, 3rd month, the various lords came to have audience in Zhou; thereafter [they] attacked the Kunyi [barbarians]." <sup>12</sup>
33 (37)	1054	46	5	"In [Di Xin's] 33rd year...[the Zhou] removed to Cheng." <sup>13</sup>
34 (38)	1053	47	6	"In the 6th year [of the Mandate, King Wen] attacked Chong." <sup>14</sup>
				"The next year (i.e., the 6th), [King Wen] attacked Hu, Marksman of Chong." <sup>15</sup>
				"In [Di Xin's] 34th year, Zhou armies took Qi and Yu; thereafter they attacked Chong and the men of Chong surrendered." <sup>16</sup>
35 (39)	1052	48	7	"In [Di Xin's] 35th year, there was a great famine in Zhou; the Earl of the West removed from Cheng to Feng." <sup>17</sup>
				"When the King of Zhou had resided in Cheng for 3 years, [Zhou] met with a great famine from Heaven." <sup>18</sup>
				"After having attacked Chong, a city was built at Feng." <sup>19</sup>
36 (40)	1051	49	8	"In [Di Xin's] 36th year...the Earl of the West sent Heir Apparent Fa (i.e., King Wu) to lay out [the city] Hao." <sup>20</sup>
				"In [Di Xin's] 40th year, Zhou built the Spirit Tower; the [Shang] King sent Jiao Ge to demand jade of Zhou." <sup>21</sup>
				"The Zhou had tablets of jade. [Shang] Zhou ordered Jiao Ge to seek them, but King Wen did not give [them to him]." <sup>22</sup>

37 (41)	1050	50	9	"In [Di Xin's] 41st year, 3rd month, in spring, Chang, Earl of the West, died." <sup>23</sup> "My Gentle Deceased Father, King Wen, was able to fulfill his meritorious task and greatly respond to Heaven's Mandate to take in hand the Xia of the four quarters. In the 9th year [of the Mandate], with the Empire not yet gathered together, [he died]." <sup>24</sup> (King Wen's probable age, 58 sui.) "In the 9th year of the Mandate, in late spring, King Wen summoned Heir Apparent Fa and said, 'Wuhu! I am old.' <sup>25</sup> "King Wen died in the 9th year of the Mandate." <sup>26</sup> "Evidently, the Earl of the West reigned for 50 years." <sup>27</sup>
38 (42)	1049	1	10	King Wu in mourning, continues the Mandate calendar. "In [Di Xin's] 42nd year, the Earl of the West, Fa, received the Cinnabar Writing from Lü Shang." <sup>28</sup> "In the King's First Year, 2nd/8th month, <u>bingchen</u> (day 53), new moon, the King was at Hao. He summoned Dan, Duke of Zhou, and said, 'Wuhu! Be attentive!'" <sup>29</sup> Confirms July 26, 1049 B.C. (JD 133 8483) as the 1st day of the Zhou 8th month, in King Wu's 1st year.
39 (51)	1048	2	11	"In [Di Xin's] 51st year, in winter, the 11th month, <u>wuzi</u> (day 25), the Zhou armies forded at Mengjin and withdrew." <sup>30</sup> "In the 11th year, King Wu attacked Yin. In the 1st month, <u>wuwu/wuzi</u> (day 55/25), the armies forded at Mengjin. [The King] composed the 'Great Harangue' in 3 chapters." <sup>31</sup> "At this time, 800 of the various lords met before the appointed time at Mengjin. All said, 'Zhou [Xin] may be attacked!' King Wu said, 'You do not know the Mandate of Heaven; it may not yet be done.' Thereupon, he returned (to Zhou) with the armies for 2 years." <sup>32</sup> "The 'Taishi Preface' says, 'In the 11th year, King Wu attacked Yin.'" <sup>33</sup>
40 (52)	1047	3 (1:1)	12	"In [Di Xin's] 52nd year, <u>gengyin</u> , Zhou first attacked Yin; in autumn, the Zhou armies camped at Xianyuan; in winter, in the 12th month, the Zhou armies sacrificed to Shangdi; Yong, Shu, Qiang, Mao, Wei, Lu, Peng, and Pu followed the Zhou armies in attacking Yin." <sup>34</sup> "In King Wu's 11th/3rd year, <u>gengyin</u> , Zhou first attacked Yin." <sup>35</sup> "In the King's 3rd year, King [Wu] was at Feng when [Zhou Xin's] plans were reported to him. The King summoned Dan, Duke of Zhou, and said, 'Wuhu! Shang is completely guilty'....The Duke of Zhou said, 'The time has come.' Thereupon, he raised the armies to follow the precedent [of Cheng Tang]." <sup>36</sup> "Formerly, when King Wu attacked Yin, Jupiter was in Quail Fire; the moon was in Heavenly Quadriga; the sun was in the Ford that Separates Wood; the new moon was in the Handle of the Dipper; Mercury was in Heavenly Turtle....Jupiter was in the region allotted to us, the Zhou." <sup>37</sup> Analysis confirms the accuracy of these positions during the period November 26 (JD 133 9336) to December 3 (JD 133 9343), 1047 B.C.
	1046	4 (12)	13	"In [King Wu's] 12th/4th year, <u>xinmao</u> , the King led the various lords of the western barbarians in attacking Yin and defeated it at Muye...[he] set up Zhou [Xin's] son, Lu Fu--this was Wu Geng; in summer, in the 4th month, the King returned to Feng and celebrated a sacrifice (to the royal ancestors) in the Ancestral Temple; he issued commands to the Overseers in Yin, whereupon he went on a royal hunt at Guan; he made the Great Martial Music." <sup>38</sup> "In the 13th year, the King was at Guan. Guan Shu henceforth acted as Overseer in Yin. The lords of the eastern region were all rewarded by the King." <sup>39</sup> "When King Wu punished Shang, it was on day <u>jiazi</u> . [Our] facing east (lit. "dawn") toward Jupiter confirmed that by nightfall [we would] hold Shang." <sup>40</sup> "In the 2nd/1st month, <u>jiazi</u> (day 1) in the twilight, King Wu arrived at dawn at Muye in the suburbs of Shang; thereupon, he harangued the troops." <sup>41</sup> Confirms January 20, 1046 B.C. (JD 133 9391) as the date of the Zhou Conquest. "From King Wen's Receipt of the Mandate to this was 13 years; Jupiter was again in Quail Fire ...4 years after King Wen's demise, King Wu defeated Yin." <sup>42</sup> "The 'Great Harangue' Chapter says, 'It was in the 13th year, in spring, the great convocation at Mengjin.'" <sup>43</sup> "The 'Great Plan' Chapter says, 'It was in the 13th year that the King visited Jizi.'" <sup>44</sup>

"It was the 23rd/13th year, gengzi (day 37), new moon; the lords of the 9 Regions all came to Zhou. The King was at Feng. In the morning twilight, the King stood in the Lesser Hall. The King announced to Dan, Duke of Zhou, 'Wuhu.' The various lords have all come to felicitate us on the difficult campaign against Shang. How shall I preserve and keep them? How shall I employ them and send them off?"<sup>45</sup> Confirms April 26, 1046 B.C. (JD 133 9487) as the 1st day of the Zhou 5th month in the 13th or Conquest year.

1045 5 (13) "In the 13th/5th year, Chao Bo came to be hosted [in Zhou] [the King] presented Yin (captives, booty, etc.) in the Ancestral Temple. Thereafter [he] grandly [re-]invested the various lords."<sup>46</sup>

1044 6 (14) "Two years after having conquered Shang, the King became ill and was disconsolate."<sup>47</sup>  
 "In the 14th/6th year the King became ill. The Duke of Zhou prayed at the altar in the arena and made the 'Metal Bound Coffin.'<sup>48</sup>  
 "Two years after conquering Yin the Empire was not yet pacified when King Wu died."<sup>49</sup>

1042 8 (16) The Duke of Zhou appoints himself Regent.

1041 9 (17) In the 17th/9th year [the King] named Song (i.e., King Cheng) heir to the throne in the eastern palace. In winter, in the 12th month, the King died aged 94."<sup>50</sup>  
 "Six years after conquering [Shang] Zhou, King Wu died."<sup>51</sup>

1040 1 King Cheng accedes to the throne.  
 (1039) (11) ("When King Wu conquered Yin he was 86. Seven years later he died."<sup>52</sup>)





The table documents the reconstruction of the chronology of late Shang and early Western Zhou based on the primary astronomical dates considered above. They are the total lunar eclipse in King Wen's 35th year, the Triple Conjunction in King Wen's 41st year, the location of Jupiter in Quail Fire in 1059-1058 and 1047-1046, and the *Guoyu* observations dating from the late autumn of 1047 B.C. A comparison of the astronomical dates with the *Bamboo Annals* chronology has revealed a pattern of systematic errors in this work. Equipped with this knowledge, it becomes possible to establish the chronology of the period by collating the data from a variety of sources whose idiosyncracies are understood. For example, no dates in the *Bamboo Annals* are recorded in terms of the Mandate calendar, whereas those in *Yi Zhoushu*, *Shiji*, *Shangshu*, and *Han shu* regularly are. In this way one can distinguish which entries in the *Bamboo Annals* are prefaced by what I take to be true reign years and which are distorted (note particularly Mandate years 5-8), and occasional errors in other works can also be set right. For example, two calendar dates comprising year, day of month, and *ganzhi* have been recovered from *Yi Zhoushu* for years 1049 and 1046 B.C.

The reign years for Di Xin and King Wu given in parentheses are those now found in the *Bamboo Annals* for the events. They are provided in order to illustrate the 4-year and 8-year (and  $4 + 8 = 12$  year) distortions which have entered the text in stages, as described in Parts 2 and 6. The reconstruction extends only as far as the immediate post-Conquest period. Certain sources which give an account of the end of King Wu's reign and the beginning of King Cheng's appear contradictory; I have illustrated this fact by providing references for the different traditions regarding Wu's death. Further research will show whether the contradictions are only apparent. At present the evidence indicates that Wu died either in the winter of 1044 or, more probably, 1041 B.C.; that the Duke of Zhou's 7-year regency began in 1042; and that King Cheng actually acceded in 1040. Thus it appears that opposition to the Duke of Zhou from within the Zhou House may have arisen because he assumed the role of Regent during Wu's terminal illness.

1. The dates for Di Yi and Di Xin are based on three premises: first, that the *Bamboo Annals* and *Lüshi chunqiu* are both correct in dating the earthquake of 1092 B.C. to the 3rd year of Di Yi and the 8th year of King Wen, respectively; second, that the *Bamboo Annals* err in allotting Di Yi a total of 9 years, rather than 8; third, that the 10th year of Di Xin, in which the *ren fang* 人方 campaign was mounted, was 1077 B.C. as the corpus of inscriptional evidence collected by Tun Tso-pin (*Yinli pu*, vol. 2, pp. 9.48a-63b) documenting this expedition seems to indicate. See also Chen Mengjia, *Yinxu buci zongshu*, pp. 301-4. This date was suggested to me by David Nivison after I had provisionally identified 1087 B.C. as a possible candidate. My subsequent discovery of the correlation between the two dates for the earthquake in Zhou lent strong support to the 1077 dating. The inscriptions require the 1st month of the 10th year (i.e., the 1st lunation after the solstice) to begin on or shortly after *jisi* (day 6), and the Shang 1st month of 1077 would have begun on *renshen* (day 9). The  $4 + 12 = 16$  year distortion in the identification of Di Xin's 1st year as 1102 B.C. is probably contemporaneous with the reconstitution of the *Bamboo Annals* after their discovery, since this distortion actually compounds an earlier systemic error: First, there was a 4-year backdating of Di Xin's last year from 1047 to 1051, and second, the lengthening of his reign by another 8 years (for a total inflation of 12 years, from 40 to 52 years) due to the error locating the Mandate conjunction in Scorpius; 1102 is simply the sum of 1051 and 52 (inclusive), which operation compounded the first 4-year error. The entry was probably inserted at the same time the cyclical designations for each ruler's accession year were interpolated into the text.

2. *Lüshi chunqiu* (SPPY ed.), 6.7a-7b. 周文王在國八年歲六月文王寢疾五日而地動。東西南北不出國郊。

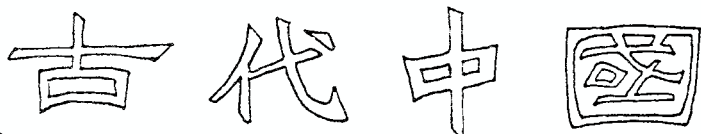
3. *Bamboo Annals*, p. 82. 三年...夏六月周地震。

4. *Diwang shiji*, p. 28. See Part 1.

5. *Shangshu dazhuan*, 4.5a, 2.16b. 文王受命一年斷虞芮之質。
6. *Shiji*, ch. 4, p. 119. See Part 4.1. 蓋受命之年稱王而斷虞芮之訟。后七(十)年而崩。
7. *Shangshu*: "Wu yi" Chapter. 文王受命惟中身; 厥享國五十年. This suggests that King Wen was 50 *sui* in the 1st year of the Mandate.
8. *Shangshu dazhuan*, *ibid.* 文王三年...伐密須。
9. *Shiji*, ch. 4, p. 118. 明年伐密須。
10. *Shijing* 詩經: "Mian" 緜 (#237), a lost fragment quoted in *Shisanjing zhushu*, 1:413, subcommentary to "Cai wei" 采薇, attributed to Zheng Xuan's commentary on *Shangshu dazhuan*. 猷夷, 混夷也。詩云,「混夷駮矣, 四年伐之, 南仲一行, 并平二寇。」
11. *Shangshu dazhuan*, *ibid.* 文王... 四年伐猷夷。
12. *Bamboo Annals*, p. 84. 三十六年春正月諸侯朝于周遂伐昆夷。
13. *Bamboo Annals*, p. 83. 三十三年遷于程。
14. *Shangshu dazhuan*, *ibid.* 文王六年伐崇。
15. *Shiji*, ch. 4, p. 118. 明年伐崇侯虎。
16. *Bamboo Annals*, p. 84. 三十四年周師取耆及邶遂伐崇崇人降。
17. *ibid.* 三十五年周大飢; 西伯自程遷于豷。
18. *Yi Zhoushu*, 2.6a. 惟周王宅程三年遭天之大荒。
19. *Shijing*, ode #244, "Wen Wang you sheng." 既伐于崇, 作邑于豷。
20. *Bamboo Annals*, p. 84. 三十六年... 西伯使世子發營鎬。
21. *ibid.* 四十年周作靈臺; 王使膠鬲求玉于周。
22. *Hanfeizi* (SPPY), 7.6a. 周有玉版, 紂令膠鬲索之, 文王不予。
23. *Bamboo Annals*, p. 84. 四十一年三月西伯昌薨。
24. *Shangshu*: "Wu cheng" Chapter, quoted in *Shiji zhengyi* (*Shiji*, ch. 4, p. 120). 我文考文王, 誕膺天命, 以撫方夏, 惟九年, 大統未集。
25. *Yi Zhoushu*, 3.4b. 文王受命之九年, 時維暮春, 在部。召太子發曰「嗚呼, 我身老矣」。
26. *Han shu*, ch. 21B, p. 1015. 文王受命九年而崩。
27. *Shiji*, ch. 4, p. 119. 西伯蓋即位五十年。
28. *Bamboo Annals*, p. 84. 四十二年西伯發受丹書于呂尚。
29. *Xin Tang shu*, ch. 27B, p. 604. 維王元祀二(八)月丙辰朔, 王在部。召周公旦曰「嗚呼, 敬哉。」 *Yi Zhoushu* (3.10a) has "3rd year" for "1st year" which is incorrect. Bingchen (day 53) was the new moon day of the 8th month in the Zhou calendar in 1049 B.C., hence "2nd month" is almost certainly an error for "8th month."

30. *Bamboo Annals*, p. 85 五十一年冬十一月戊子周師渡盟津而還。
31. *Shangshu*: "Preface." 惟十有一年武王伐殷，一月戊午師渡盟津，作泰誓三篇。The "Preface" and the *Bamboo Annals* (in the previous entry) are probably reporting the same event and date. Either the *Bamboo Annals* wuzi (day 25) is a mistake for wuwu (day 55) or vice versa. The two are often confused. The "1st month" of the "Preface" account is given as "12th month" in *Shiji*, ch. 4, p. 121, so that it is not clear what the original said. It may be that the Xia 11th month (*Bamboo Annals*) is simply the equivalent of the Zhou 1st month ("Preface").
32. *Shiji*, ch. 4., p. 120. 是時，諸侯不期而會盟津者，八百諸侯。諸侯皆曰「紂可伐矣」。武王曰「女未知天命，未可也。」乃還師歸，居二年。
33. *Shangshu*: "Taishi" preface, quoted in *Shiji zhengyi* (*Shiji*, ch. 4, p. 120). 泰誓篇序云「惟十有一年武王伐殷」。
34. *Bamboo Annals*, p. 85. 五十二年庚寅周始伐殷；秋周師次于鮮原，冬十有二月周師有事于上帝；庸蜀羌鬲微盧彭濮從周師伐殷。
35. *Xin Tang shu*, ch. 27B, p. 604. 武王十一年庚寅周始伐商。The 8-year error should be deducted from King Wu's reign year.
36. *Yi Zhoushu*, 3.11b. 維王三祀王在豐，謀言告聞。王召周公旦曰「嗚呼，商其咸辜...」時至矣。乃興師循故。This confirms the date of the second campaign, in King Wu's 3rd year, as 1047 B.C.
37. *Guoyu*: "Zhouyu," 3.18a-18b. For the Chinese text, see the Introduction.
38. *Bamboo Annals*, p. 89. 十二年辛卯王率西夷諸侯伐殷敗之于坻野...立受子祿父是為武庚，夏四月王歸于豐饗于太廟，命監殷，遂狩于管，作大武樂。The 8-year error should be deducted from the indicated reign year.
39. *Yi Zhoushu*, 4.4a. 惟十有三祀王在管，管叔自作殷之監，東隅之侯咸受賜于王。
40. *Li gui* inscription. 武王征商隹甲子朝歲鼎克餽玁有商。The translation of the second phrase is tentative. Several interpreters agree that *sui* 歲 refers to Jupiter, but their renderings of the next sentence seem equally tentative. See *Wenwu* (1977)8:1-12 and *Kaogu* (1978)1:58-59 and 6:77-84 for discussion by Tang Lan 唐蘭, Yu Xingwu 于省吾, Xu Zhongshu 徐仲舒, Qi Guiyan 戚桂宴, Huang Shengzhang 黃盛璋, Zhang Zhengliang 張政烺, Zhao Cheng 趙誠, et al.
41. *Shiji*, ch. 4, p. 122. 二月甲子昧爽，武王朝至于商郊牧野乃誓。This should read "1st month"; see Part 3.
42. *Han shu*, ch. 21B, pp. 1015-16. 自文王受命而至此十三年，歲亦在鶉火...崩后四年而武王克殷。
43. Quoted in *Shiji zhengyi* (*Shiji*, ch. 4, p. 120). 太誓篇云「惟十有三年春，大會于孟津」。Since the "Taishi" should be associated with the previous campaign in the 11th year of the Mandate (1048), this passage may have been erroneously attributed to the "Taishi." The allies converged on Mengjin on both occasions, but the first campaign was called off in late autumn, as we have seen.
44. Quoted in *Han shu*, ch. 21B., p. 1015. 洪範篇曰「惟十有三祀，王訪于箕子」。
45. *Yi Zhoushu*, 3.1a. 維(二)十三祀庚子朔，九州之侯咸格于周。王在豐，昧爽立于少庭。王告周公曰「嗚呼，諸侯咸格來慶，若爾，吾何保守，何用行」。The text now reads "23rd year," but this is certainly an error. Feng did not become the Zhou capital until after the defeat of Chong, in the 6th year of the Mandate. The Duke of Zhou goes on to deliver a homily on good governance, and it is impossible that he could have been serving in an advisory capacity to King Wen in the 23rd year of Wen's reign. There was of course no 23rd year in the Mandate calendar. The text must originally have read "13th year," since once this change is made, day gengzi (April 26, 1046 B.C.) is immediately confirmed as the 1st day of the Zhou 5th month in the year of the Conquest.
46. *Bamboo Annals*, p. 89. 十三年策伯來賓，存殷于太廟，遂大封諸侯。As Wang Guowei notes in his comment, some of these events properly belong in the preceding year. The main entry concerns Chao Bo, so that the remainder appears out of place here.
47. *Shangshu*: "Jin teng" Chapter. 既克商二年，王有疾弗豫。
48. *Bamboo Annals*, p. 89. 十四年王有疾，周公禱于壇墠，作金縢。The 8-year error should be deducted.
49. *Shiji*, ch. 28, p. 1364. 武王克殷二年，天下未寧而崩。Since the "Basic Annals," ch. 4, p. 131 and the "Genealogy of the House of Lu," ch. 33, p. 1516 both say that King Wu recovered from this illness only to die some time later, and since the original passage from *Shangshu*, (n. 47), does not say that King Wu died in the year mentioned, it may be overinterpreting the present text to take it to mean that King Wu died 2 years after the Conquest. The 8-year error should be deducted from King Wu's reign year.
50. *Bamboo Annals*, p. 90. 十七年命王世子誦于東宮。冬十有二月王陟，年九十四。The 8-year error should be deducted from King Wu's reign year. In his comment, Wang Guowei cites the Song work *Lushi* 路史 (ca. A.D. 1170), which quotes the *Bamboo Annals* as giving 54 *sui* for King Wu's age at death. The highly inflated figures of around 100 years for the age at death of both Kings Wen and Wu, which are found as early as Mencius 2A/1, resulted from a misreading of the *Shangshu*: "Wu yi" passage quoted in note 7. If "received the Mandate" were understood there to refer to Wen's appointment to succeed his father, i.e., to his accession in Zhou, then the only logical conclusion that could have been drawn from the *Shangshu* was that he must have lived to be 100 *sui*.
51. *Yi Zhoushu*, 6.25b. 既克紂六年而武王崩。
52. *Han shu*, ch. 21B, p. 1016. 武王克殷之歲八十六矣，后七歲而崩。Liu Xin's unique solution was dictated, at least in part, by his pushing the founding of Zhou back to 1122 B.C. See Léopold de Saussure, "La Chronologie chinoise," TP 23 (1924):299.





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