

# Hollow Brick Tombs, Rock-Cut Chamber Tombs, and the Two-Tiered Earthen Platform Phenomenon in Qin Tombs

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**Abstract:** Despite the continuous improvement of productivity and the growing human ability to transform and utilize nature, natural conditions and the ecological environment have always been decisive factors shaping the characteristics of cultural remains. During the Warring States, Qin, and Han periods, the emergence of vertical shaft tombs with a rammed-earth two-tiered platform, the subsequent prevalence of rock-cut chamber tombs and hollow brick tombs, and eventually the popularity of small brick tombs, were all passive adaptations to the reality of dwindling timber resources, reflecting the principle of making the best use of local conditions.

**Keywords:** Qin and Han periods, rammed-earth two-tiered platform, rock-cut chamber tomb, hollow brick tomb, timber scarcity, making the best use of local conditions

## 1. Introduction

Mr. Huang Xiaofen once pointed out that the transition in the Western Han period from constructing large tombs exclusively with timber to using multiple building materials in parallel was very likely directly related to a crisis in forest resources. Although the owners of large tombs could, by virtue of their power, requisition and transport timber from other areas or employ various political means to achieve their ends, such measures were ultimately unsustainable. The most effective way to overcome this crisis was to source materials locally and adapt to local conditions. Compared with large tombs, the owners of medium- and small-sized tombs generally lacked the financial and material capacity to obtain timber from distant locations, making them more sensitive to environmental changes and more dependent on local adaptability in their choice of construction materials for tomb building [1]. The authors agree with this view and, based on a comprehensive review and observation of data on medium- and small-sized tombs, approach this issue from the perspective of hollow brick tombs, rock-cut chamber tombs, and the two-tiered platform phenomenon in Qin tombs, for analysis and discussion. Any shortcomings in this study are subject to further correction.

## 2. The Widespread Emergence of Hollow Brick Tombs

Hollow bricks were a type of large ceramic building material in ancient China, rectangular in shape and hollow inside, hence the name “hollow brick.” They were used either as steps in palace architecture or for constructing tomb outer coffins (guo chambers) in place of wooden ones [2]. To date, the earliest hollow bricks have been found at the Chiqu site in Yuntang Village, Zhouyuan, Shaanxi. These date primarily to the pre-Zhou period, with the latest examples possibly extending to the early Western Zhou. They are a type of relic closely associated with large rammed-earth architecture [3]. Although hollow bricks were invented during the Western Zhou period, they were likely not widely used at the time, possibly due to limitations in production output and quality. This period may still have been a stage of trial production and experimental use [4]. In the Western Zhou period—especially its middle and late phases—the number of brick-producing units was small, and no examples of hollow bricks have been found from the Spring and Autumn period through the early Warring States. It was not until the mid-Warring States period that hollow bricks were discovered at the Yongcheng site [5] and the ancient city of Zhenghan [6], with a long chronological gap between the two finds. Particularly noteworthy is the discovery of hollow brick tombs at the ancient city of Zhenghan, marking the beginning of their large-scale use in certain regions. In addition to improved manufacturing techniques and increased output, social demand must have been a key factor driving their widespread adoption. During the Western Han period, hollow brick tombs reached their peak, becoming prevalent in the Central Plains and Guanzhong regions. In the Eastern Han period, as small brick tombs gradually became popular nationwide, hollow brick tombs disappeared.

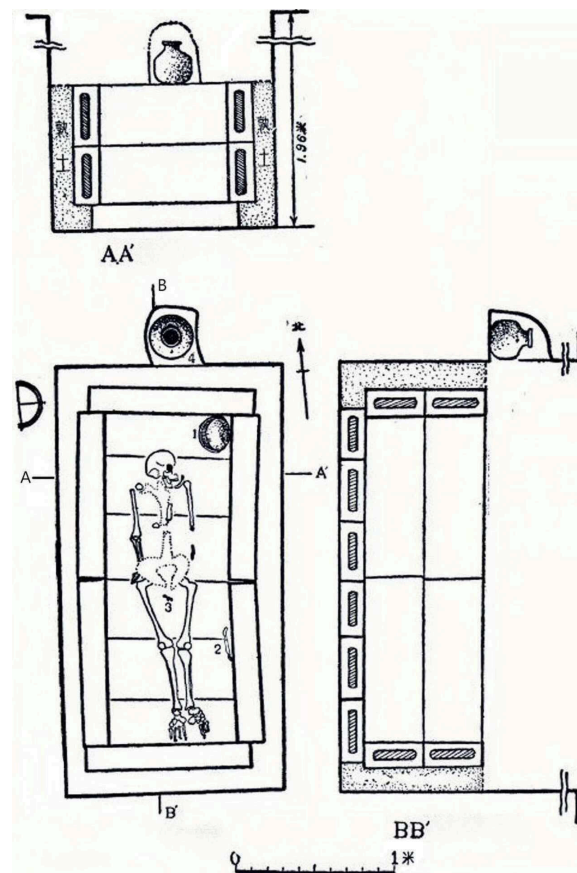


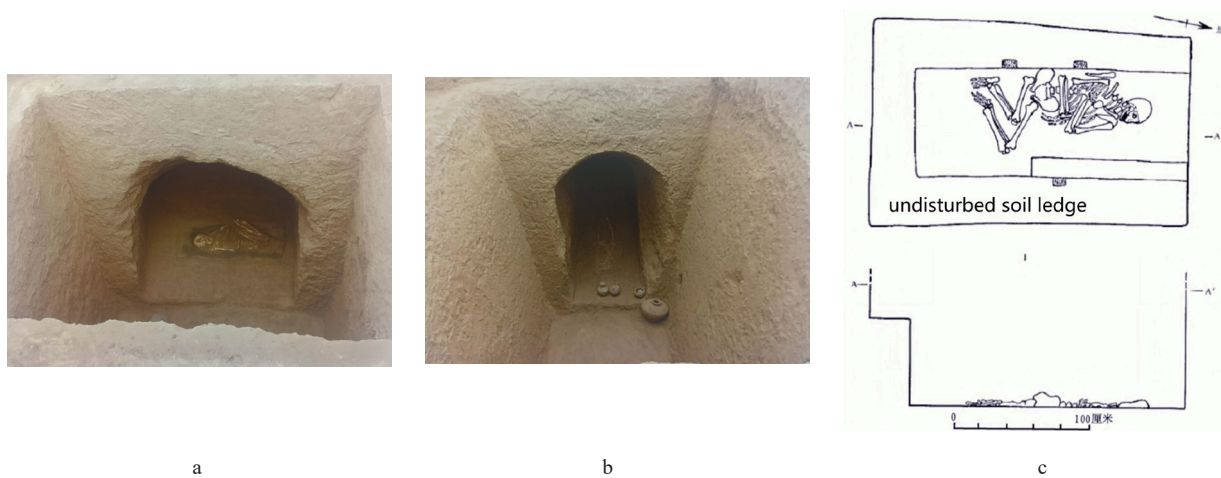
Figure 1. Hollow Brick Tomb M16 from Zhengzhou Erlitou Site

From the mid to late Warring States period through the Eastern Han period, the Central Plains and Guanzhong regions were the first to adopt hollow bricks and small bricks to replace timber for tomb construction. This shift in tomb building materials initially appeared in the densely populated, early-developed Central Plains and Guanzhong areas, where timber resources had clearly diminished, and it began with medium- and small-sized tombs. In contrast, the less populated, later-developed, humid, and forest-rich Yangtze River basin still used timber for tomb construction at this time. These changes were not accidental but reflected the timber supply shortage in the Central Plains and Guanzhong regions. Using bricks or stone for tomb construction was an effective response to the timber resource crisis [7]. Supporting evidence includes that the form, structure, and size of early hollow brick tombs were very similar to wooden outer coffin tombs, with the only difference being the building material of the outer coffin; thus, hollow bricks clearly functioned as a substitute for timber [8]. For example, among the 26 hollow brick tombs excavated at Erlitou in Zhengzhou, 22 tombs did not use hollow bricks to form side-laid and top-laid coverings on the hollow brick outer coffin walls (see Figure 1). According to the residual plaster marks found on the wall bricks in a few tombs, the top cover of these coffin chambers was likely wooden boards. The wooden board cover in tomb M452 is well preserved, measuring 2.4 meters long and 1.3 meters wide [9]. The use of wooden board covers in hollow brick tombs indicates that at the time there was a desire to maintain the characteristics of wooden coffin tombs while reducing timber use, with hollow bricks serving as a timber substitute. It is well known that overexploitation inevitably leads to timber scarcity and rising timber prices; reducing timber use could effectively lower tomb construction costs. Compared to the timber shortage, the Central Plains and Guanzhong regions, which pioneered hollow brick tomb construction, had abundant clay resources — the main raw material for bricks — which was inexpensive and suitable for mass production.

### 3. Rock-Cut Chamber Tombs and the Two-Tiered Platform Phenomenon in Qin Tombs

The traditional tomb form of Qin tombs was a rectangular vertical shaft tomb. In the late middle period of the Warring States, rock-cut chamber tombs began to appear in Qin tombs in the Guanzhong region and subsequently became widely popular [10]. For example, the Qin tombs M105 and M197 in the eastern suburbs of Xianyang are examples of a side rock-cut chamber tomb and a straight-line rock-cut chamber tomb, respectively (Figure 2 a–b) [11]. The Guanzhong region is a

plain area with thick loess soil layers and good soil stability, making it suitable for constructing rock-cut chamber tombs.



**Figure 2. Cave Tombs and the Double-Layer Platform Phenomenon in Qin Tombs**

(a–b. Qin Tombs M105 and M197 from Eastern Suburb of Xianyang; c. Qin Tomb 13#M25 from 2000 Mingzhu Garden, Youjiazhuang, Xi'an)

A large amount of archaeological data from medium- and small-sized tombs confirms that the two-tiered platform phenomenon in Qin tombs differs from that in the tombs of the Six Eastern States during the Shang, Western Zhou, and Eastern Zhou periods. The two-tiered platforms that appear extensively in Qin tombs are made of rammed earth, whereas those in the tombs of the Six Eastern States during the Shang, Western Zhou, and Eastern Zhou periods are predominantly made of prepared earth, as shown in Tables 1 and 2. The rammed-earth two-tiered platforms in Qin tombs appear not only in vertical shaft tombs but also in rock-cut chamber tombs. Many vertical shaft tombs retain traces of wooden scaffolding on the two-tiered platforms. For example, in the Late Warring States period tomb M25 at Youjiazhuang 2000 Mingzhuhua Garden, rammed-earth two-tiered platforms remain on three sides of the tomb. Based on three wooden scaffolding traces on the platforms, it is inferred that the platforms functioned to support the scaffolding (Figure 2 c) [12]. Furthermore, similar rammed-earth two-tiered platforms have not been found in Western Zhou Xirong tombs [13]. The widespread appearance of rammed-earth two-tiered platforms can be regarded as one of the typical features of Qin tombs after the mid-Warring States period.

**Table 1. Statistics of Two-Tiered Platforms in Tombs of the Six Eastern States during the Shang, Western Zhou, and Eastern Zhou Periods**

	Shang Dynasty	Western Zhou	Eastern Zhou			
			Jin and the Three Jin States	Chu	Qi	Yan
Tomb Site	Anyang Dasikong Village Shang Tomb [14]	Zhangjiapi Western Zhou Tomb [15]	Zhengzhou Erlitou [16]	Zhaojiahu [17]	Pingdu Dongyue Shicun [18]	Tianjin East Suburb Zhangguizhuang [19]
Period	Late Shang Dynasty	Western Zhou	Early Warring States to Early Han	Late Western Zhou to Early Late Warring States	Early to Late Warring States	Mid to Late Warring States
Tomb Type	Vertical shaft tomb	Vertical shaft tomb	Vertical shaft tomb	Vertical shaft tomb	Vertical shaft tomb	Vertical shaft tomb
Total Tombs	166	340	212	297	20	33
With Prepared Earth Two-Tiered Platforms	Majority have prepared earth two-tiered platforms	Majority have prepared earth two-tiered platforms	All 212 tombs (100%)	0	0	0
With Rammed Earth Two-Tiered Platforms	8 tombs (4.82%)	8 tombs (2.35%)	0	0	0	0

The following table presents statistics on the two-tiered platform phenomenon in Qin tombs (periods that are unspecified are excluded from the statistics).

**Table 2. Qin Tombs at Dianzi, Long County [20]**

Period	Total Tombs	Tombs with Rammed Earth Two-Tiered Platforms	Tombs without Two-Tiered Platforms	Tomb Type
Mid Spring and Autumn	5	0	5	5 vertical shaft tombs
Late Spring and Autumn	14	0	14	14 vertical shaft tombs
Early Warring States	47	4(8.51%)	43	47 vertical shaft tombs
Mid Warring States	52	7(13.46%)	45	52 vertical shaft tombs
Late Warring States	41	14(34.15%)	27	40 vertical shaft tombs; 1 rock-cut chamber tomb
Qin Dynasty	63	36(57.14%)	27	50 vertical shaft tombs; 13 rock-cut chamber tombs

**Table 3. Qin Tombs at Maopo Guanghua Jiaoxie Factory [21]**

Period	Total Tombs	Tombs with Rammed Earth Two-Tiered Platforms	Tombs with Prepared Earth Two-Tiered Platforms	Tombs without Two-Tiered Platforms	Tomb Type
Late Spring and Autumn	2	M75 (Semi-Rammed and Semi-Prepared Earth Two-Tiered Platform)	1(M83)	0	2 vertical shaft tombs
Early Warring States	4	3 (75.00%)	0	1 (25.00%)	4 vertical shaft tombs
Mid Warring States	11	10 (90.91%)	0	1(9.09%)	6 vertical shaft; 5 rock-cut chamber tombs
Late Warring States	16	4(25.00%)	0	12(75.00%)	3 vertical shaft; 13 rock-cut chamber tombs
From King Zhaoxiang to the Fall of Qin	10	0	0	10	1 vertical shaft; 9 rock-cut chamber tombs
Before Emperor Wu of Han	1	0	0	1	1 vertical shaft tomb

**Table 4. Qin Tombs at Maopo Postal and Telecommunications College [21]**

Late Warring States Period to Qin Unification				
Tomb Type	Total Tombs	Tombs with Rammed Earth Two-Tiered Platforms	Tombs without Two-Tiered Platforms	
Vertical Shaft Pit Tombs	3	3(100%)	0	
Side Chamber Tombs	3	1(33.33%)	2	
Straight Chamber Tombs	154	101(65.58%)	53	

**Table 5. Qin Tombs at Ta'erpo, Xianyang [22]**

Period	Total Tombs	Tombs with Rammed Earth Two-Tiered Platforms	Tombs without Two-Tiered Platforms	Tomb Type
Early Late Warring States	37	14(37.84%)	23	11 vertical shaft; 26 chamber tombs
Late Late Warring States	123	55(44.72%)	68	41 vertical shaft; 82 chamber tombs
Qin Dynasty	28	10(35.71%)	18	8 vertical shaft; 20 chamber tombs

From Tables 2 to 5, it can be seen that from the early Spring and Autumn period to the unification of Qin, the phenomenon of rammed earth two-tiered platforms in Qin tombs developed from nonexistence to prevalence, gradually increasing in

number. This development is likely a result of the intrinsic emergence and evolution of Qin culture. In addition, the rammed earth two-tiered platform phenomenon appeared predominantly in vertical shaft tombs, and after the emergence of chamber tombs, it also appeared in chamber tombs but in smaller numbers. The rammed earth two-tiered platforms in chamber tombs seemingly had no practical function, and their presence may have been influenced by those in vertical shaft tombs.

Rammed earth two-tiered platforms are widely present in Qin tombs from the mid-Warring States period onward; however, it is important to note that the rammed earth two-tiered platforms in Qin tombs differ significantly in nature from the tamped earth two-tiered platforms found in Shang and Zhou tombs. The tamped earth two-tiered platform is naturally formed by rammed soil filling the gap between the four inner walls of the tomb's expanded lower section and the outer wooden coffin frame, representing no intentional structural design or practical function [23]. In contrast, the rammed earth two-tiered platforms and chamber tombs in Qin tombs emerged against the backdrop of the decline of ritual systems during the Spring and Autumn and Warring States periods. Traditional ritual requirements for coffin and outer coffin structures were no longer strictly observed, and the appearance of rammed earth two-tiered platforms and chamber tombs aligns with the trend toward simplification and practicality in the form and structure of Qin tombs during this era. Additionally, Tian Yaqi and Zhao Shizhen categorized the coffins excavated from the Qin tombs at Dianzi in Longxian, Shaanxi, into three types: Type A: Multiple coffin structures with two or more nested layers, such as double outer coffin-double inner coffin, double outer coffin-single inner coffin, single outer coffin-double inner coffin, and single outer coffin-single inner coffin; Type B: Single-layer complete coffin, but with wooden frameworks above or wooden posts around it; Type C: Single-layer coffin without such frameworks. Types A and B correspond to vertical shaft tombs. In Type B, the complete coffin is a single coffin, but the outer coffin is replaced by a two-tiered platform, wooden framework, and supporting posts. The two-tiered platform represents the outer coffin frame, the wooden framework is the coffin cover, and the posts tightly attached to the inner wall of the two-tiered platform serve to reinforce and support the rammed soil inside the tomb. Type C corresponds to chamber tombs, where the chamber entirely replaces the function of the coffin protection. Regarding materials, Type A coffins generally use thicker materials, with outer coffin boards about 0.08–0.13 meters thick and coffin boards about 0.05–0.10 meters thick. Type B coffins show two conditions: tombs with wooden frameworks on the two-tiered platform tend to have thinner coffin boards, approximately 0.04–0.07 meters thick; tombs without wooden frameworks have thicker coffin boards, about 0.08–0.10 meters thick. Some tombs without wooden frameworks on the two-tiered platform have thinner bottom and side boards but thicker lids. Type C coffins use the thinnest materials, generally only about 0.03–0.06 meters thick [23]. Therefore, taking the Qin tombs at Dianzi in Longxian as an example, it can be concluded that chamber tombs and Qin tombs with rammed earth two-tiered platforms mostly omit the outer coffin, and their coffins use thinner materials, resulting in reduced wood consumption and indicating a characteristic of wood conservation.

## 4. Conclusion

In summary, hollow brick tombs, chamber tombs, and Qin tombs with rammed earth two-tiered platforms all exhibit a tendency to reduce wood consumption. Hollow brick tombs and chamber tombs appeared in the mid-Warring States period, while Qin tombs with rammed earth two-tiered platforms emerged as early as the early Warring States period. However, regardless of whether they are hollow brick tombs, chamber tombs, or Qin tombs with rammed earth two-tiered platforms, their widespread appearance occurred after the mid-Warring States period. In fact, during the early to mid-Warring States period, forest resources in the Central Plains and Guanzhong regions had already shown signs of depletion, and the trend of conserving wood in tomb construction aligns with this background.

From a climatic perspective, studies indicate that after the Spring and Autumn period, the climate in eastern China tended toward cooling. At least during the late Warring States to early Western Han period, the climate in the middle and lower reaches of the Yellow River shifted from the relatively warm conditions of the Spring and Autumn period to a colder phase, representing a climatic cold period [24]. Cold climates are unfavorable for vegetation growth, causing tree growth to slow or even cease.

From the perspective of forest resource distribution, during the Spring and Autumn and Warring States periods, the Jing and Wei river basins in Shaanxi, the Fen River basin in Shanxi, and the vast plains of Qilu and Yu were already crisscrossed by a dense network of roads and fields. Due to human reproduction and expansion, trees in the plains were basically eradicated, and forests near the mountains gradually became sparse. Mencius lamented this as “Niushan is bare.” However, the entire Taihang Mountains, Yimeng Mountains, and Jiadong Hills still consisted of primeval forests, and the original forests in the Yin Mountains, Qinling, Xiong'er, Funiu, Liupan, and Qilian Mountains remained completely undisturbed by human activity [25]. Nevertheless, transportation during the Spring and Autumn and Warring States periods was still underdeveloped, and these remote, rugged primeval forests could not be exploited. The “Records of the Grand Historian: Annals of Qin Shi

Huang” records that in the 35th year of Qin Shi Huang’s reign, “more than 700,000 prisoners were conscripted to build the Epang Palace and the Lishan Palace. Stone coffins were quarried from the northern mountains, and timber was transported from Shu and Jing regions.” Shu refers to what is now northern Sichuan; Jing refers to Jingchu, i.e., northern Hubei. This indicates that the timber used for constructing the palaces and mausoleums of Qin Shi Huang came from present-day northern Sichuan and northern Hubei. The direct reason the Qin people traveled thousands of miles south of the Qinling Mountains to fell and transport timber was the scarcity of forest resources in the Guanzhong and Central Plains regions.

With timber scarcity, large tomb owners could mobilize timber through their authority, but this was costly and not sustainable in the long term. Tomb owners of smaller tombs more often opted for a locally adapted approach, seeking cheaper substitutes. The emergence of vertical pit tombs with rammed earth two-tiered platforms, the spread of chamber tombs and hollow brick tombs, and eventually the prevalence of small brick tombs in the Central Plains and Guanzhong regions all represent strategies adopted to cope with timber shortages.

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