Early China
Astronomical Dates in Shang
and Western Zhou

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"Astronomical Dates in Shang and Western Zhou"

page 18 2nd paragraph, 6th line: "conjunction of 1059 B.C." should be "First Year of the Mandate 1058 B.C."

page 19 first paragraph, last line: for "1-½" read "one and one-half".

page 22 first paragraph, middle: for "late November at 15h 24m" should be "late November at 16h 28m".

page 23 Table 1: under King Wen 1st year: "1111" should be "1113", "12" should be "14".

page 30, note 66 for "122" read "121-22".

page 31, note 88 for "100" substitute "83".

page 31, note 103 "Zhuang IV/688 B.C." should be "Zhuang VI/687".

page 37, note 31 "Preface" should be "Taishi Preface".
Ever since the people first came into being, has there ever been a time when soverigns, 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 beneficial 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.

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, King Zeng, who already in 102 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 (d. A.D. 23) "long chronology" calculations which yielded the result of 1122 B.C., and Karlgren's suggestion of 1027 B.C. 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 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, gazhi 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 "jishba" (既死霸) is still hotly debated; we know next to nothing about the mechanics of intercalation in the early Zhou calendar 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. 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 典音 : "Zhouyu" (Chinese: "Zhouyu") in the 23rd year of King Jing, or "Zhouyu" (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 Quai Fire; the moon was in Heavenly Quadrant: 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. 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--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 (竹书纪年), or 竹书纪年 Annals from the Tomb in Jixian, as the work was traditionally known. I do not so 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 dynasty 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 and, after its partitioning, the state of Wei, concluding in the year 299 B.C.

The work survives in two versions, a jiben (original) or "current" version of uncertain provenance and a guben (true) or "genuine" version reconstructed from quotations in pre-Song works by Zhu Youzeng and Wang Guwei. 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. 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.

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 Guoyi, 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.

The Conjunction of 1059 B.C.

The "current" Bamboo Annals record a conjunction of all five naked-eye planets in Scorpius (lunar lodge Fang, or "House" #4) in 1071 B.C. According to the Bamboo Annals, this conjunction 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 夏州, and by deduction from this and other sources we know that this ought to have been the 41st year of King Wen’s reign.

In his Diwang shiji "Genealogies of Kings" 世 纪, for example, Huangfu Mi 皇甫谧 (A.D. 215-282) wrote: "King Wen was at Feng. The Tords 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’…" The 九州诸侯咸至,五星聚於房,文王即位四十二年, 跋在鶉火, 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" and 周益集於周社, 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, 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 (alias King Wen).

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,降之周社曰：'天命周文王伐殷百國'. In Lushi 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!"

In other kingdoms, 天必先見祥乎下民... 及文王之時 天先見火, 赤鳥銜璽書集於周社. 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, re-
ported in the "Taishih" chapter of Shangshu,18 Ch'ung-lu,
the "Zhou fuzi" section of Shiji, Han shu
(quoting Shangshu),21 Yi Pin,22 Luenheng,23 Songshu,24
e., 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 Mengin, the ford on the Yellow River
where the troops converged to be harangued.25 In one
of the most interesting accounts, the Han work Yi Lin,
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. Ji ji26 took
to roaming" in the Spring and Autumn period,征战伐周

The third appearance, reported in the
Bamboo Annals, the Song shu monograph on auguries
and talismans, and the Han dynasty apocryphal Shangshu
chapter "Zhouou luoshou 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.27 "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 yinglinga 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 came out with it and together they
canopied the Yellow River...." 武王没成王少

Kung lung shih, ru shih, shen hou
huang, che yi shih, nian yin, yin, shih, hou
hui han, jun yin, ti shi, hou, zhe, shi, hou

What is behind all this imagery? However un-
likely 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 lowest moving
planets, have an average conjunction 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 30'. In right
ascension by 3° in declination, a patch of sky easily
covered by a clenched fist held at arm's length. Any-
one 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 im-
posing sight this must have presented. In addition,
according to Tung Tso-pin's chronological tables,28
May 28, 1059 B.C. also happened to be day jiazi 甲

This is the first in the series of sexagenary desig-
nations. 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.33

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.

The computer-generated tables of
solar and planetary longitudes for the mid-2nd
century B.C. revealed the historical basis of the
Bamboo Annals account of the conjunction of the five
planets.30 Not surprisingly, nothing of consequence
occurred in the year 1071, the cyclical date assigned
to the event in the Bamboo Annals, but there was in-
deed 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 longi-
tudes of the sun and planets in May and June of 1059 B.C.:

<table>
<thead>
<tr>
<th>Sun</th>
<th>Me</th>
<th>Ve</th>
<th>Ma</th>
<th>Ju</th>
<th>Sa</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 7</td>
<td>36°</td>
<td>57°</td>
<td>58°</td>
<td>63°</td>
<td>74°</td>
</tr>
<tr>
<td>17</td>
<td>45</td>
<td>70</td>
<td>70</td>
<td>69</td>
<td>76</td>
</tr>
<tr>
<td>27</td>
<td>55</td>
<td>79</td>
<td>82</td>
<td>78</td>
<td>83</td>
</tr>
<tr>
<td>June 6</td>
<td>64</td>
<td>79</td>
<td>94</td>
<td>82</td>
<td>80</td>
</tr>
<tr>
<td>16</td>
<td>74</td>
<td>73</td>
<td>106</td>
<td>88</td>
<td>82</td>
</tr>
</tbody>
</table>

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., 猎或, or Carriages
Ghost #23), which is shown to the right in Figure 1.31
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 close 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 30' in right
ascension by 3° in declination, a patch of sky easily
covered by a clenched fist held at arm's length. Any-
one who has observed even a modest alignment such as
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nations. 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.33

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, 1933 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 nine minutes. From this we can conclude that 1050 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-calender for the period is confirmed by astronomical observations, thus justifying the extrapolation of the gaojuzi back into the 41st century, at least as far as Zhou calendrical usage is concerned. Moreover, there is a distinct possibility zheng, i.e., in the date may be an error for san, which would make the year begin with the first lunation after the solsticial, 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 solsticial 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 Scorpio is also off by more than 1100'. 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 W22

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 Yueqi 雷 悦淇 did in the early 19th century. In a comment on the entry concerning the conjunction in Zhushu jinian yizheng 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" 甲午十二年伐紂,天在鶉火推之,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 Men'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 may have derived this from the text. Another tradition that implied that the attack occurred in the 12th year of the Mandate rather than the 12th year of King Wu.

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 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 Zuoqizuan about a disastrous fire in the state of Song between the Marksman of Jin, Duke Dao "傅公", 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 Antares Great Fire. In the time of Tao Tang (i.e., Yao) the Regulator of Fire, Fu Bo (son of Gao Xin), lived at Shanggu 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." 《史記》記載,在周朝時,人們就會觀察黃帝,以判定天象是否安定。如果黃帝出現,表示著天下太平,國泰民安。
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.\(^{40}\) 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, "Great Fire is the star of E Bo; this [star] in fact marked the period of the Shang people."

大火星，適伯之星也，附記簡人，魏昭$q$昭$q^n$ remarks 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 of Cheng Tang’s victory.\(^{42}\) 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.\(^{43}\) We know too that Liu Xin and his father Liu Xiang (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.\(^{44}\) 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 explanation (which Ban Gu 批评, 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.\(^{45}\)

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 in the Bamboo Annals 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 Canon of Luminaries 星经, 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 钱樂之 originally constructed in mid-5th century A.D.\(^{46}\) The caption on the section of the star map depicting the station Quail Fire reads: "From 99 in Willow, \(26^\circ\), to \(79^\circ\), in Spread, \(26^\circ\), the chronogram \(w\)u, 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, \(25^\circ\), is the location of the Vermilion Bird, therefore it is referred to as 'Quail Fire.' It is the allotment of Zhou."

Although the degree figures represent the standardization introduced in the Han dynasty after the Tai Chi 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
recognize today ceased to have any validity in calendrical astronomy for many centuries ago. The patterns we perceive among the stars near the ecliptic have not changed appreciably since the Greeks first identified these constellations 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 number of twelve names for the Jupiter stations in use in the Zhou is limited, we can be confident that the portion of the star constellation identified as Quail Fire by Shen Shi'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.

2.2: The Astronomical Significance of the First Red Bird Aquatory

We are now in a position to interpret the mythic language used in the sources quoted above to describe what the early Chinese people witnessed. In 1059 B.C., the portion of the Vermilion Bird asterism identified as Beak, Neck, and Crook occupied the range 5h 30m to 5h 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 0.4m 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 report observed a Great Red Bird descending as 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 aquatory. The jade sceptre or guli 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 is the famous "Two 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.

2.3: The Role of Jupiter in Zhou Astrology

Judging from the mid- to late-Zhou traditions the planet Jupiter played a central role in the Red Bird aeratures by "energizing" this asterism through its presence there. The most concise statement of Jupiter's pertinence to the Red Bird 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 2. Correlation of mid-11th century B.C. ephemerides of Jupiter and the location of lodges Willow (24), Seven Stars (25), and Spread (26) in the Vermilion Bird asterism.

Shown here is the "zodiac" with the vernal equinox (0°) at the margins. Uppermost are the names of the Jupiter stations, Chunhuo being Quail Fire. The second scale shows the determinative stars in the lodges according to Shi Shen's identifications with summer solstice (90°) and the autumnal equinox (180°) positions ca. 450 B.C. The next scale shows the determinative stars of the "Old Degree" system of the 6th century B.C., the earliest of which we have detailed knowledge. Summer solstice and equinoxes are indicated for mid-11th century B.C. Beneath is a graphic representation of Jupiter's actual periods of visibility from 1061 B.C. (-1060 in astronomical notation) through 1034 B.C. Dated intervals which punctuate the line of Jupiter's progress indicate periods of invisibility during conjunctions with the sun. For example, in 1050 B.C. the planet was last visible at dusk in the west on or about June 11. It subsequently reappeared at dawn in the east on or about July 15, just within Willow, the "beak" of the Red Bird. Immediately below are the two other Red Bird years, 1047-1046 and 1035-1034, demonstrably associated with historical appearances of the Red Crow or Phoenix during the reigns of Kings Wu and Cheng.

Note the slight eastward shift (4.25°) of the period of invisibility in successive cycles. Every 7 cycles of 11.86 years the Jupiter "clock" gains one entire station by comparison with the nominal 12 year cycle the planet was thought to keep by the Zhou astrologers.
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 Oi Shan, (e.g., in Qi Yang, 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 tides are foretold when Jupiter remains undisturbed in its path. When it advances or retrogrades and fails to observe the usual order 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. That Jupiter was thought to govern the harvest is also the central theme of a fragment of the Jinzi 记子 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 T'aiyin 太陰.

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.), quoting from Shangshu 大夏zuan in his Chunqiu fanlun, wrote: "When Zhou was about to arise, a Red Bird came and alighted on the 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)."

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. 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 Mowangdui manuscript, entitled "Progressions of the Five Planets." The modern value for the synodic period of Jupiter (i.e., between successive conjunctions with the sun) is 399.884 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" suxing derives from this coincidence. The chronogram with which each of the 12 Jupiter stations was identified (e.g., Quai1 Fire with Wu, the 5th lunar month) in practice indicated the month in which the conjunction of Jupiter with the sun occurred in a suit bearing that designation. In the case of Quai1 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 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 nodes, which had been identified with the planets (Figure 2). This phenomenon of "station drift" was not clearly understood until Liu Xin's time, when he introduced the "leap chronogram" 年辰 every 144 years in an attempt to compensate. The correct figure is actually 83 years. The failure of Jupiter to play a more significant role in Zhou and later calendrical science was doubtless a result of this problem. According to Han Shihui, 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 -- rather than as the interval between passages of the sun through the winter solstice. 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 frighteningly. 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 infuriated the asterisms through which it passed with productivity, but it detracted from the fulfillment of their potentialities when it failed to make timely appearances among its encampments (tzu 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."

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 Quai1 Fire sui. This is the case because after disappearing behind the sun in June of 1059, Jupiter reappeared at dawn in mid-July at 5° 56' below the horizon. In right ascension, just within the "peak of the Vermilion Bird asterism (Figure 2). This confirms Huangfu Mi's assertion that King Wen's 42nd
year was a Quaill Fire year. Jupiter's appearance in Quaill 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 at 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 Quaill 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.

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's65 was one of the first to show that the dates contained in the "Luqao" and "Shaqao" Chapters of Shangshu for events in the seventh and last year of the Duke of Zhou's regency conform to the yingzhi 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 (3° on July 30) and would have been clearly visible well before sunset in the west, "crowning the Yellow River in company with the sun," as recounted in Song shu. 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 nonsensicalus in connection with the events of the conquest period. In the "Basic Annals of Zhou,"66 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 jiazhi 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 Qi67 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 dates 11th and 12th years, respectively, for wuwu (day 55) when the troops forded the Yellow River at Mengjin. But then Sima Qian adds 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 event 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 as late as 111 B.C., 1st year of 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 dazhuang68 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 shuangyin, yinjia, the first event recorded being King Wen's adjudication of the dispute between Yu and directly.9, 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 less than trustworthy (or at least irreconcilable) traditions about the period.69 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... "70 蓋受命之年稱王而斷
廣周之計，后七年而崩，諡為文王，改法度，
制正朔矣。

The version of Shangshu dazhuan on which Sina Qian relied undoubtedly had 77 years later he died," since this is how the text still reads, and since Sina 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 B1. As I implied above, Sina 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. Yinji "solution" to the chronology problem to which I alluded in Note 4.
In this scheme 1003 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 12 and Yi zhoushu as quoted by Huangfu Mi in his Duiang shiji, 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 Xun's account of the two campaigns that found in Shiji. In the latter, Sina Qian is quite explicit that the campaigns took place 2 years apart. However, Shiji takes no account of the sources dating the conquest to the 13th year, nor does Sina 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, 11th year; conquest, 12th year, 2nd month. Liu Xun, 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 the campaign 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; thereafter he attacked [Shang] Zhou and conquered Yin, taking Jizi [with him] he returned in the 13th year." 遠歸三年，乃遂伐周滅殷，以夷子孫，十三年

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 be cause there are several examples in the same context where he invariably specifies "later" so-and-so many days or years when he intends the figure to be taken exclusively (e.g., three days "later" from day 25 to day 28). Only once does he violate this practice because he has no choice when confronted with a passage from "Shaoqiao" 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 Xun'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 B1. 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. 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. 2 武王上祭于畢

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. 77 This refers to 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., and by late July it had moved 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. 78

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. 79 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." 80 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 Hien. This was signified by the promulgation of a new calendar reckoning the years of the new dynasty from the First Year of the Mandate. 1059 B.C. It is also quite evident that the de facto overthrow of the Shang at Muye came on January 29, 1046 B.C. (JD 1:13931), 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 (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 B1. 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 B1 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 jade beads, 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." 81
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.82 He also ignored the gathering of planets in 205 B.C. at the very beginning of the Han dynasty, which was recorded in Shiji83 probably for the same reason. Preoccupation with grandiloquent 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 been 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 suit. 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 一星 (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 811 B.C. In fact, Yi Xing actually believed that Jupiter speeded up by some 30 per cent between the Shang and Warring States periods.84 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.85 Mencius believed that 'slightly more than 500 years' 五百餘戲 separated Yao and Shun from Tang, Shang, and the three generations from Confucius. In fact, 508 years separated the Mandate-confining 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).67 Although not as impressive as the conjunction of 1059 B.C., such a 'gathering' 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.88 'Triple Conjunctions at intervals of 516 years occurred in 27 B.C. and 543 B.C. The first was recorded in detail by Han shu, together with astrological commentary.89 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 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 周, 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，夜星隕如雨．

According to the Bamboo Annals, after this portent Jie's absolute 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' 湯滅夏之，年至二十九王周興四百九十六年．The same figure of 496 years for the duration of the Shang dynasty is found in the Han apocryphal work Yiwei jilantu.91 In addition, as the Bamboo Annals chronology 93 both Chen Mengjia 陳梦家 and Tung Tso-pin 侶作仁 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 School of calendrical astronomy which was very influential from the 4th century B.C. until the later Han period. As Wang Guowei 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 10th 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 to his 10th year in 1059 B.C., not to the de facto conclusion in 1047 B.C. The period 496, indirectly identifies the Mandate conjunction to Mandate conjunction --1059 + 517 = 1576 B.C., in which the years of the triple planetarium are indeed recorded 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 not an 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 (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.).

Besides being a component of the equation 496 + 21 = 417, 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 four-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 Yinyin chronologists, was lost on Liu Xin. 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 Yuan 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. 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 and Luo rivers ran dry (presumably as a result of the tremor). Later, in the 29th year we read that "two suns simultaneously appeared", and elsewhere that "two suns contested [which would be] eclipsed." Other sources expand and embellish these and other eerie signs of the dissolution of the natural order such as extremes of weather, crop failures, etc., all of which are attributed to the divine behavior of Jie. Some of these may ultimately be attributed to the planetary alignment, 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 notion of the planets. Although cuoxing 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 Riyou wuxing tu 138 has: "In the last year(s) of Jie the five planets criss-crossed, curved arrows descended, and the Spirit of Fire appeared. "139

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 Yuan 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
1576 B.C. Sun 213° 227° 224° 206° 227° 234° 221° 233° 237° 228° 234° 238° 236° 239°

Nov 7 213° 227° 224° 206° 227° 234° 221° 233° 237° 228° 234° 238° 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. However, the unusual group performance, a proper understanding of which 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 引 of the character cuo 错 in its earliest form in the oracle bone inscriptions is written or 水, comprising "sun" 日 and an expanse of water 水. 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. For example, we find these texts at 181:3.

(前 28.3) 丁亥卜,殷贞金乙酉祭祖,月四月大甲祖乙百百凡,月三百日

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

(前 427.3) 丁亥卜,殷贞丁丑...

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

(著 51) 昔四日庚申亦有来妻自北。子居

The geographical location of these events has been discussed in detail. In the sixth month, at ....

In later usage, "crack" (GSR 798 sijåk), which is cognate with xi 引 (GSR 796 dzjak), frequently means "yesterday," "night," as well as the more general "previously," or "formerly." For example, in Chungju 103 we read, "Xinmiao (day 29). Last night the fixed stars did not appear." 今昔不見; in Zuozhuan, 104 "the space of one night" 一日之期; in Mengzi, 105 "Yesterday I was ill, today I am better." 先者病而今愈, 106 "That is like going to Yue today and arriving there yesterday; is it not an overlong retrogression?" 由此之習而吾當也.

From the usage reflected in these and other passages I believe we may conclude that the basic concept which the oracle bone graph 错 is intended to represent is a passage of the sun through the watery void beneath the earth, that is, the sun's "glumy night journey back to the east." 108 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 疑 "next day" and lāi 来 "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 signification 金 to form cuo 错 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 错 "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. Lushi chungiu 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." 及湯之時天現金刀生於水，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 I was tempted to interpret this portent 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 overthrown 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 into 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 Lushi chungiu could have been fashioned from whole cloth many centuries after the events they purport to describe.

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 defining 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 1500 in the Bamboo Annals). The decisive battle is said to have been fought at Mingtiao during a violent thunderstorm in which 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" the transfer of the Mandate begun during the reign of his father Shi Gui 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' heliacal rising in that year occurred on or about October 28 (at latitude 35° N), only one week after Jupiter would have appeared at dawn in the east.

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 10° in right ascension and 6° in declination from Antares.

The passage from Ruyue wuxingju 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 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. A simple arithmetical 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. 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 calendars" 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 eighteenth year, when King Cheng reached majority and began his own rule. Following de Saussure, I accepted the identification of 1035 B.C. as the origin 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 we also read that "in the 10th year the King invested Tang Shuyu as Marksmen of Jin." 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 we are told that "when Jin was first enfeoffed, Jupiter was in Great Fire." 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.
<table>
<thead>
<tr>
<th>Bamboo Annals Chronology</th>
<th>Actual Chronology</th>
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<tbody>
<tr>
<td>Jie 10th year/ stars &quot;cross&quot;</td>
<td>1580</td>
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<tr>
<td>Tang 1st year</td>
<td>1575</td>
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<td>21</td>
<td>21</td>
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<tr>
<td>Jie 31st year/ exiled</td>
<td>1559</td>
</tr>
<tr>
<td>Tang accedes as Tianzi in his 18th year--Shang dynasty begins</td>
<td>1558</td>
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<tr>
<td>King Wen 1st year</td>
<td>1111</td>
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<td>496</td>
<td>496</td>
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<tr>
<td>Mandate Conjunction</td>
<td>1071</td>
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<tr>
<td>King Wen dies</td>
<td>1062</td>
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<td>508</td>
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<tr>
<td>King Wu 1st year</td>
<td>1061</td>
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<tr>
<td>Retreat from Mengjin</td>
<td>1052</td>
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<tr>
<td>Zhou &quot;first&quot; attacks Shang</td>
<td>1051</td>
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<tr>
<td>Conquest at Muye</td>
<td>1050</td>
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<tr>
<td>292</td>
<td></td>
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<tr>
<td>King Wu dies</td>
<td>1045</td>
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<tr>
<td>King Cheng 1st year</td>
<td>1044</td>
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<tr>
<td>275</td>
<td></td>
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<tr>
<td>Cauldrons settled at Luo</td>
<td>1027</td>
</tr>
<tr>
<td>257</td>
<td></td>
</tr>
<tr>
<td>King You last year</td>
<td>771</td>
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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 Lu 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 夷季 (A.D. 261-303) in Jin shu 鉅書, that, according to the newly discovered Bamboo Annals, which he personally examined, "From Zhou's capture of the Mandate to King Wu was 100 years." 騰國受命至穆王百年. We now know that the date of the receipt of the Mandate was 1056 B.C., the first year of the new order promulgated by King Wen. This makes King Wu'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 117 of Leopold de Saussure's analysis of the chronology of early Zhou in T'oung Pao. 118 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 1039 ± 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. seen 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 astronomical theory of the influence of multiple conjunctions." Joseph Needham 119 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 phenomena 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 foot-holds 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 興, as some scholars have speculated. 120 Further, my investigation has indicated the dates of King Wu's reigns have been 1059 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 Muwe 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. They likely had 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!"

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 Presaging the Conferment of the Mandate on Wang Meng of Zhou and the Conquest of Yin by King Wu" which is forthcoming in Chinese Paleography, and is a case study of the Bamboo Annals.

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. (For the record, the Bamboo Annals are not a forgery, and that it deserves to be taken seriously as a source for the history of the period. (See various papers presented at the American Oriental Society in San Francisco in April, 1980, and 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 Archaic period occurred in 3052 B.C., a view he still holds. (In his seminar in the autumn of 1950, 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 1046. At the same time, he called attention to the conjuncture recorded in the Annals under 1047, and tried unsuccessfully to date it.

I am in an unusual position in respect to this work of Professor Nivison's. I was dependent upon it for getting started in my studies of Zhou chronology and astronomy, not in the least, but mostly, Wang Guowei's interlinear comments on the Annals. Liu Xin's analysis of the astronomical observations in Guoyu, and Herbert Cheshet'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 revaluation 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 now then, having found them to be consistent with my own reconstruction based on the archaeological record. In regard to the chronology of the conquest period, the main conclusion we disagree about is whether the first campaign started in late 1047 (the year after the first campaign--my own view), or in late 1048 (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 Emble, Lecturer in Astronomy at Stanford University, for his help in writing the computer program used in calculating the stellar coordinates, and Dr. E. McLeod of the Jet Propulsion Laboratory at the California Institute of Technology, for reconverting 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 李漣 (ca. A.D. 420) commentary Shiji 史記, 見 "From King Wu's extinguishing Yin down to King You was a total of 257 years" (自武王滅殷至幽王止二百五十七年). 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 Tainyuan 太原, Shanxi 山西, either directly or indirectly concerned this issue. Liu Yili 刘亦立 presented a paper entitled "The Dates of Western Zhou" in which he adopted the interpretation of Wang Guowei who identified the four terms as lunar quarters. Scholars are somewhat divided into two schools of thought. Both schools essentially agree that he or she (the preferred form in modern texts) refers to the bright area of the moon; there, however, the agreement ends. The view championed by Liu Xin and Guowei, which is quoted in Han shu (Beijing, 1962) ch. 215, p. 1015, based on the "growing" term, lunar phase, and apparent dates for the year of the Zhou conquest from the Old Text version of the "Wu Cheng" chapter of Shang shu, maintained that the "dying" term is "dying brightness" referred to the "new moon" or "new moon and waxing crescent" refers to the full moon. By and large, this has been the orthodox view ever since. In this interpretation, "after" implied completion or the end of the period, i.e., when the moon is completely dark or full. The opposing view, for which there is considerable evidence in literary sources, holds that "dying 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, "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 jihshengba as the 6th or 7th of the month (i.e., the 3rd quarter) and jishang 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 Guawang jilin 輿 geographicum 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-nin pointed out in Yinfu yu 殷曆譜 (Shihuan, 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
The astronomical record is added by the Musicologist Zhuou (朱周) in a rambling reply to Long's questions about the success of the new and older castings of a set of bells, which evidently was a failure. Zhuou's lecture on the calendar and harmonics is actually a homily on the theme of "harmony" 陰陽, the lack of which is implied as the cause of the failed casting. As an example of the theory of correspondences, Zhuou 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 horoscope; 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 their movements in their orbits. There is no indication that the Han Chinese astronomers possessed such knowledge, as Nathan Sivin has pointed out in Cosmology and Cosmography in Early Chinese Mathematical Astronomy (Leiden, 1968). p. 24. Mean values for the planetary periods arrived at by the later Han dynasties were quite accurate; nevertheless, Liu Xie miscalculated the location of Jupiter in 1183-23 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. transcription of the Bijing of Jupiter for the first century B.C., which I discuss in Part 2.3.1, 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 not introduce significant error in calculations over several centuries in the past. The secular acceleration of the moon, first discovered by Edmund Halley in 1695, does not take into account the acceleration of the moon's period of revolution. This acceleration is given by the equation of the mean 2.5 years. In the case of Mercury, the error will be 1.56° in 1,000 years. See Paul Clement, Astronomische und astrologische Tafeln für China, Japan und Korea (Leipzig, 1960). pp. 7-8; therefore, with 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.

6. SSS ed., 3.18a. The astronomical record is added by the Musicologist Zhuou (朱周) in a rambling reply to Long's questions about the success of the new and older castings of a set of bells, which evidently was a failure. Zhuou's lecture on the calendar and harmonics is actually a homily on the theme of "harmony" 陰陽, the lack of which is implied as the cause of the failed casting. As an example of the theory of correspondences, Zhuou 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 horoscope; however, his zeal for "categorizing" in terms of the "five phases" appears to have led him to misconstrue the record at several points.


14. Lüshi chunqiu (SPPY ed., 6.7b) says King Wen reigned 84-43 = 51 years, which, counting inclusively, is actually 52 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. Diwan 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" (a Phoenix "friends with the bird" of the Yellow River). The official comment to this entry identifies this as King Wen's First Year, AD 836.

17. 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 this text as a result of a misreading of a passage in Shanghai; see notes 7 and 53 to Table 3). The "Red Bird" is also mentioned in the "Red Bird" of the Song of Lu, 6.12a: "AnVGBe8 ... And the spirit，则 ... the spirit, and the spirit, the spirit of the Yellow River." In summary, the Phoenix is associated with the Red Bird, the three-legged crow frequently mentioned in Han reliquary sculptures. The Phoenix can be identified as the symbol of the Yellow River, because the Phoenix and the Red Bird are both associated with the Yellow River. The Phoenix is the bird of the sun, and the Red Bird is the bird of the moon. The Phoenix is associated with the sun, and the Red Bird is associated with the moon. The Phoenix is the bird of the sun, and the Red Bird is the bird of the moon. The Phoenix is associated with the sun, and the Red Bird is associated with the moon. The Phoenix is associated with the sun, and the Red Bird is associated with the moon.

18. The "Red Bird" is also mentioned in the "Red Bird" of the Song of Lu, 6.12a: "AnVGBe8 ... And the spirit，则 ... the spirit, the spirit of the Yellow River." In summary, the Phoenix is associated with the Red Bird, the three-legged crow frequently mentioned in Han reliquary sculptures. The Phoenix can be identified as the symbol of the Yellow River, because the Phoenix and the Red Bird are both associated with the Yellow River. The Phoenix is the bird of the sun, and the Red Bird is the bird of the moon. The Phoenix is associated with the sun, and the Red Bird is associated with the moon. The Phoenix is associated with the sun, and the Red Bird is associated with the moon. The Phoenix is associated with the sun, and the Red Bird is associated with the moon. The Phoenix is associated with the sun, and the Red Bird is associated with the moon.
26. Ji Ji was the virtuous minister of Shang Zhou whose monstrosities were rewarded with imprisonment. After Shang Zhou's defeat King Wu ordered his release (Shiji, ch. 4, p. 126), but Ji Ji refused to recognize Wu as anything but a usurper. Eventually, we are told, he was persuaded to impart the principles of good government enshrined in the 'Great Plan' chapter of Shangshu to the new Son of Heaven. What the augury is clearly associated with the victorious campaign.

27. Bamboo Annals, p. 93. The appearance of the Phoenix and the settling of the caudrons at Luo under the 18th year of King Cheng, Shiji (ch. 4, p. 133) also mentions the installation of the nine caudrons at Luo but, in this case, immediately after the government is restored to King Cheng. In addition, "Zhongsheng" (Yuan shangfang jiyishu, vol. 4, p. 1980). In its account of events surrounding the beginning of King Cheng's personal reign, it 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 16th. The evidence is inconclusive, however, so that I will not insist on identifying both events as having occurred in the same year.

29. Song shu, ch. 27, p. 766. 1 take 萬 (QSR 843d qǐng) "glorious" to be 布 (QSR 843a qǐng) "dazzling," jingkeng 睛星 being one of several designations for Venus. See Zhang Shoujie 陳秀介, Shiji zhengyi 史記正義, quoted in Shiji, ch. 27, p. 1322. In contrast, yingzhou 楚州 "Sparkling Boulder" (to borrow Edward H. Schafer's term) refers to Mars. Mars is not visible before sunset, however.


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 +6.


33. The account of the Conquest campaign in Lushi changju (15.16b) has King Wu pressing his troops to the 黃帝 against the renunciates of his officers in order to reach Muye by the date jiaji previously agreed upon. It is possible to David Rivenson for quickly pointing out to me that May 28, 1059 B.C. was in fact a jiaji day. The recent discovery of the Liji 利簋 inscription, "When King Wu attacked Shang it was on day jiaji, 武王征伐西申子, has confirmed the traditional account identifying the date of the battle at Muye as day jiaji. See Wenyu 1977.8:1-12.

34. Zhu youzeng, Yi Zhouhu yijian ziaosi 雙國見集, 新編 (1846; reprinted ed. Taipei: Yuwen yinshuguan, n.d.), vol. 1, p. 61. I am grateful to Professor David S. Rivenson for reminding me of this passage, whose veracity we both then verified usingNeed's tables.

35. Liu Baolin's "Table of Lunar Eclipses B.C. 1500-B.C. 1000," Chinese Astronomy 3 (1970): 179-96 gives for the time of maximum eclipse -1084 March 13 JDT 133 2554 dinghou (day 14), 3:51 local time at Anyang (2:25 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 VSIOLIY at Anyang, Research Report EP 025, The Johns Hopkins University (Laurel, 1971), p. 64 gives -1064 March 13 JDT 133 2504 dinghou (day 14), 3:52 local time at Anyang (3:26 at Qishan), which reduces to UT 20:15. The difference between the two results 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 JDT day number, calendar date, and ganzen estimates.

36. Tung Tso-pin followed the earlier convention which took Greenwich time as reference standard and advanced the JDT day number, calendar date, and ganzen estimates. 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 dates given for the event in Yi Zhouhu, Shenmu, 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 contentions that the Shang (and pre-Dynastic Zhou) counted one day from daybreak to daybreak, the so-called "Babylonian day."

37. 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] February 15th, when the five planets gathered in House 24," Later a Phoenix clasping a writing in its beak roared about King Wen's capital. 感之盟勛, 武周昌邑書書, 五位之盟, 王之公司的. 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 Astrologers and Talismans" of the Zhoushu was culled largely from apocryphal works--the present passage, minus the date, is from Chuangshu chuangmingbao--the Jin dynasty astrologists tried to stem the flood of these ideas by creating a new authenticity: 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 it 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 dates from the vernal equinox on March 31, 1059 rather than from the first day of the first month of spring (ideally) 43 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 20° and 45° respectively, and the Jupiter 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.
in the Xia calendar, it is the 4th month in the Shang calendar, and it is the 5th month in the Zhou calendar. The Xia system accords with Heaven.“

41. Guoyu, 10.3a.

42. Han shu, ch. 21B, pp. 1012-14. The astronomer Yi Xing interpreted the tradition in the same manner in the Tang dynasty (Xin Tang shu, ch. 27B, p. 530).

43. 春秋元命苞 See Yuan shangfang liyishu, 4.2113.

44. As Léopold de Saussure conclusively demonstrated nearly fifty years ago in "La Chronologie chinoise et l'avenement des T'angs," T'oung Pao 23 (1924): 289-329, all this is quite obvious from the manipulations Liu Xin was obliged to perform to correct the reign lengths of the kings who ruled Zhou before 821 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 (Han shu, ch. 21B, p. 1017), second Duke of Lu, since Shua Qian (Shi ji, 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 Min's receiving the Mandate to this [i.e., the conquest], it was 13 years; Jupiter was again in Quail fire" (卷臣受命而至比十三年 亊亦在火) 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 astronomical commentary, made by Chen Zhuo 賢卓 (fl. ca. A.D. 310). According to Su li shu (ch. 19, p. 304) Chen based his work on the catalogues of stars of Shi Shen, Gan De 賢德 and Wu Xian 亊成, 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 Su li shu, see Joseph Needham, Science and Civilization in China, vol. 3 (Cambridge, 1959), pp. 266-71. The Dunhuang ms. has been published in Hanwu shi, 5:27-38. The explanations accompanying each region of the sky are also found in Kaiyuan zhengli 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 朴耐, "An Investigation of Ancient Observations of Our Country's 28 Lunar Lodges and Their Dates" (中国古籍的二十八宿观测及其时代考), Zhoubian wenwu lun cong (1979): 173-82. This has confirmed the 5th century B.C. date of the system of Shi Shen.

48. See Yuan shangfang, 4.1990. When this precise location is not intended the asterism Red Bird as a whole (conventionally all 7 lodges from Well #22 through Axielree #28) is simply denoted "Quail." In Zhouzhu (Xi Y 655 B.C.) both usages occur in a passage whose astronomical indications are reminiscent of the Guoyu passage quoted in the introduction. In the one context in Zhouzhu, the constellation is called "Quail," and the specific location in the 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 聯 'quail' (GR 464; dwm) and 春 (GR 463a; t'wm) suggests that the choice of "Quail" as another designation for the asterism is unlikely to have been purely coincidental.

49. Shi ji, 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 astronomical contexts in Shiji and Han shu.

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

51. Erqan, Congshu jicheng ed. vol. 2, p. 283, says that "Beak is called Willow" (亊曰之柳), and glosses 亊 as "flock together" 樹。Then it says that "Willow is Quail! Fire" 亊炎火也.


53. Zhu Keqen, "A Discussion of the Use of Processions of the Equinoxes to Determine the Date of the Four Medial Asterisms in Yoqian's Chapter of Shangshu" (以流星逐日節氣與四時星之年代) Kexue xuebao 11.12 (1927); reprinted ed. in Zhu Keqen wenji (Beijing, 1979), pp. 100-107.

54. In 1059 B.C., the Fire Star, Alpha Scorpius, was located at R.A. 13h 35m as indicated. According to the Astronomical Almanac, civil twilight at the latitude of Xi'an (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 \(\phi_s = H_s = \phi + H_s\), where \(\phi_s\) 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), and \(H_s\) is the hour angle of the sun, i.e., hours west of the meridian or noon. The equation becomes this: \(\phi_s = 0 + 6.58\) and \(H_s = 5.03\) or 85.7° 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°) to within 2.5° of the position of Delta Hydrae (87.7° in 1059 B.C.), the determinative star of Willow + Spot 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: \(\phi_s = 0 + 6.58\) and \(H_s = 5.03\) or 85.7°. This is 5.4° from the computed location of Alpha Hydræ in 1059 B.C. (103.8°). Since 4 minutes variation in the time of observation will produce a 1° 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 87.7° - 90°, approximately in mid-11th century B.C. The range occupied by Willow + Spot or "Beak" in 1059 B.C. was 87.5° to 103.8°.

55. Edward H. Schafer in Pacing the Void, p. 163, has noted that "the astronomical associations of the glorious sun as it flies across the sky have seemed self-evident to many peoples. For the Greeks, the quails was the forerunner of the returning sun [Gk. ortys '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 Dian 賤 in the Book of Changes and the appearance of the constellation Scorpius. A huge expanse from the area of Arcturus and Spica to the "Tail" or 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 #21) 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 cause maximum expression. See Léopold de Saussure, "Les Origines de l'astronomie chinoise: la regle des cho-ti," T'oung Pao 42 (1912), p. 350; reprint ed. in Les Origines de l'astronomie chinoise (Paris, 1930), p. 378. See also Han shu, ch. 27A:901.
75. Han shu, “Zhonghou” Chapter (Yuan shanfang tyishu, 4:1989) dates the sacrifice to the 4th month. According to Yi Zhoushu (SPY ed., 3.4b) King Wen died at the end of spring in what must have been 1050: if the 3-year mourning period (actually 27 months) was observed, 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., the 6th month of that year. Since King Wen was buried at Si the ceremony that took place there in the 4th month is identifiable with the da xiang sacrifices 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 often sent by Heaven. See Yuan Tan’s account of the same events in Part 4. This conjecture is also supported by the fact that apocrypha contain stories about Tai Gi Gong Wang (i.e., Lü Shang) having fished a jade huang out of the Wei River, ostensibly in response to the Red Bird augury witnessed by King Wen. The jade was a message that explicitly conferred the mandate on the Ji ruler, just as the writing on the fish did in certain accounts. See, for example, “Zhonghou” Chapter of Shangshu in Yuan shanfang, 4:1088-89.

77. Shiji (quoting Shi Shen), ch. 27, p. 1312. In Zuo zhuan (Zhao 237.510 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.” 越忌數而伐之必受其凶

78. According to Wang Chong, Wang (A.D. 27-97), the very name Mengjin 徑津 “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 de cidian, 3:6553.8.

79. Several of the queries addressed to Heaven by Qu Yuan (ca. 332-295 B.C.) in his Tianshen 天問 “Heaven Questioned” refer to this episode: “In David hawkes’ translation of ch’u ta’i: the songs of the South” (London, 1999), p. 53, which I have modified, we read that “The morning of the first day we took our oath. How did we all arrive in time? When the goose came flapping 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 Chou zuishu, Qu Yuan 蜀紀補注, SPP ed., 3.15a-15b, Yang Yi quotes as follows from the lost “Liu too 六度” Chapter of Zhoutu, which is possibly the same work referred to in Zhongzi (Y-i index 65/24/8): “When King Wu went east to attack and reached the banks of the Yellow River, it refined 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’s [Xin’s] troops, drew up the army and halted [the advance]. Tai Gong asked, ‘Sir, why do you not have a charge?’ The Duke of Zhou said, ‘The season of Heaven is not with us. Divination by tortoise and firebrand give no sign. The prognosis by milfoil is inauspicious, it is perverse and unfavorable; what is more, the changes in the stars are belifful. Therefore, [1] Dan halted them. How could they [be allowed to advance?” 武王東伐至於河上而雨雷降，周公入諌曰：‘天不祐周，應者君德行未疇，百姓怨怒，欲天降吾民，謫遷之。’太公曰：不也，武王欲入以討諸侯之僞，引軍而止之。太公曰：‘吾與文王則也。周公入諌曰：天弗祐周，應者君德行未疇，怨怒，欲天降吾民，謫遷之。’顧者君德行未疇，怨怒，欲天降吾民，謫遷之。’顧者君德行未疇，怨怒，欲天降吾民，謫遷之。’

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. Kalyuan zhandian, 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 Zongshen (“Great Deviation”) was actually associated. The true augury associated with Jupier’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 earlier Harangue in the latter's reign would naturally have been taken to be the one that culminated in the victory at Mu Ye early in the 12th year. By the former Han the confusion was so complete that Shen Dan 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 17th, 12th, and 13th years are all dated using the Varaedate calendar, the apparent contradictions are easily resolved. See Table 2.

81. Taiping yulan, 292.5a.
82. Sinian, 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. 157-158.

84. According to Yi Xing's Xu Xing yi wuxing yao, as quoted in Xin Tang shu, ch. 278, 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 MING interregnum.

86. Mencius, 7B/38.
88. See note 100.
89. Han shu, ch. 26, p. 1310.
90. Bamboo Annals, p. 85.
92. Yinli pu, vol. 1, 4.2a-4b.

95. This fact was also deduced by Chen Mengjia (Yinliu, p. 212) and Lung ta-si-lin (Yinliu, p. 4.3a) from the role of the figure 496 years as in the duration of the Shang dynasty in the Yinliu chronology. The Yinliu chronologists knew that the 496th year was the year before King Wu received the Mandate, however, they failed to distinguish Cheng Tang's 1st year as Xiao Jie's successor from the transfer of the Mandate in Xiao Jie's 10th year. As a result they identified 1279 as the 1st year of Shang and 1804 B.C. as its last.

96. This record of a meteor shower is the first of the 147 reports which Zhuang Tianshan has collected from various sources; see "Ancient Chinese Records of Meteor Showers," Tiannwe xuebao 14 (1966):37-58; reprint ed. Chinese Astronomy l (1977):197-220. Zhuang misconstrued the Bamboo Annals "8th year, five stars-planets moved criss-cross" as "8th year, stars moved criss-cross," which explains now 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. 218., p. 1014.

98. As we have seen above, even when this important distinction was understood by the Yinliu chronologist, for example, who were or less correctly analyzed the relative chronology of the Zhou Conquest period, the parallels 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 shihli in Sui tang shuang shu (Yinliu ed.), p. 142.1b. The Bamboo Annals now has "three suns simultaneously appeared." Lin Chunhuo (p. 4.17b), however, demonstrates conclusively that "three" is an error; see Qingshi linian (Beijing: Zhubuo shanfang jiake ed., 1839), 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 Swift cites a 1980 paper, "The Effect of Planet Movement on Changes in Climate," by Ren Zhenguo 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 10% longer than normal, extending one or another season according to formulas [provided]." Thus it seems that the ancient Chinese may have gotten the climatic consequences of a change of the Mandate right as well.

101. Quoted in Lin Chunhuo, Qingshi linian, 4.10b.
103. Mencius, 28/2.
104. Zhuangzi, H-Y Index, 93/33/73.
105. For additional examples with xixi 西 "yesterday" and xisui 休 "last year," see W.A.C.H. Dobson, A Dictionary of the Chinese Particles (Toronto, 1976), p. 660.
107. Lushui shangyu, 31.4a.
109. Songs hui, ch. 25, p. 735. Shen Yue gives as his source "surviving writings" 晉書, "surviving writings" 續漢書, "surviving writings"

110. As I pointed out in note 3, Fei 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. 501-513, 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. Shen Mengqun, op. cit., p. 19, Zhang Guangxiang, op. cit., p. 59, and David S. Rivison, "Dates," p. 10, have all suggested that the figure "257" resulted from the transposition of the last two digits of the figure "2275." It is now clear that this must be the correct explanation. At some point after the inscription of the Bamboo Annals the comment was rewritten to read that "when King Wu extinguished the Yin the year was genxian (i.e., 1051 B.C.), 24 years later the year was xiajin (1027 B.C.) and the tripods were settled at Lu. Down to King You it was 227 years; altogether it was 281 years. From King Wu's 1st year jiajia (1002 B.C.) to King You genxian (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 backstrokes 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 has 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, 1559 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 - 777 = 273). 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 backdating 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 summation 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. 291, 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 dates in 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. "gengxin" 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 1556 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 "gengxin" version, which had survived intact the 8-year backdating and which stated that from the receipt of the Mandate to King Wu 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 Wu [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. confirms this hypothesis and pinpoints the most likely date for the "recalculation" of the date of the Zhou conquest in the 8th century B.C.


115. Guoyu, 10.3a.

116. Jīn shù, 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.


118. "La Chronologie chinoise et l'avénement des Tchéou."


120. The Zhengzhou samples in question, ZK-177, ZK-178, have yielded radiocarbon dates of 1573 ± 140 and 1556 ± 110. For a discussion of the issues involved see Kwang-chin Chang, Shang Civilization, pp. 270-71, 363, 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. Luyu, 9/9.
<table>
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<tr>
<th>Di Yi's Reign</th>
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<th>King Wen's Reign</th>
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<td>1094</td>
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**TABLE 2: CHRONOLOGY OF KINGS WEN AND WU**

Di Xin succeeds Di Yi after the latter's death in his 8th year.

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.


**33**

- **31 (35)** 1056 44 3
  - "In King Wen's 3rd year [of the Mandate, he] attacked Mi.xu."¹⁸
  - "Next year [i.e., the 3rd], he attacked Mi.xu."²⁹

- **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]."¹⁰
  - "In King Wen's 4th year [of the Mandate, he] attacked the Quanyi [barbarians]."¹¹
  - "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]."¹²

- **33 (37)** 1054 46 5
  - "In [Di Xin's] 33rd year...the Zhou removed to Cheng."¹³

- **34 (38)** 1053 47 6
  - "In the 6th year [of the Mandate, King Wen] attacked Chong."¹⁴
  - "The next year [i.e., the 6th], [King Wen] attacked Hu, Marksman of Chong."¹⁵
  - "In [Di Xin's] 34th year, Zhou armies took Qi and Yu; thereafter they attacked Chong and the men of Chong surrendered."¹⁶

- **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."¹⁷
  - "When the King of Zhou had resided in Cheng for 3 years, [Zhou] met with a great famine from Heaven."¹⁸
  - "After having attacked Chong, a city was built at Feng."¹⁹

- **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."²⁰
  - "In [Di Xin's] 40th year, Zhou built the Spirit Tower; the [Shang] King sent Jiao Ge to demand jade of Zhou."²¹
  - "The Zhou had tablets of jade. [Shang] Zhou ordered Jiao Ge to seek them, but King Wen did not give [them to him]."²²

King Wen accedes to the throne of Zhou (probable age 9 sui), after King Wen Ding 変 的 Shang kills Wen's father Jiji.³
"In [Di Xin's] 41st year, 3rd month, in spring, Chang, Earl of the West, died." 23

"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." 24 (King Wen's probable age, 58 sui.)

"In the 9th year of the Mandate, in late spring, King Wen summoned Heir Apparent Fu and said, 'Wuhu': I am old.'" 25

"King Wen died in the 9th year of the Mandate." 26

"Evidently, the Earl of the West reigned for 50 years." 27

King Wu's Reign

King Wu in mourning, continues the Mandate calendar.

"In [Di King's] 42nd year, the Earl of the West, Fu, received the Cinnabar Writing from Lu Shang." 28

"In the King's First Year, 2nd/8th month, bingchen (day 53), new moon, the King was at Hao. He summoned Dan, Duke of Zhou, and said, 'Wuhu': Be attentive!" 29

Confirms July 26, 1049 B.C. (JD 133 8483) as the 1st day of the Zhou 8th month, in King Wu's 1st year.

"In [Di Xin's] 51st year, in winter, the 11th month, wuzi (day 25), the Zhou armies forded Mengjin and withdrew." 30

"In the 11th year, King Wu attacked Yin. In the 1st month, wuwu/wuzi (day 55/25), the armies forded at Mengjin. [The King] composed the 'Great Haranque' in 3 chapters." 31

"At this time, 900 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." 32

"The 'Taiji Preface' says, 'In the 11th year, King Wu attacked Yin.'" 33

"In [Di Xin's] 52nd year, genyin, Zhou first attacked Yin; in autumn, the Zhou armies camped at Xianyuan; in winter, in the 12th month, the Zhou armies sacrificed at Shangdi; Yong, Shu, Qiang, Mao, Wei, Lu, Peng, and Pu followed the Zhou armies in attacking Yin." 34

"Inking Wu's 11th/3rd year, genyin, Zhou first attacked Yin." 35

"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]." 36

"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." 37

Analysis confirms the accuracy of these positions during the period November 26 (JD 133 9936) to December 3 (JD 133 9934), 1047 B.C.

"In [King Wu's] 12th/4th year, xinmiao, 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 Gong; 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 Oversegers in Yin, whereupon he went on a royal hunt at Guan; he made the Great Martial Music." 38

"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." 39

"When King Wu punished Shang, it was on day jiazhi. [Our] faceing east [lit. "dawn"] toward Jupiter confirmed that by nightfall [we would] hold Shang." 40

"In the 2nd/1st month, jiazhi (day 1) in the twilight, King Wu arrived at dawn at Muye in the suburbs of Shang; thereupon, he harangued the troops." 41

Confirms January 20, 1046 B.C. (JD 133 9919) 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." 42

The 'Great Haranque' Chapter says, 'It was in the 13th year, in spring, the great convocation at Mengjin.' 43

The 'Great Plan' Chapter says, 'It was in the 13th year that the King visited Jizhi.'" 44
"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?'"\(^{45}\) 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."\(^{46}\)

1044 6 (14)

"Two years after having conquered Shang, the King became ill and was disconsolate.\(^{47}\) "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 Coffer.'"\(^{48}\) "Two years after conquering Yin the Empire was not yet pacified when King Wu died."\(^{49}\)

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.\(^{50}\) "Six years after conquering [Shang] Zhou, King Wu died."\(^{51}\)

1040 1

King Cheng accedes to the throne.

(1039) (11)

("When King Wu conquered Yin he was 86. Seven years later he died."\(^{52}\)
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 Daul Fire in 1059-1058 and 1047-1046, and the (in) observations dating from the late autumn of 1047 B.C. A comparison of the astronomical data 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 idiosyncrasies 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 regularlary are. In this way one can distinguish which entries in the Bamboo Annals are prefaces by what I take to be true reign years and which are distorted (note particularly Mandate years 3-8), and occasional errors in other works can also be set right. For example, two calendar dates comprising year, day of month, and gongzi 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 4-12-12 year) distortions which have entered the text, 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 Lushi chunqiu are both correct in dating the establishment of 1027 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 83; third, that the 10th year of Di Xin, in which the ren fang revolution occurred, was 1077 B.C., as the corpus of inscrptional evidence collected by Yen Tso-pin (Yenli pu, vol. 2, pp. 5-6a-6b) documenting this expedition seems to indicate. See also Chen Mengjie, "Yin bu zangwu," pp. 301-4. This date was suggested to me by David Nivison after I had previously identified 1077 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 jiazi (day 6), and the Shang 1st month of 1077 would have begun on renshen (day 9). The 4-12-12 year distortion in the identification of Di Xin’s 1st year as 1102 B.C. is probably inconsistent with the reconstruction 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. Lushi chunqiu (SPPP ed.), 6.7a-7b. 周文王受命于九年

3. Bamboo Annals, p. 82.


5. Shangshu, 4.5a, 2.16b. 文王受命一年

6. Shiji, ch. 4, p. 119. See Part 4.1. 蠲命之年

7. Shangshu, "Wu yi" Chapter. 文王受命惟辛巳，故

8. Shangshu, 4.119. 文王三年。 伐密须

9. Shiji, ch. 4, p. 118. 明年伐密须

10. Shih i ch. 6, p. 27. 吾伐密须。 (2371), a lost fragment quoted in Shun ban jiu zhou. 1.4.13, subcommentary to "cai wei" ziqi, attributed to Zheng Xuan’s commentary on Shangshu, Dazhuan, 寤夷、僣夷也。詩云: "僣夷度矣, 四年伐之, 南仲一宿, 并乎三隅。" 伐密须

11. Shangshu, 4.119. 文王四年伐密须

12. Bamboo Annals, p. 84. 四年卽正月諸侯朝于周 相伐密须

13. Bamboo Annals, p. 83. 二年卒于程 石

14. Shangshu, 4.119. 文王六年伐密须

15. Shiji, ch. 4, p. 118. 明年伐密须

16. Bamboo Annals, p. 84. 二年伐密须 賸 其子

17. Bamboo Annals, p. 84. 四十年伐密须 邀其子 及INGTON 密须 僣夷人降

18. Yi Zhoushu, 2.6a. 桓王立丙午三年遭天下人

19. Shi Jing, ode 244, "Wen weng you sheng." 伐密须 子 伐子 畢邑子

20. Bamboo Annals, p. 84. 二年密子世立書記

21. Bamboo Annals, p. 84. 二年密子世立書記

22. Shangshu, "Wu yi" Chapter, quoted in Shiji zhengyi (Shiji, ch. 4, p. 120). 文王受命，延及元年

23. Bamboo Annals, p. 84. 四十年三月西伯昌薨

24. Shangshu, "Wu yi" Chapter, quoted in Shiji zhengyi, Shiji, ch. 4, p. 120. 文王受命，延及元年

25. Yi Zhoushu, 3.4b. 文王受命之九年，時周昌在

26. Shiji, ch. 21b, p. 1015. 文王受命之九年而崩

27. Shiji, ch. 4, p. 179. 西伯昌即位五十年

28. Bamboo Annals, p. 84. 四十年西伯受天書

29. Xin Tang shu, ch. 278, p. 604. 西伯受命二（8）月

30. Wangshu, 3.7da has "3rd year for 1st year which is incorrect. Dongcheng (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. 95. 五十四年冬十一月戊子
周師渡盟津而還。

31. Shangshu: "Preface." 惟十有一年武王伐殷。 元月三月稱夏商。 武王伐
殷之事自今三顧。 The "Preface" and the Bamboo Annals (in the previous entry) are probably
reporting the same event and date. Either the Bamboo Annals
wu (day 25) is a mistake for wu (day 55), or vice versa.
The two are often confused. The 12th 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 equi-
valent of the Zhou 1st month ("Preface").

32. Shiji, ch. 4, p. 120. 是時，諸侯不朝而會盟津
者，百有餘國。諸侯皆曰： 非可伐矣。 武王曰：
「非未知天命」未可也。」遂為盟而歸二年。

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. 五十四年庚午盟角伐殷；
殷叛者次于陰原。冬十二月周師有事于帝
商，姜曬，蕃、漢，諸侯自伐殷簡。 The 8-year error should be deducted
from King Wu's reign year.

35. Yi Zhoushu, 3.1b. "五王三夏王在豐，謀伐殷。簡...
王召周公于京師曰：「非可伐矣。」諸侯皆諾。乃
興師伐殷。 This confirms the date of the second
campaign, in King Wu's 3rd year, as 1047 B.C.

36. Guoyu: "Zhouyuy," 3.18a-18b. For the Chinese text, see
the introduction.

37. Bamboo Annals, p. 89. 二十八年三月丁未，諸侯伐
殷敗之于姚複野，立武王以伐殷，武王以甲
癸誓於盟津，王師遂伐殷，伐作大誅。

The 8-year error should be deducted from the indicated
reign year.

38. Yi Zhoushu, 3.4b. "惟十有三年王在衞，管叔嚭作
殷之難，東陽之侯商賜。王在衞。

39. Li gui inscription. 武王征商硬甲子朝諸侯克歸
巩有茲。 The translation of the second phrase is
tentative. Several interpretations agree that sui 懐
tfers to Jupiter, but their renderings of the next sentence
seem equally tentative. See Wenwu (1977) 1,1-12 and Wenwu
(1976): 55-59 and 6.27-54 for discussion by Tang Lan 鄧
蘭, Yu Xingwu, Xu Zhongshu 賀仲舒, Qi 趙
guiyan, Huang Shenzhang, Zhang Zhenglang 張政娘, Zhao Cheng 趙成, et al.

41. Shiji, ch. 4, p. 122. 二月甲子昧爽，大王
至于厥師牧野乃誓。 The text in Shiji should read "1st month; 
see Part 3.

42. Han shu, ch. 218, pp. 1015-16. 古之王者受命而至
十三年，或成而有天下，或成而有天下，或成而有
天下，或成而有天下。 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 comprised
on Mengjin on both occasions, but the first campaign was
called off in advance, as we have seen.
Early China 7 1981–82

The Annual Journal of the Society for the Study of Early China

Editors
David N. Keightley
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