



# How ancient Chinese constellations are applied in the city planning? An example on the planning principles employed in Xianyang, the capital city of Qin Dynasty

Tinghai Wu · Bin Xu · Xuerong Wang

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As the first empire of imperial China, the Qin Dynasty is a crucial period for the establishment of China's territory, nationality, political system and academic thoughts [1]. The planning and construction history of Xianyang, the capital city of the Qin, can be dated from the 12th year of the King of Qin Dynasty, Qinxiaogong (350 BC) to the death of the Second Emperor of Qin (206 BC) spanning a total of 144 years. During that time, Xianyang was transformed from the “capital city of a state” to the “capital city of an empire”. Along with the transformation, a new and important tradition of “Modeling Heaven and Earth” in capital city planning was founded. Based on historical records, archaeological materials and the recovery of star maps, we found two types of “Modeling Heaven and Earth” in Xianyang's planning. One is the model of “Hengqiao Nan Du” in the period of the King Zhaoxiang of Qin (r. 306 BC–251 BC); the other is the model of “Epang Du Wei” in the period of the First Qin Emperor (r. 246 BC–210 BC) [2].

Early in the section of “the Thirty-fifth Year” (212 BC), *the Annals of the First Qin Emperor*, the *Shiji* (*Records of the*

*Grand Historian*, written in the Western Han), Sima Qian took notes of the planning and construction details of Xianyang, which reflected the First Qin Emperor's intention of making Xianyang the capital city by arranging the layout according to locations of certain constellations. “A causeway leads across the Wei River from Epang to Xianyang, just as the Heavenly Corridor in the sky leads from the Apex of Heaven across the Milky Way to the Royal Chamber” [3]. It shows that the planning of Xianyang in the thirty-fifth year is characterized by “Modeling Heaven and Earth”. The Apex of Heaven, the Royal Chamber, the Milky Way and the Heavenly Corridor are names of constellations recorded in the *Tian Guan Shu* (*The Astrological Treatise*) of the *Shiji*. The Apex of Heaven is classified as “the Central Palace”. The Royal Chamber is classified as “the Northern Palace”. And the six stars connecting the Apex of Heaven and the Royal Chamber across the Milky Way are called the Heavenly Corridor (Fig. 1a). The plan was to connect Epang, the new palace on the south bank, and Xianyang, the existing palace on the north bank, together by a causeway across the Wei River. We studied the locations of relics on the ground, and found it was exactly the same spatial pattern as described by Sima Qian (Fig. 1b). The Apex of Heaven is equivalent to Epang Palace, the Royal Chamber to Xianyang Palace, the Milky Way to the Wei River, and the Heavenly Corridor to the causeway. The Emperor's route between the two palaces is similar to the God of Heaven's route between the two constellations. In this paper, we call it the model of “Epang Du Wei”.

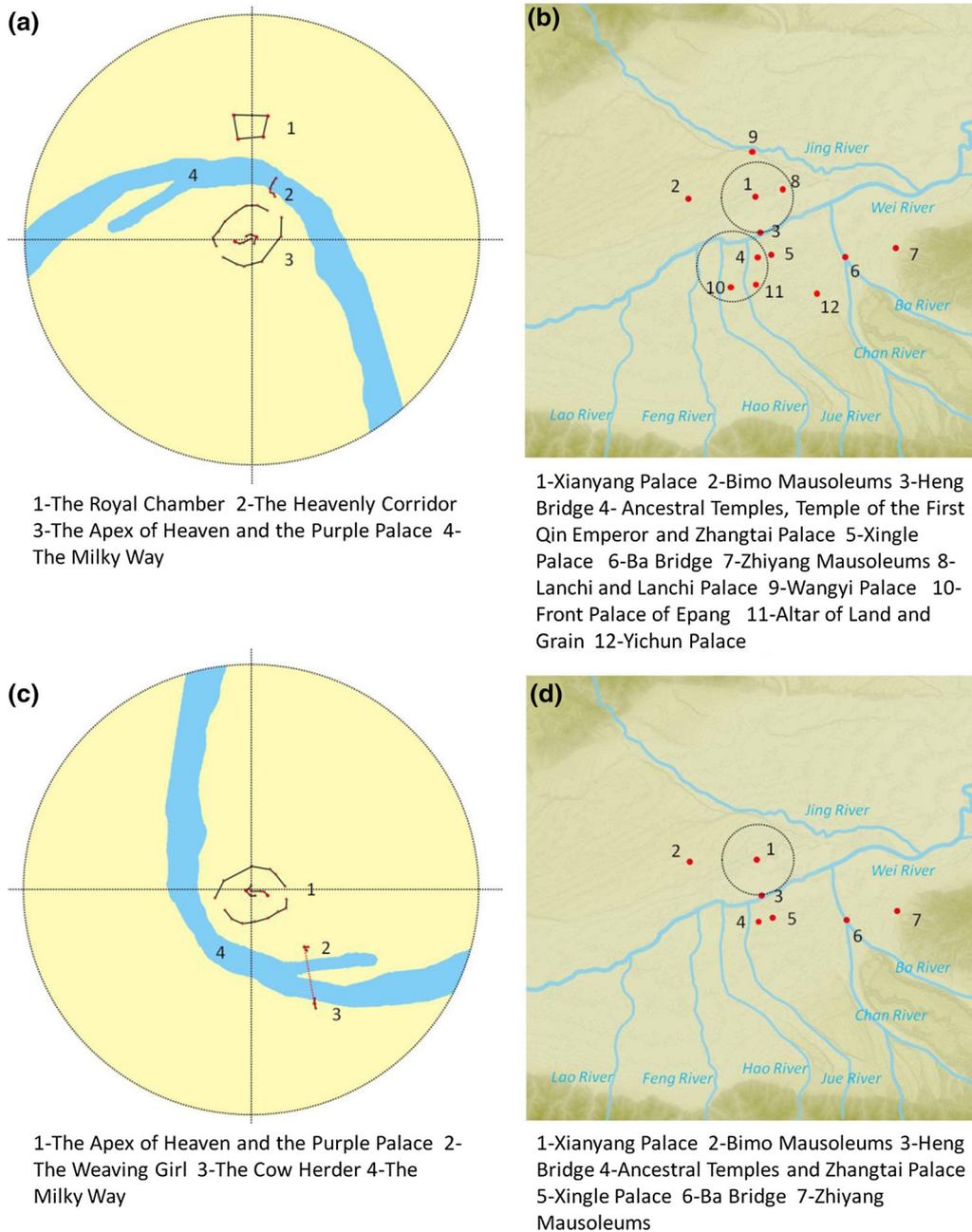
A later work, the *Shui Jing Zhu* (written in the Northern Wei Dynasty by Li Daoyuan), provides another record about the planning of Xianyang characterized by “Modeling Heaven and Earth”. “The Wei River crossing the capital city Xianyang is like the Milky Way. The Heng Bridge toward the south is like the Cow Herder (Altair)”

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T. Wu  
School of Architecture, Tsinghua University, Beijing 100084,  
China  
e-mail: frank@tsinghua.edu.cn

B. Xu (✉)  
The Palace Museum, Beijing 100009, China  
e-mail: bin.xu724@foxmail.com

X. Wang  
Cultural Heritage Protection and Research Center, Institute of  
Archaeology of Chinese Academy of Social Sciences,  
Beijing 100710, China  
e-mail: wangxr@cass.org.cn



**Fig. 1** The model of “Epang Du Wei” in the period of the First Qin Emperor (r. 246 BC–210 BC) (a, b) and the model of “Hengqiao Nan Du” in the period of the King Zhaoxiang of Qin (r. 306 BC–251 BC) (c, d). Source: The star maps are recovered according to Ref. [4], and the archaeological sites are recovered according to Ref. [5]

[6]. This model equates the Wei River to the Milky Way, and the Heng Bridge to the Cow Herder in the sky. It is also recorded in other historical records such as the *Taiping Huanyu Ji*, *Chang’an Zhi* and *Sanfu Huangtu* that the Xianyang Palace equates to the Purple Palace in the sky [7]. Let us call it the model of “Hengqiao Nan Du”. Apparently, it is quite different from the model recorded in the *Shiji*. In *Tian Guan Shu*, the Purple Palace is classified as “the Central Palace” and the Cow Herder is classified as

“the Northern Palace”. In Fig. 1c, we can see the Cow Herder and the Weaving Girl are located on different banks of the Milky Way. If we regard Xianyang Palace as the Purple Palace, and the Wei River as the Milky Way, then the line connecting the Cow Herder and the Weaving Girl is quite like the Heng Bridge across the river. It could also be inferred that the record of the *Shui Jing Zhu* is actually the description of the layout of Xianyang during the reign of King Zhaoxiang of Qin (306BC–251BC). It is earlier

than the reign of the First Qin Emperor (246 BC–210 BC). So, it helps to confirm the center of the capital city at that time was Xianyang Palace, despite other constructions south of the Wei River (Fig. 1d).

Two types of “Modeling Heaven and Earth” emerged in Xianyang’s planning marks the maturity of the thought of “Modeling Heaven and Earth” and its successful application in capital city planning. It is widely believed that there are two trends of thought in city planning, especially capital city planning in ancient China. One is the thought of “Jiang Ren Ying Guo” in the *Kao gong ji*<sup>1</sup> [8], the other is the thought of “Yin Di Zhi Yi” in the *Guan Zi*<sup>2</sup> [9]. However, by studying the first capital city in imperial China, we actually found out the third trend, the thought of “Modeling Heaven and Earth”. This thought can be traced back to the procedure of site selection for suitable place by observing the locations of constellations in the sky and the geographic features on the ground, according to the *Book of Changes* [10]. As the knowledge of astronomy accumulated and evolved, the thought of “Modeling Heaven and Earth” was gradually employed in the capital city planning for its close relationship to the authority of the king or the emperor. The thought of “Modeling Heaven and Earth” in the planning of Xianyang had profound influence on the subsequent capital cities in the following two thousand years. Exploring the theory and method of “modeling Heaven and Earth” can provide us a new approach to understand the meaning and techniques of

capital city planning in ancient China. It will also inspire us to plan with nature, and to enhance the urban planning work from the height of cultural creation.

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**Conflict of interest** The authors declare that they have no conflict of interest.

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<sup>1</sup> Jiang Ren Ying Guo is a traditional city planning method recorded in the *Kao gong ji*. It contains the standard of the city size, the numbers of gates, the width of streets, as well as the locations of functional zones, such as the palace, court, market, ancestral temple, altar of land and grain by following the ritual system.

<sup>2</sup> Yin Di Zhi Yi is another traditional city planning method recorded in the *Guan Zi*. It is not as formal as Jiang Ren Ying Guo, but pays more attention to the nature and physical environment. So it means to arrange the layout of city according to the landform and flow of water.