

Resettlement Strategies and Han Imperial Expansion: Isotope Evidence from Shamaoshan, Yunnan, Southwest China

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1. Introduction

The Dian Kingdom, ruling what today is central northern Yunnan, China, from the 4th c. BC to its annexation by the Han Empire in 109 BC, is one of the few non-Han groups mentioned in early Chinese historical sources that can be connected reliably with a specific body of archaeological evidence (Twitchett et al. 2008). Since the discovery of the golden *Seal of the King of Dian* in grave M6 at Shizhaishan in the 1950s (Yunnansheng 1959; Yunnansheng Bowuguan Kaogu 1959), much has been written about Dian, its social structure, burial customs, unique metal objects, and its connections with the Steppe on the one hand and Southeast Asia on the other (Dewall 1967; Li and Han 2011; Tong 1980; Yang Bin 2011; Yao 2010, 2016; Zhang Zengqi 2001). Studies on the process of integrating Dian into the Han Empire and its social and cultural ramifications, however, are more limited.

Historical accounts tell us that considerable population movements from the Central Plains and other regions to the South and Southwest took place already during the Qin (221-206 BC) and especially during the Han period (206 BC – AD 220), some through organized movement of troops, settlers, and administrators, others by people fleeing natural disasters or political upheavals (Hsu 2012:152). Based on census data from AD 2 and 140, over 5 million people migrated north during this period alone (*Hanshu* 28 for AD 2 census; *Hou Hanshu* 29-33 for AD 140 census; Bielenstein 1947 for further research). At the same time, archaeological remains reflect an increase in access to Central Plains style objects, first in the form of single bronze weapons, then increasingly more Han metal weapons, vessels, and coins in the most elaborate graves, and finally a complete replacement of Dian material culture by Han items in the 2nd c. AD (e.g., Allard 1999; Pirazzoli-t'Serstevens 1974; Xiao 2008). What remains difficult to ascertain is the identity of the tomb occupants, their place of birth and cultural affiliation. Is the presence of Han objects a sign of the foreign origin of the dead whom they accompanied or are they objects used by locals who had access to foreign goods? Did Han officials stationed in Dian take on local customs or did they combine both traditions in their graves? And on a more general level, how did Han administration, migration, and settlement work on the ground in Yunnan? Was it mainly the upper-class locals who were in contact with the Han or did various types of exchange occur on all levels of society? Furthermore, did Hanification happen quickly and for all social groups or was there resistance among the locals or even cultural change among the Han immigrants, Dianification, so to speak?

One of the newest scientific techniques commonly employed in distinguishing local and immigrant populations is isotope analysis. In Southwest China, although this type of research is still in its infancy, the latest achievements have revealed its enormous application potential (Zhang et al. 2014, 2018). Where isotope analyses are conducted, there is a tendency to jump to conclusions, declaring individuals identified as non-local to come from specific areas, in the case of Han-period Southwest China automatically the Central Plains, even though isotope studies cannot offer this level of information. What is needed to make progress toward answering some of the questions posed above is thus a larger number of isotope studies as well as a combined analysis of archaeological, textual, environmental, and scientific data. This is what the present study attempts to do.

On the scientific end, we conducted strontium, oxygen, and carbon isotope analysis on human tooth enamel from 18 skeletons from 11 graves from the Shamaoshan to assess if the individuals may have been of non-local origin. The samples

were chosen from graves which have been attributed to the Dian Culture but whose assemblages also show Han cultural connections and represent a sample of different interment types, sexes, ages, and periods. The results are compared with previous analyses done on skeletons from other Dian cemeteries. To balance out this the limited number of samples, we connect the scientific evidence with information on object assemblages, grave structures, and burial customs from the late Bronze Age to the Eastern Han period, and also provide a critical analysis of the textual evidence for the imperial expansion into the Southwest.

2. Historical and Archaeological Background

2.1 Historical Evidence for Population Movements and Central Plains Expansionism

One obstacle in text-based research on the Qin and Han expansions is that the few historical documents mentioning the Southwest were recorded by Central Plain's historians and are thus of limited reliability and tinged by a political agenda. They do, for instance, claim that the Dian kingdom was established by the Chu general Zhuang Qiao in 281 BC (Sage 1992:144; Yang Bin 2009), but it is now clear that a political regime had been established in the Dian basin already two centuries earlier and was characterized by a complex sociopolitical structure and material culture of its own making (e.g., Watson 1970; Zhang Zengqi 1998).

According to the *Shiji*, the *Records of the Grand Historian* written in the 2nd - 1st c. BC for the Han emperor, groups located west of Dian were involved in trade of horses, yaks, and slaves with the Qin, a trade network that likely also involved Dian (*Shiji* 129; Watson 1993 vol. II:291). First historical evidence for direct contact consists of reports of a Qin envoy to central Yunnan in the late 3rd c. BC and military campaigns against the Baiyue in neighboring Lingnan in 214 BC (*Shiji* 6; Holcombe 2001:147-150). Recent metal analyses have furthermore shown that raw material from Yunnan was used to produce bronzes for the Central Plains already in the 2nd mill. BC, so trade networks might have expanded much further at a much earlier time than the written sources suggest (Chiou-Peng 2009).

Historical texts document the Han expansion toward the Southwest from around 135 BC, the Han aiming to establish a stable trade network toward South and Southeast Asia and beyond into Daxia, i.e., Bactria, to obtain exotic goods (*Shiji* 116; Sun and Xiong 1983; Yü 1986: 457-8). As the most powerful groups in the Southwest at the time, the Dian and the Yelang were the largest obstacle (*Shiji* 116; Watson 1993:294-6). As they were having difficulties annexing Dian, the Han first established the Jianwei commandery (southwest of present-day Yibin County, Sichuan) in 135 BC, followed by further commanderies in other parts of southwest China (*Hou Hanshu* 113; Yü 1986:458) (**Fig. 1**). These commanderies proved difficult to hold, though, with the locals rebelling and the Han occupiers – not used to the local climate and diet – dying from illness and starvation (*Shiji* 116). There was much opposition to investing into what some saw as useless territories in the Southwest (e.g., *Shiji* 112), and during the resource-intensive war with the Xiongnu, some of the southwestern commanderies were abandoned and the roads built for the southern trade fell into disrepair (*Shiji* 116).

Yizhou commandery (*Shiji* 116; Watson 1961:296). The Han thus followed an established model of acknowledging local rulers in exchange for their support, declaring them to be subjects to Han rule yet local kings. It is not entirely clear how far the influence of the Han went and how autonomous the Dian and Yelang rulers – the only southwestern leaders to have received kingly seals from the Han (*Shiji* 116) – may have been. The mountain groups further west who were much more difficult to control due to the rugged local terrain, may have retained complete independence and their acknowledgement of Han supremacy was only pro-forma (Sage 1992:189). In the Dian basin, however, the Han were more influential, relocating large numbers of people from the Central Planes and other regions and establishing a local administrative system staffed by immigrant officials (**Fig. 2**). In a nation-wide census undertaken in AD 2, the Yizhou commandery, consisting of 24 prefectures, was reported having 81,946 households and a population of 580,463 people (*Hanshu* 28A), however, the percentage of locals vs immigrants is not mentioned, and there is very little information on the relations between them.



Fig. 2 Map of Dian and Shamaoshan in Relation to the Western Han Empire

In spite of these planned population movements, the area was not easy to keep under control, as reports of at least seven uprisings in Yizhou between 105 BC and AD 176 show (Allard 1998:331). These uprisings were costly for both sides, the Han killing large numbers of people and livestock and an alleged 70% of Han soldiers dying of illness alone during a three-year campaign under Wang Mang (AD 9-23) (*Hou Hanshu* 86; Yü 1986:459). The Dian lands nevertheless remained attractive, providing both access to long-distance trade networks and great natural resources of their own. Han officials living in the Dian region became rich due to the great agricultural lands, exotic

birds, fish, livestock, salt, and precious metals the land held (*Shiji* 129; Watson 1993 vol. II: 450). In the upheaval following the rise of Wang Mang, even more migrants came to the southwest, although mostly as refugees and thus probably in less orderly a fashion than previously, and Han control faltered once again. Finally, troops from Ba and Shu defeated local uprisings and a new governor brought order, apparently gaining popularity among both locals and immigrants (*Hou Hanshu* 86). There are several stories of certain officials being popular, but more often than not, relations between locals and immigrants seem to have been tense. Furthermore, the large number of dead on both sides and the many immigrants and soldiers succumbing to the unfamiliar climate and local germs, would have meant a considerable fluctuation in population numbers, probably destabilizing the region further.

Besides moving more military into Dian, resettling even more people, and establishing a local bureaucracy, under Huangdi (AD 146-168) a new approach was taken: educational efforts were made to teach the “southern barbarians” Han customs and thus make them easier to govern (*Hou Hanshu* 86) – with varying success as an uprising in AD 176 shows (*Huayang Guozhi* 4; *Hou Hanshu* 8). This was the last of the rebellions during the Han, however, and most of the 2nd c. AD was without major upheavals. At that point, the region was largely under Han control, administered through Han officials and local rulers installed or confirmed by the Han. In terms of material culture, Han artifacts became increasingly common and by AD 100, typical Dian items had largely disappeared from graves in the central river basin (Watson 1995:88), but only around the 3rd c. AD in the western mountains (e.g., Hein 2014; Yao 2016). This shift in material culture will be described in greater detail below

2.2 Dian Archaeology: Local Developments and Evidence for Central Plains Connections

The archaeology of southwest China is extremely varied as a recent summary of the current state of research in this area reflects (Yao 2010). For the purposes of this study, we concentrate on material remains from the central lake basins (lakes Dian, Fuxian, and Xingyun) in eastern Yunnan usually associated with the Dian kingdom (also referred to as Shizhaishan culture) (**Fig. 3**).¹ The majority of material comes from graves, but in recent years significant progress has been made in settlement research as well.

2.2.1 The World of the Dead: Evidence from Graves

The flat and fertile area around the major lakes differs markedly from the surrounding mountains not just in geomorphology but also in the considerable number of elite cemeteries containing exceptionally richly furnished graves unparalleled in other parts of southwest China. The oldest of these cemeteries, Yangfutou (Yunnansheng et al. 2005) and Tianzimiao (Kunmingshi 1985), originated in the 6th c. BC with huge founding graves involving inner and outer coffins with clay plaster, second-level ledge, and waist pits, elements that have been suggested to copy burial practices of the Central Plains (Chiou-Peng 2008:39; Tong 1986; Yao 2016:133-135). The elaborate grave architecture and large amounts of bronze objects of unique local character concentrated

¹ It is debatable what type of political structure the group had whose leader was given the title “King of Dian” by the Han. Tong Enzheng (1991), for instance, argued that it was a chiefdom, rather than a kingdom.

in a few graves furthermore indicate the presence of a stratified society with a highly developed metallurgy considerably predating what textual sources see as the founding date of the Dian Kingdom, the 3rd c. BC.

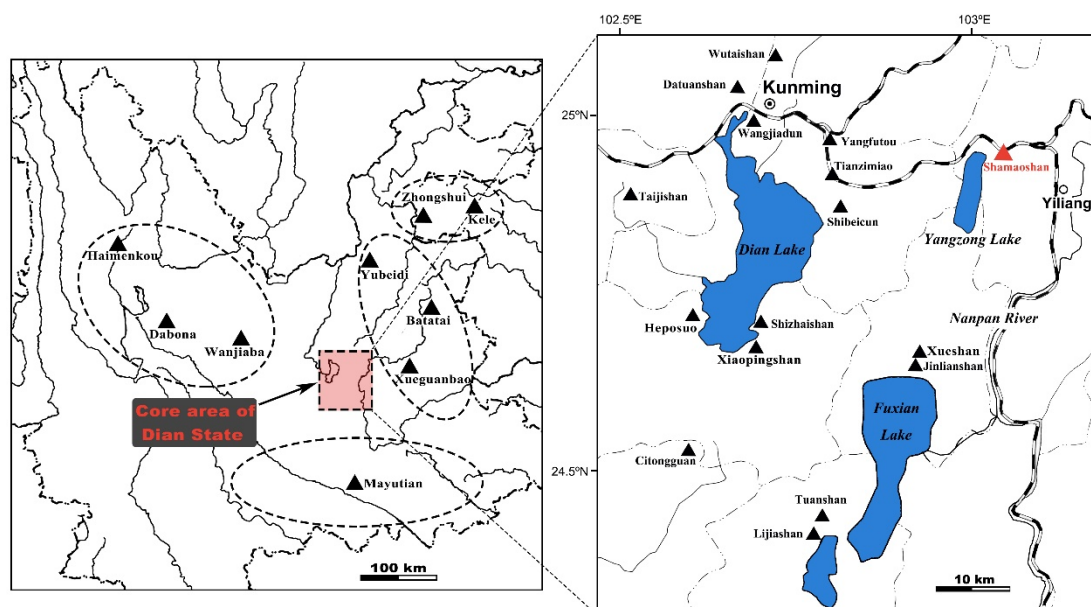


Fig. 3. Sites Mentioned in the Text.

From the middle to late Neolithic at the latest, the region had been part of long-distance exchange networks that came to reach all the way to the northern steppes on the one end and Southeast Asia on the other. Finds from the site of Haimenkou suggest that metal working, first in the form of pure copper hammering and smelting of simple tools and ornaments in stone molds, emerged around the first half of the 1st millennium BC at the latest, deriving the new technology either from northern Sichuan and thus ultimately from the steppe (Chiou-Peng 2009), from the Central Plains (Piggott 2012), and/or Southeast Asia (Yao 2010:232). Likely based on restricted access to raw materials, routes of exchange, and technological knowledge, many of the groups inhabiting southwest China saw the development of increasingly more hierarchical social organization. During the 8th c. BC, what Yao (2016:118) calls a “drum-owning elite” emerged throughout the region, reflected in a small number of large graves containing bronze drums and cowrie shells showing interactions with Southeast Asia, as well as weapons from the Chengdu Basin and the mountains of western Sichuan, some of them having their antecedents as far north as the Steppe (Chiou-Peng 1998).

Prior to the Han, the inhabitants of the central lakes region and the surrounding mountains were therefore by no means isolated but in constant exchange with a variety of other groups and regions, not only to their north and south but also to the east. In the earliest elaborate graves at Shizhaishan, dating to the 9th or 8th c. BC, bronze *ge* halberds and arrowheads appear that are nearly identical with Central Plains Shang or Western Zhou types, but these were probably obtained not through direct contact but through intermediaries in Sichuan where such object types are common as well (Chiang 2011). Lacquer wares likewise seem to have reached Yunnan from Sichuan, where lacquer production flourished. The first lacquer wares found at Yangfutou, the earliest known Dian cemetery dating to the 4th c. BC to 1st c. AD, carried red-and-black designs suggesting their Sichuanese origin (Yunnansheng et al. 2005). Iron technology appeared prior to the Han as well, transmitted through Sichuan or the middle Yangzi

(Yang Yong 2011:326-7).

Yangfutou and Tianzimiao, located closely together at the edge of the Lake Dian basin differ from Shizhaishan and Lijiashan in the considerable number of small graves they hold (vs the large graves of the latter two cemeteries) and the many ceramics. It has been suggested that the larger number of ceramics may reflect an agricultural lifestyle (Yang Yong 2011:53), or a lower status of the burying community of Yangfutou as compared to Shizhaishan and Lijiashan. It may be a matter of chronology, though, as the richest graves at Yangfutou predate those at the other sites. The custom of burying higher-level members of society in graves equipped with hundreds and even thousands of objects seems only to have emerged when the center of power had shifted to the immediate vicinity of Lake Dian (Chiang 2012:186) and the asymmetry in wealth between the central lacustrine basins and the surrounding mountains grew (Yao 2016:153-56). At this point, Yangfutou may have become only a secondary burial ground, not the place where the highest levels of society interred their dead.

Even at Yangfutou and Tianzimiao, bronze items are the most common burial object, and the grave forms are similar, too, earthen shaft graves oriented in North-South to Northeast-Southwest orientation, some of the large ones with waist pit, second-level ledge, and/or wooden chamber and/or coffin, the most common type of interment being extended-supine, sometimes side-crouched single, and more rarely small-group primary or secondary burials (in many cases, preservation conditions were too poor to be certain (Yang Yong 2011; Yunnansheng et al. 2005).

Certain burial goods are shared between the graves in the central river basins and the surrounding mountains, including drums in the largest graves, bronze *ge* halberds, swords, and knives, but some items are unique to the Dian graves in the central lake basins such as elaborately decorated non-utilitarian axe forms, and from the 4th c. BC onward cowrie shell containers and drums with three-dimensional scenes involving humans and animals (seen most prominently at Yangfutou, Tianzimiao, and Shizhaishan), large numbers of cowries shells, full-body bronze armor, as well as the sheer number of burial goods. The inclusion of Heger I/Dongson drums – object types widely distributed throughout Southeast Asia (Calò 2009) –, of cowrie shells from the Indian Ocean, and of weapons and ornaments of Shu and potentially steppe style (Chiou-Peng 2004 and 2008; Zhang Zengqi 1997) in the most richly equipped graves reflect an exclusive access of an elite stratum of Dian society to these far-ranging exchange networks. At the same time, the number of weapons and the prevalence of martial themes in imagery as well as the emergence of horse iconography suggest an increasing competition for resources and trade routes (Chiou-Peng 2004; Yao 2010:231).

From the 3rd c. BC onwards, some of these graves began to contain a small number Han items, for instance crossbows, iron and composite swords, iron and bronze vessels, sometimes mirrors and *banliang* coins (in use 202-213 BC) in the northern mountains (e.g., Batatai and Zhaotong; Yang et al. 2009 and 2010). As Allard (2015) has shown, in pre-conquest times, cemeteries located at some distance from the central lakes region (e.g., Tianzimiao and Yangfutou) contained only few Han items such as weapons and vessels, but as most graves there held only 2-5 objects, the Han items made up a considerable proportion of the assemblages. The central lake region cemeteries of Shizhaishan and Lijiashan, on the other hand, furnished as many as 119 Han objects in 10 very wealthy burials, but they made up less than 1% of the

assemblages (Yunnansheng et al. 2007). For the former group, the Han items – likely as a reflection of long-distance contact and access to exotic goods – seem to have been of much greater importance – at least in burial context – than for the individuals buried in the rich graves by Lake Dian.

During the 2nd c. BC, Shizhaishan and Lijiashan became the main cemeteries for elite graves, their size and lavishness in burial goods far surpassing earlier graves (Jiang 2002:76). Only very few graves are thus built and equipped, though, while over 90% of all graves are quite moderate in size and number of offerings (Lee 2001). The contrast between the few rich and the majority of moderately or poorly equipped graves grew, with the wealthiest two graves containing an average of over 300 artifacts and the poorest 149 only 2-3 items each (Lee 2001). The majority of graves both at Shizhaishan and at cemeteries such as Datuanshan, Shibeicun, Tuanshan, and Wutaishan – usually referred to as commoner cemeteries based on the small size of their graves and the limited number of associated objects – are of the second type and tend to lack iron objects or Han-style items (Yunnansheng 1980, 1983a, and 1984). This changes only after the Han conquest in 109 BC.

During the late Western Han period, likely after the conquest, Han-style items began to appear in especially large concentration in the elite graves of Shizhaishan and Lijiashan as most prominently visible in the grave of the King of Dian (Shizhaishan M6) which held Han-style bronze vessels including *dig* tripods, *hu* wine jars, ear-cups, as well as bronze mirrors, jade *bi* disks, a jade suite, incense burners, ceramic stove models, a set of six bronze chimes, and of course the famous seal, but also a large number of weapons, both foreign and local, and what seems to be a traditional local attire with armor, scabbard, and buckles of local style, as well as bronze bovine heads (Yunnansheng 1959). In spite of this wide variety of mostly very special Han items, they make up less than 3% of all objects found in this particular tomb; similar percentages can be observed in other rich burials (Allard 2005). Other elite graves at both sites likewise combine a number of choice Han items with local attire, insisting on the local tradition of East-West aligned earth-pit or rock-cut graves and the interment of bronze drums, cowrie containers, cattle imagery, chime bells, and in some cases horse imagery and horse gear. Crossbow mechanisms, bimetallic or iron swords occur exclusively in the larger ones of the elite graves while Han style iron knives have a much wider distribution.

Although shortly after the Han conquest, considerably more Han-style items appear in nearly all cemeteries, their number remains limited in the largest graves which continue to include cowrie shells but not Han coins which in turn are very common in smaller graves and sites further away from the center. The wealthiest graves thus incorporate only a select few Han items together with objects of other foreign origin, all associated with an overwhelming majority of local metal products displaying a flourishing local culture and craftsmanship. It has been suggested, that it may have been the contact with the outside and even more so resistance against the Han that served as a catalyst for the increasingly more lavish interments and the emphasis on local customs and objects for the elite graves (Yao 2016).

The presence of Han coins and simple tools such as iron knives is especially notable at lesser cemeteries such as Shibeicun, Taijishan, but also Tianzimiao where large graves become increasingly less common (Kunmingshi 1985, Yunnansheng 1965 and 1980). Here, occasionally also S-shaped belt hooks appear, indicating a Hanified dress for the commoners, at least in their last resting place. Noteworthy is again

Yangfutou, where only four Han-style items (2 iron swords, 1 iron knife, 1 coin) are found in 161 post-conquest Dian burials (Allard 2005). Chiang (2012:186) interprets this as a sign that Yangfutou had become less important and thus lacked access to Han objects, but Han objects appear also at considerably more remote sites in the mountains, e.g., in the Qujing Basin. Furthermore, Yangfutou itself also holds 29 graves dating to the 1st c. AD whose assemblages are completely Han in nature, so Yangfutou seems to have been part of the network connecting Dian and the Central Plains and may have received Han immigrants as well. It is noteworthy, however, that even the Eastern Han graves at Yangfutou are not Han brick graves but have the form of traditional Dian graves: east-west oriented rectangular shaft graves, albeit with burial mounds above and exclusively Han-style objects inside. Similarly, in Zhaotong both brick tombs and cliff burials continue to appear side-by-side (Zhongguo and Yunnan 2001). This poses the question if these graves belong to Han immigrants who have been buried with Han items but in local-style graves – as this was supposedly what the local “undertakers” were accustomed to provide – or if they were locals adopting the whole range of Han grave goods.

While for most of the western Han period only few graves contain any Han objects, more Han items appear from the 1st c. BC onward to become rather common from the early eastern Han and including not just lacquer, iron, and bronze objects as before, but also ceramic models. From the middle eastern Han onward, north-south aligned brick graves and rock-cut tombs emerge, the earlier ones still in the form of vertical pits, but the later ones consisting of several chambers and ramps as common in the Central Plains (Yang Yong 2011:325-9). They also begin to appear over a much wider area, intruding further north and west into the Hengduan mountains. For the Eastern Han, over 400 mounded brick tombs at over 70 burial grounds have been recorded for northern and central Yunnan (Zhongguo and Yunnan 2001). The Han graves usually are located at some distance from the local graves but often within the same cemetery as seen at Yangfutou. In some cases, there are even burial mounds and stele identifying the tomb occupant as Han (Yang Fan et al. 2010; Yunnansheng 1999:408-9). Following Han customs, these graves usually contain single primary interments in single or double wooden coffins and bronze sacrificial vessels such as *ding* tripods, various types of cauldrons, *hu* wine jars, mirrors, belt hooks, incense burners, lamps, eared cups, various types of lacquer items and grey fine ware ceramics, ceramic models of domestic or agricultural scenes (stoves, wells, fields, houses, domestic animals), and sometimes small jade or gold items (**Fig. 4**).

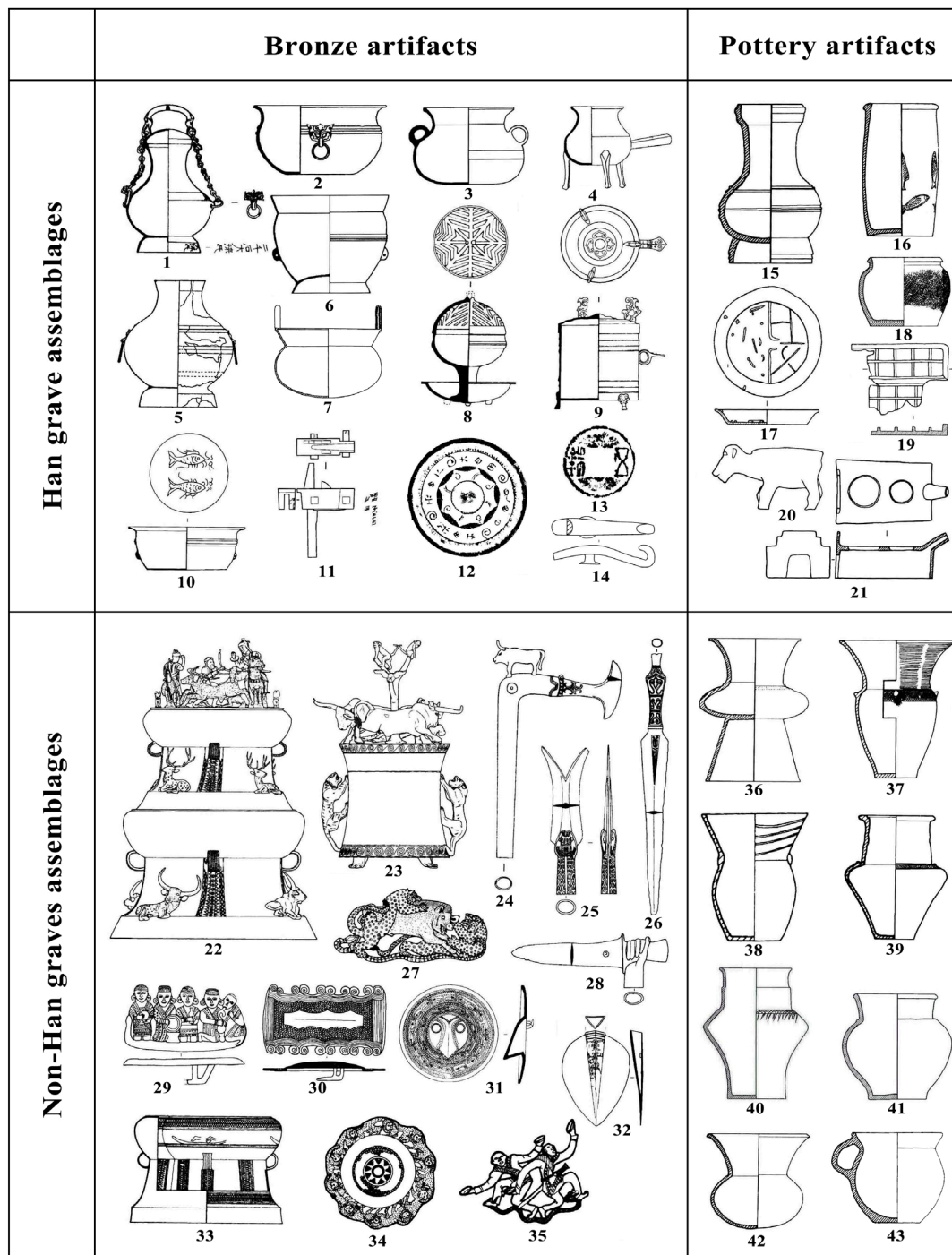


Fig. 4. Han-style and local-style objects from Yunnan:

A. Han-style bronze artifacts (top left): 1., 5. hu jars (Xiaosongshan, Chenggong; Shizhaishan, Jinning); 2. xi basin (Shizhaishan, Jinning); 3. mou cauldron (Yangfutou, Kunming); 4. jiaodou heating implement (Lijiashan, Jingchuan); 6. steamer basket (Yangfutou, Kunming); 7. fu cauldron (Shamaoshan, Yiliang); 8. incense burner (Lijiashan, Jiangchuan); 9. zhi container (Lijiashan, Jiangchuan); 10. xi basin (Yangfutou, Kunming); 11. crossbow mechanism (Lijiashan, Jiangchuan); 12. mirror (Xueguanbao, Luliang); 13. wuzhu coin (Shamaoshan, Yiliang); 14. belt hook (Jinlianshan, Chengjiang);

B. Han-style ceramic objects (top right): 15. hu jars (Yangfutou, Kunming); 16. well model (Yangfutou, Kunming); 17., 19. paddy field model (Yangfutou, Kunming);

Lihuacun, Songming); 18. *guan jar (Muyi, Guangnan)*; 20. *cattle figure (Yangfutou, Kunming)*; 21. *oven model (Yangfutou, Kunming)*;
 C. *Local-style bronze objects (bottom left)*: 22., 23. *cowrie shell containers (Shizhaishan, Jinning)*; 24. *yue battle axe (Lijiashan, Jiangchuan)*; 25. *forked implement (Lijiashan, Jiangchuan)*; 26. *sword (Lijiashan, Jiangchuan)*; 27., 29., 30., 31., 34., 35. *belt buckles (Shizhaishan, Jinning; Yangfutou, Kunming)*; 28. *ge dagger axe (Lijiashan, Jiangchuan)*; 32. *hoe (Shizhaishan, Jinning)*;
 D. *Local-style ceramic objects (bottom right)*: 36.-38. *zun vessels (Yangfutou, Kunming; Wutaishan, Kunming)*; 39.-41., 43. *guan jar (Xueguanbao, Luliang; Yangfutou, Kunming; Shamaoshan, Yiliang)*.

As Yang Yong (2011:366) has pointed out, these Han-style graves in Yunnan show certain local particularities such as the shallow grave pits, the large number of bronzes – possibly emulating local customs – clay models in the form of local style stilt houses, rice paddies, and ponds, and also some local object forms such as *fu* cauldrons of ceramic and bronze and some ceramics with local impressed patterns. While at first there is still a clear difference between these graves and local-style earth-pit graves with only a few Han-style items, local and foreign graves finally become indistinguishable, turning into “no more than regional variants of the metropolitan culture present in central and northern China at the time” (Allard 2005:234).

Most of the evidence discussed so far comes from elite burials while lower levels of society are severely underrepresented, not only because fieldwork has focused on large graves and elite cemeteries, but also because the lowest ranks of society seem to have been buried without any burial goods, making the graves difficult to date (Yang Yong 2011). Survey and excavation work conducted at settlement sites in recent years has provided an additional window onto past communities as a whole in daily life.

2.2.2 The World of the Livings: Settlements

In terms of settlement patterns, recent surveys suggest that large domestic sites existed in the central lake region by the second half of the 1st mill. BC, but there is no evidence for large defensive works, walls, or palace-type architecture as one might expect based on the lavish burials. What has been found are various types of wooden house structures, stone tool and paleobotanical remains pointing at a wide variety in subsistence systems, and in some cases evidence for metal production. Several prehistoric shell middens have been identified near Lake Dian, for instance at Wangjiadun, an early Bronze Age site characterized by stilt houses as well as crudely made copper artefacts and slag (Li and Wang 1983; Murowchick 1989:97-8). Citongguan, a deeply-layered habitation site furnishing post holes, refuse pits, a well, ceramics, and copper slag indicate both habitation and metal production activities from the 1st mill. BC into the Eastern Han, as Han coins suggest (Allard 1999:81; Yunnansheng et al. 2006). Hejiashan, located at the pass between Lakes Dian and Erhai, likewise held metal working remains (Zhang Zengqi 2000:49). Another possible bronze production site was observed at 10 km distance from the Han period copper mine of Jiudingshan (Zhang Zengqi 2000). Near Kunming, the site of Yubeidi revealed a considerable number of copper ore, slag, and other bronze smelting remains among 15 semi-subterranean houses, 49 trash pits, six urn-burials, and a number of ceramics, stone, and metal objects that await further analysis and publication (Yang Wei 2016). Bronze production thus occurred locally at a number of sites, likely in small-scale undertakings rather than a centralized system of metal working. The close proximity to a Han period copper mine begs the question who controlled the access to metal and

metal production at the time and how far the Han government and its officials were involved. Considering the in the beginning likely rather nominal control of the region, it is not unlikely that the Han officials mainly tried to extract taxes without necessarily getting involved in metal production on the ground. This may have changed during later periods, though.

In the Dian basin, a major complex of Bronze Age settlement sites has been observed around Hebosuo, i.e., in close proximity to the Shizhaishan cemetery and in the immediate vicinity of Lake Dian (Yao and Jiang 2012). The largest site, Hebosuo itself measures about 31 ha in size, and was surrounded by 16 sites falling into two categories of 4-10 ha and below 2 ha (Yunnansheng and Meiguo 2012). A secondary, smaller (4 ha) center was identified at Gucheng toward the Northeast, likewise close to a cemetery, and surrounded by a number of smaller settlements in the vicinity. All sites rested on stratified shell deposits, probably aimed at making the wetland habitable (Yao and Jiang 2012:365) and contained archaeobotanical evidence indicating a wetland habitat and cultivation of rice, millet, and wheat, and also some evidence for metal and stone working. One of the smaller Bronze Age sites located about 300 m north of Shizhaishan, Xiaopingshan, measuring only about 300 by 500 m but consisting of five cultural layers with large amounts of local brown-black and red pottery, stone tools, a number of ash pits, and two house foundations, one a semi-subterranean structure, the other constructed above ground, possibly on stilts (Yunnansheng and Jinningxian 2009). Excavations at Xueshan, a site which is very close to the Jinlianshan cemetery, revealed ceramic assemblage in its Bronze Age layers, two house foundations, one a semi-subterranean structure, the other a stilt house, both associated with ceramics resembling the Shizhaishan-type remains found in the Jinlianshan graves as well as a bronze arrowhead of the same style and period (Jilin et al. 2010). Outside the Dian basin, Shihudui and Luofeng have been identified as major Bronze Age occupation centers connected with Yangfutou, but excavation work and detailed reports are still outstanding (Yunnan et al. 2005:862). For the mountainous parts of western Yunnan, both archaeological and historical sources suggest that they were inhabited by various groups engaged in pastoralism or mixed form of subsistence in contrast to the settled agricultural communities of the central lake region (Sun and Xiong 1983:14; Watson 1993: 2:253-8; Yao 2010:226). For the Han, a low-land people, the Dian Basin was one of the few places in the high-altitude mountains of Yunnan that provided a level ground, climate, and soil and water profile attractive to and manageable for them, and people that they could relate to, i.e., settled agriculturalists (Sage 1992:191; Yao 2016:190).

In terms of Han occupation, from the 1st c. BC onward large settlements with rammed-earth walls and single- and multi-storied mud-brick buildings covered with Han clay roof tiles reflecting Han building techniques, emerged in the Dian and Qijing basins, mirroring the increasing Han incursion into the region seen in textual accounts. Nevertheless, clay models depicting stilt houses found in some of the eastern Han graves indicate that local house structures continued to be present. In the Dian Basin the 61 ha site of Jincheng is most noteworthy, both for its size and large number of Han roof tiles, but also for its location, not close to the lake like earlier settlements, but at the very edge of the flood plain in the foot hills (Yao and Jiang 2012). It has been suggested that Jincheng may even have been the center of Yizhou which replaced the former Dian capital at Hebosuo as political center after the Han conquest (Yao 2016:187). The location potentially having been chosen for its easier defensibility in times of upheavals (Yao and Jing 2012:364) or for better access to long-distance exchange networks. Another 13 Han sites have been documented in the vicinity, again

falling into two size clusters of 4-10 ha and below 2 ha.

Systematic settlement surveys are still outstanding for the areas outside the central lake region. For the Qujing Valley, it has been shown that the Han period settlements are spaced at 10-16 km distance all along the valley close to the main river, similar to the placement of garrisons on the northern Han frontier aimed at organizing frontier populations (Yao 2016:189), however, the exact date of the sites in Qujing are still debated and it is therefore not sure if they were concurrently occupied or what kind of settlement structures and subsistence practices were prevalent here.

2.2.3 Human-Environment Relations: Subsistence Practices and Deforestation

Recent archaeobotanical research has shown that there is some variety in subsistence patterns between sites even within the central lake regions in spite of general developmental trends. In a summary study, Li Haiming et al. (2016) have suggested that on there were three phases of agricultural development on the Yunnan-Guizhou plateau: rice cultivation from 4800-3900 cal. BP (ca. 2840-1940 BC), mixed rice and both foxtail and broomcorn millet 3900-3400 cal. BP (ca. 1940-1440 BC), and mixed rice, millet, and wheat cultivation 3400-2300 cal. BP (ca. 1440-340 BC), but this is not the whole story. At Haimenkou, a deeply-layered site dating from the Neolithic to the Bronze Age (ca. 2000-500 BC), people experimented with a number of different crops, soon finding out that in the western mountains, rice was not a reliable food source (Jin 2014; d'Alpoim Guedes 2013). Although they eventually turned to wheat as an important staple, a variety of crop and non-crop plants and gathered foods remained important for diversification and protection against crop failure. Similarly, zooarchaeological research suggest a mixed reliance on wild and domestic animals; however, in Yunnan, this type of research is still in its infancy and further work is needed before general assessments can be made.

In the Dian basin, climate and altitude are much more conducive to rice agriculture, but also here diversification seems to have been the most common subsistence strategy up to the advent of the Han and beyond. In the Neolithic, rice and foxtail millet were used in mixed cropping, from the early Bronze Age onward supplemented by soybean and small amounts of wheat (e.g., Hebosuo, Yubeidi); the middle to late Bronze Age witnessed a switch to foxtail millet and wheat mixed cropping, always accompanied by wild fruits, nuts, and other gathered plants, but also soy bean, buckwheat, and hemp for the later periods (Yang Wei 2016). There is some locational variation to this pattern, though. People at Xueshan, for instance, relied mostly on wheat, while rice, foxtail and broomcorn millet, buckwheat, soy beans, and fruits were of only secondary importance (Jilin 2010; Wang 2014; Yang Wei 2016). Considering that the site is located in the central lake basin, planting rice would not have been a problem, but for some reason wheat – at that time a new, exotic, but also hardy grain – held more attraction.

For later periods, it is generally assumed that the arrival of the Han lead to an intensification of rice cultivation and building activities that should be visible in pollen profiles. Historical sources claim that the Han constructed irrigation systems and introduced terracing in AD 19 (Sun and Xiong 1983:249), leading to an intensification of agriculture. Environmental research around Lake Erhai has shown a decline in arboreal taxa coupled with an increase in grasses already from the 5th mill. BC (Dearing 2008; Shen et al 2006; Sun et al. 1986). Over the following millennia, secondary pine forest expanded, which has been interpreted as the outcome of shifting agriculture (Shen et a. 2006). Various clearance phases have been identified through a rapid decline

in pine forests especially from 180 BC, so only slightly before the Han took Dian. At the same time, deciduous trees increase, suggesting the development of large-scale grazing and/or the expansion of settlements, with deciduous trees planted around settlements for fuel and construction material (Shen et al. 2006:275-6). This phenomenon of deforestation followed by erosion was not limited to the Dian Basin but extended throughout the lower-elevation river valleys of northern and central Yunnan (Whitmore et al. 1994). The most severe decline in pine coupled with an increase in large *Poaceae* grains suggesting wide-spread cereal production occurs only in the 9th c. AD. Erosion sets in only in the 5th or 6th c. AD, intensifying 15-fold around the 10th c. AD (Whitmore et al. 1994), probably due to the establishment of a major administrative center at Dali around 900 AD.

Considering the early onset of some levels of forest clearing and the relatively late date of massive damage to the local environment, the intensification of agriculture and building of larger settlements after 109 BC were not the only cause or even the main turning point. Forest clearing started already during the Neolithic, more intensively during the Bronze Age – possibly also to obtain fuel for an increasing local metal production. It then accelerated just prior to the arrival of the Han when Dian graves were at their most lavish, requiring bronzes and agricultural production surplus. Furthermore, the – at first rather nominal – establishment of political supremacy of the Han in Yunnan would not have led to an immediate change in vegetation, but these changes seem to have been caused by a number of different factors and people, both local and foreign, over a longer period.

3. The Shamaoshan Cemetery

3.1. Geographic background

The Shamaoshan cemetery is located east of Lake Yangzong at the edge of the central lake basin, at an altitude of 1780 m asl. The region is part of a subtropical humid monsoon climate zone. The climate is dry with little rainfall in Spring and Winter, and humid with rainy in Summer and Fall. The average annual temperature is 16.3°C and annual precipitation measures 898.9 mm. In the central Yunnan Basin, the Dian and Fuxian Lakes are surrounded by a complex geological structure dominated by magmatism and metamorphism. The bed rock of Shamaoshan cemetery consists of Paleozoic sandstone, shale and mudstone (**Fig. 5**).

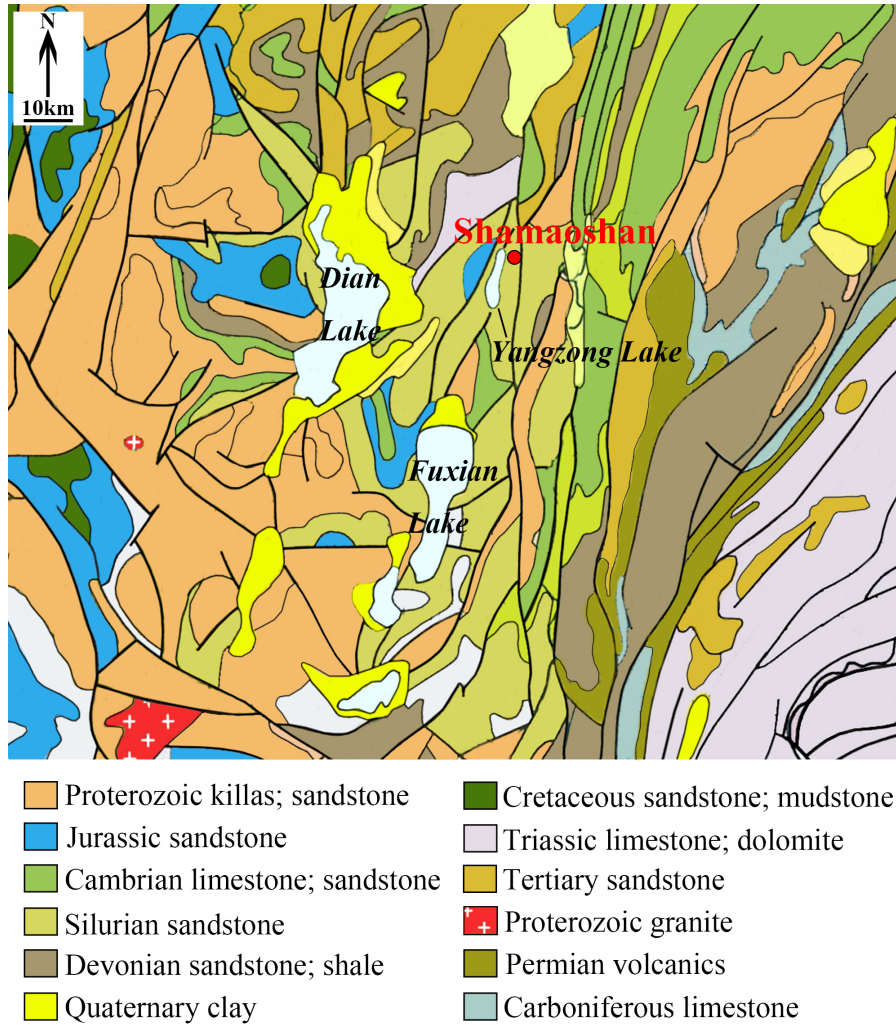


Fig. 5 Geological Map of Central Yunnan

3.2. The Cemetery

Fifty-seven burials were excavated at Shaomaoshan cemetery, spanning a time period of BC 250-55 according to the four available ^{14}C dates, coincident with the historical period from Late Warring States to Late Western Han Dynasty according to Central Plains chronology (Yunnansheng et al. 2012). Based on stratigraphic evidence, artifact typology, and ^{14}C dates, the burials were divided into four phases and six sub-phases dated between the 3rd c. BC and the 1st c. AD (Yunnansheng et al. 2012:365-6), the cemetery growing over time from northeast to southwest (**Fig. 6**).

3.2.1 Grave and Cemetery Layout

They are all shaft-pit graves, oriented roughly in Northeast-Southwest direction (mostly $310\text{-}320^\circ$), with measurements of mostly 2-2.5 by 0.8-1.2 m and depth of mostly 1-2 m (**Tab. 1**). There was a certain range in measurements, though, the southern graves being somewhat larger with length of up to 3.2, width of up to 1.9, and depth of up to 2.6 m, while the smallest graves measured but 1.4 m in length, 0.4 m in width, and 1 m in depth, however, no clear size classes could be distinguished. The graves in the southern part of the site tend to be deeper than those in the north. Ten graves additionally had one or two pits in the waist or foot area, and four had a second-level ledge (**Appendix II**).

	Volume	Area	Depth	Width bottom	Length bottom	Width top	Length top
Mean	3.54	8.50	1.66	0.93	2.11	0.99	2.28
Standard Error	0.25	0.51	0.05	0.04	0.05	0.04	0.06
Median	3.16	8.37	1.60	0.90	2.18	1.00	2.20
Mode	2.38	5.94	1.40	0.80	2.20	0.80	2.20
Standard Deviation	1.63	3.29	0.34	0.23	0.35	0.27	0.38
Range	8.47	19.92	1.60	1.40	1.80	1.50	1.75
Minimum	0.34	0.80	1.00	0.40	1.40	0.40	1.45
Maximum	8.81	20.72	2.60	1.80	3.20	1.90	3.20
Number	42.00	42.00	42.00	41.00	41.00	42.00	42.00
Confidence Coefficient	0.51	1.03	0.11	0.07	0.11	0.08	0.12

Tab. 1 Basic Statistics of Grave Measurements

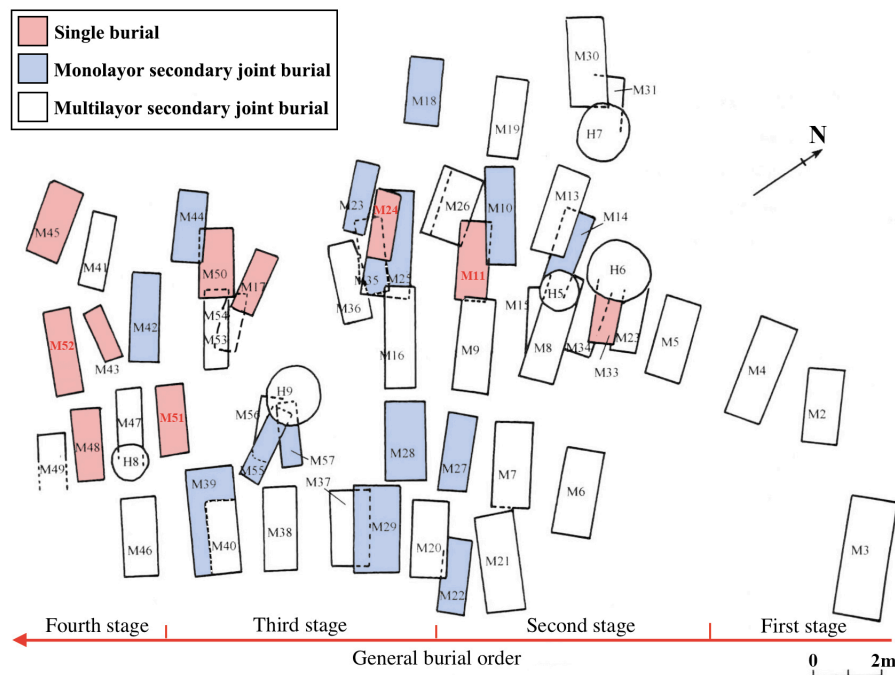


Fig. 6 Layout of the Shamaoshan Cemetery.

3.2.2 Interment Customs

As preservation conditions were favorable, different interment types could be distinguished: single, twin, and multiple interment, either primary or secondary, and three graves without any human bones (M15, M34, M36). Single interments are few in the early phases and increase gradually over time. Various types of secondary joint burials are most common throughout the Shamaoshan Cemetery, including monolayer group burials and multilayer group burials, usually combining primary and secondary interments in several layers being separated from each other by layers of soil. For example, grave M3 held 16 individuals which were separated into three layers, the

topmost layer holding three primary and three secondary interments, the second eight and the third two primary crouched interments (**Fig. 7**). Males and females are about equally well-represented but there are more adult than juvenile or infant skeletons, suggesting that not the whole population of one settlement was buried here but preferentially adult and mature individuals (**Appendix I; Appendix III**).

Tab. 2 Interment Types at Shamaoshan

Interment category	Cases	Percentage	Subcategory	Cases	Percentage
Single interments	10	20.41%			
Group interments	17	34.69%	secondary interment	5	29.41%
			primary and secondary interment	12	70.59%
Multilayer group interments	22	44.90%	2 layers	6	27.27%
			3 layers	10	45.45%
			4 layers	4	18.18%
			5 layers	1	4.55%
			6 layers	1	4.55%

There is no notable differentiation in treatment between the sexes or ages. Single interments tend to be in extended supine position. Group burials fall into several categories: secondary interment of 2-7 people, and combined primary and secondary interment of 2-8 people with the primary interment usually being in extended supine position. The multilayer group burials – usually 2-4-layered and more rarely 5-6-layered – all combine primary and secondary interments (**Tab. 2**). There is no clear correlation between age, sex, interment practice, and number or type of objects interred (**Appendix II**), however, the earliest graves tend to be multilayer burials, holding mostly secondary interment, while secondary group interments are most common in the second and third, and an increase of primary interments from Phase 3 into Phase 4.

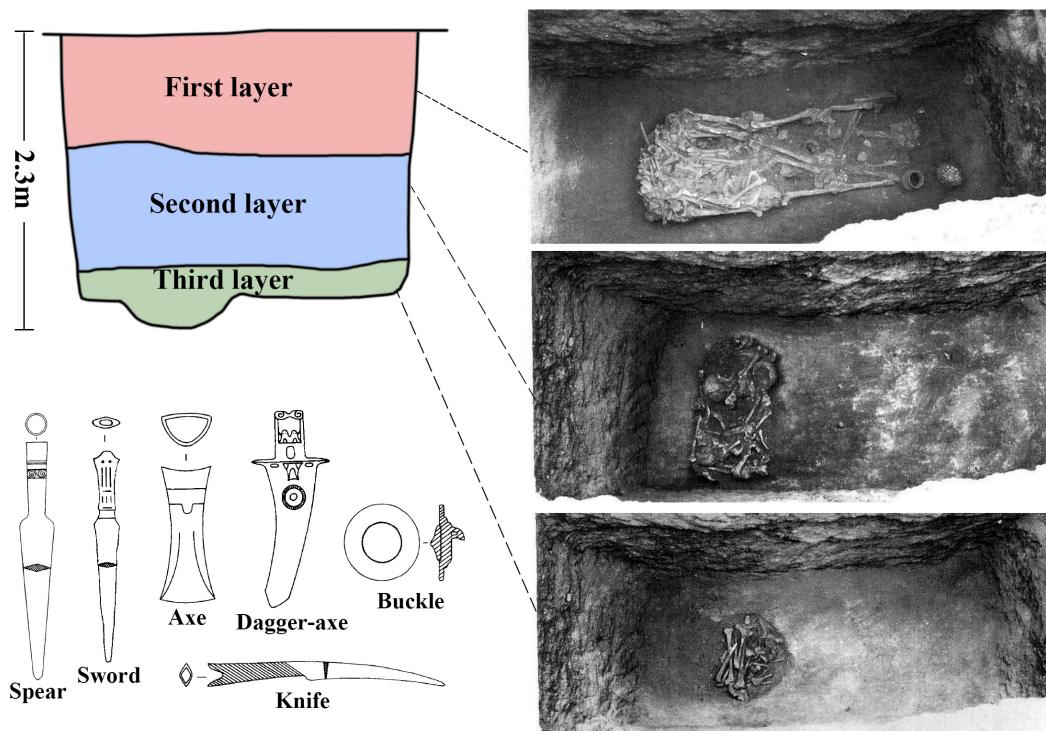


Fig. 7 Profile, Photos of the Three Layers, and Bronze Objects in grave M3

3.2.3 Grave Goods

Grave goods in the Shamaoshan burials are much less numerous than at Shizhaishan and Lijiashan and mainly consist of undecorated or minimally ornamented bronze tools and weapons (**Fig. 7**). The objects retrieved from the graves at Shamaoshan nevertheless comprise over 600 metal items, mostly bronze but also some composite and iron items, including weapons, tools, ornaments, *wuzhu* coins, *fu* cauldrons, small *ling* bells, and other items (**Appendix II; Tab. 3**). While metal ornaments and weapons are more numerous than any other type of items – at least when beads, shells, and coins are not counted individually but as item groups – ceramics are considerably more common here than in most other known contemporary cemeteries in Yunnan. It is mainly yellow coarse ware with small amounts of black and brown objects and a few fine ware items, over 70% undecorated, the others bearing incisions, corded ware, appliqué, or leaf-impressions (Yunnansheng et al. 2012: Tab. 2-3).

Tab. 3. Number of Burial Objects at Shamaoshan by Type

Objects	Number	Percentage	No. adjusted	% adjusted
Ceramic vessels	87	2.93%	87	18.91%
Spindle whorls	28	0.94%	28	6.09%
Stone tools	14	0.47%	14	3.04%
Bronze weapons	93	3.13%	93	20.22%
Iron weapons	13	0.44%	13	2.83%
Composite weapons	15	0.51%	15	3.26%
Metal ornaments	146	4.92%	146	31.74%
Beads	1207	40.64%	7	1.52%

Cowrie shells	1004	33.80%	25	5.43%
Snail shells	18	0.61%	17	3.70%
Coins	339	11.41%	9	1.96%
Jade pieces	5	0.17%	5	1.09%
Iron pieces	1	0.03%	1	0.22%
<i>SUM</i>	<i>2970</i>	<i>100.00%</i>	<i>460</i>	<i>100.00%</i>
Metal weapons/tools	Number	Percentage		
<i>ge</i> halberds	3	3.03%		
swords	4	4.04%		
spear heads	8	8.08%		
arrow heads	58	58.59%		
spear handles	3	3.03%		
armor	4	4.04%		
axes	8	8.08%		
pairing knives	5	5.05%		
chisel	1	1.01%		
spades	3	3.03%		
sickles	2	2.02%		
<i>SUM</i>	<i>99</i>	<i>100.00%</i>		
Other metal objects	Number	Percentage		
buttons	24	15.79%		
belt hooks	3	1.97%		
bracelets	120	78.95%		
<i>fu</i> cauldron	1	0.66%		
ling bell	3	1.97%		
plate	1	0.66%		
<i>SUM</i>	<i>152</i>	<i>100.00%</i>		

A number of graves are noteworthy for their larger number of objects, especially M1, which stands out as holding nearly 2000 objects, most of them large numbers of beads and cowries, but also 114 metal ornaments, a number of bronze weapons, loom weights and 6 ceramic vessels accompanying 10 people. M1 furthermore is the largest grave by far, has a waist pit, and is the only grave containing cow bones. Additionally, the grave is located on top of the mountain instead of on its slope. A group of graves containing over 50 items (M3, M4, M6, M17, M22, M30) vary in size and number of interments, but the majority of them hold several skeletons and a considerable number of shells and beads as well as metal weapons and ornaments. Exceptions are M22 – noteworthy for its 146 *wuzhu* coins, *fu* cauldron, iron and bronze weapons, but lacking shells, of moderate size and containing 3 skeletons in a single layer – and M17 –

likewise containing a considerable number of *wuzhu* coins, bronze and composite weapons, and only a small number of shells, associated with but one single skeleton, likewise in a small grave. Five graves contained no objects at all, but they were disturbed and may have held objects at some point. The majority of graves hold around 1-10 items (26 graves), some 11-20 (10) or 21-38 (9), all in medium to small-sized graves with varying numbers of skeletons and interment layers.

Overall, the main characteristics of Shamaoshan are thus a general Northeast-Southwest orientation of the graves, medium to small-sized rectangular pit graves without access ramp, burial mound, or grave furniture, in primary interments a propensity of extended supine burials with some crouched interments and a considerable number of joint primary and secondary single- and multilayer burials. Tools and objects of everyday life are most common, especially in the form of ceramics, but also bronze, iron, and stone. Among bronze objects, weapons and ornaments are the most common, but the latter are concentrated in a small number of graves. Phase 1 (4th-3rd c. BC) and Phase 2 (3rd c. BC) burials are dominated by high-necked ceramic vessels, and various types of bronze weapons; Phases 3 (2nd c. BC) and 4 (early to mid-1st c. BC) are dominated by short-stemmed bowls, wide-mouthed and single-handled jars, and a number of bronze tools; and from Phase 5 (late 1st c. BC – 1st c. AD) onward, iron and composite weapons emerge. While the general line of development in terms of the change in types of metal objects over time is common to most contemporary cemeteries in central Yunnan, the dominance of ceramics is not, nor are the multilayer group interments.

3.3 Shamaoshan in its Regional Context

While primary and secondary single and small-group interments seem to be the norm at Dian cemeteries, multilayer burials are considerably less common. At present it is unclear if this is indeed an inter-site difference in burial customs or the result of unfavorable preservation or insufficiently careful early excavations. At Shizhaishan, for instance, excavations conducted in the early 2000s revealed three multilayer burials (M54, M81, M83) among 91 graves, so only 3.4% as opposed to 83 (95.4%) extended supine single interments, but in many cases preservation conditions were too poor to ascertain the number and placement of the interred (Yunnansheng et al. 2009). At Yangfutou, 40 cases out of 671 graves were multilayer interment, so a much larger number but only 4.9% as compared to 82.8% single interments (Yunnansheng et al. 2005; Jiang 2013: Tab. 7.10). Lijiashan held a small number of secondary and group interments, but no multilayer burials, however, the site was excavated in 1972 and preservation conditions were not favorable to bone.

At Jinlianshan, a cemetery with considerably less well-equipped graves, 66 out of 284 graves, i.e., 16.9% were multilayer interments, 52 (13.3%) group interments, and 166 (42.6%) single interments (Jiang and Wu 2011; Jiang 2013: Tab. 6.1-3, Yunnansheng et al. 2011). The percentage at Shamaoshan is even higher, 38.6% (i.e., 22 graves). The two sites are fairly similar in other respects as well, showing a complex combination of primary and secondary single and group interments in the various layers of graves of a fairly similar size range and form, mostly oriented in NE-SW direction. They are similar in the range and type of metal objects as well (Yunnansheng et al. 2011), form types they share with other contemporary graves in Yunnan, but with a larger percentage of tools and without the highly decorated drums, cowrie shell containers, weapons, and three-dimensional figures for which Shizhaishan and Lijiashan are famous. All sites share the presence of cowrie shells in their largest

graves, though, and the basic grave form (earth-pit or rock-cut graves) and orientation as well as the presence of wooden coffins in many of them.

Shamaoshan and Jinlianshan are thus more similar to each other than they are to the larger sites, but they differ from each other in a couple of points as well. Jinlianshan, for instance, lacks *wuzhu* coins, although belt hooks, various iron and composite objects, and a stone seal with what might be Chinese characters (the lower of the two looks like *yu* 魚 but they may be a copy by sight without actual literacy) clearly show a connection with the Han. Another notable difference is the considerable number of ceramic vessels and loom weights at Shamaoshan, items that are all but absent from Jinlianshan. In that respect, Shamaoshan is much more similar to Yangfutou, which is known for its many ceramics that come second in number only to bronzes, followed by lacquer, gold, and jade. The ceramics from both sites resemble each other in quality as well as in certain ceramic forms (high-necked vessels, cauldron forms, large round-bottomed closed bowls, and the single-handled jars with leaf impressions on the bottom). Other forms, however, are not shared (jars with trumpet-shaped openings, some with corded-ware decoration, red-painted wares, *zun* vessels, and high-stemmed bowls at Yangfutou; round-bottomed single-handled vessels, short-stemmed bowls, incised designs, and a considerable number of loom weights at Shamaoshan). Noteworthy among the commonalities is the leaf-impressed handled jar (Yunnansheng et al. 2012: Fig. 42 and 46; Yunnansheng et al. 2001: Fig. 43.8), very rare at Yangfutou, with a few more examples at Shamaoshan, but extremely common in the southern part of the Hengduan mountain range, especially in stone-cist and megalithic graves (Hein 2014 and 2017). At Shamaoshan, the short-stemmed bowls, round-bodied jars with constricted neck, and low straight-rimmed jars (Yunnansheng et al. 2012: Fig. 40.7-10, fig. 29.5) appearing in Phase 3 likewise find their closest parallels in stone-cist graves in Sichuan (Aba et al. 1987), not in the local Neolithic or the sites in Yunnan.

In terms of both grave forms and assemblages, a number of other sites show parallels to Shamaoshan as well. The graves at Shibeicun, Tianzimidiao, Taijishan, Datuanshan, Tuanshan, Wutaishan, and Xueguanbao are mostly of medium and small size like those at Shamaoshan. Shibeicun furnished high-quality, nicely decorated bronze weapons and tools very similar to finds from Lijiashan and Shizhaishan, but only 0-10 objects per grave (2-3 on average), metal tools being in the majority, followed by metal weapons, some ornaments, ceramic net weights, but no ceramic vessels; Han-style iron and composite items are present in the later graves, but always accompanied by local-style objects (Kunmingshi 1984; Yunnansheng 1980). The assemblages at Tuanshan are similar, but without Han-style items, suggesting an earlier date, likely 5th to 4th c. BC (Yunnansheng 1983b). At Tianzimidiao the local-style bronze weapons and tools in the small-sized graves are of high quality, elaborately decorated, but without any of the three-dimensional additions or special forms the largest grave at the site (M41) holds (Kunmingshi 1985).² Similar to Shamaoshan, most graves at Tianzimidiao (excluding M41) hold 2-10 objects, a very few up to 100, some with just 1-2 ceramic vessels or loom weights, all in forms largely identical to Yangfutou, even including a leaf-impressed vessel bottom, but no Han-style items.

² M41 is similar in form and object assemblage to medium-sized graves at Shizhaishan, Lijiashan, or Yangfutou, holding over 1000 objects including elaborate weapons, a drum, lacquer ware, turquoise and agate beads, cowrie shells, and other special items. The grave has been dated typologically between the 4th and 2nd c. BC.

Taijishan – likewise consisting of a number of modestly-equipped burials holding metal weapons/tools and/or ceramics – stands somewhere between Shamaoshan on the one hand and Yangfutou and Tianzimiao on the other, the ceramics being a combination of types from both sites and the metal objects more moderately or not at all decorated, but with no clear Han-style items present (Yunnansheng 1965). Datuanshan (Yunnansheng 1982 and 1983a), Wutaishan (Yunnansheng 1984), and especially Xueguanbao (Zhongguo et al. 2015), on the other hand, bear close resemblance to Shamaoshan in grave size, orientation, and content (ceramic types, metal forms and quality). Like at Shamaoshan, some Xueguanbao graves held Han objects, including bronze mirrors, belt hooks, various iron and composite objects, a large number of *wuzhu* coins, and even a bronze seal with squiggles on the surface, likely trying to imitate Chinese characters without literacy, thus reminding of the Jinlianshan stone seal. The ceramics at Xueguanbao combine forms characteristic of Shamaoshan (e.g., low-footed bowls) with forms seen at Yangfutou and other sites (e.g., high-footed bowls), and items common to both sites, but combined with bronze objects of lower quality and less elaborate design than at Yangfutou but more similar to the Shamaoshan assemblages.

Chronologically speaking, what the excavators call the Shamaoshan Phase 1 bronze items are most closely related to the more modest items at Shizhaishan or Lijiashan; Phase 2 bronze weapons resemble items from Shibeicun Phase II, and the ceramics find close parallels in Tuanshan and Wutaishan; from Phase 4 onward, a number of Han-style items appear, including a large number of *wuzhu* coins, iron and composite weapons, belt hooks, and a *fu* cauldron; Phase 5 holds a number of *wuzhu* coins dating to the time of emperors Zhao (87-74 BC), Xuan (74-49), and Yuan (49-33 BC), providing a secure *terminus post quem* of the 1st c. BC for the last phase of the site as well as clear evidence of increasingly closer connections with the Han in the post annexation period.

In their overall assemblage and burial customs throughout all phases, the Shamaoshan grave assemblages are most similar to those at Jinlianshan (Jiang and Wu 2011) and Xueguanbao (Zhongguo et al. 2015). These connections are of especially intriguing when seen in the geographic context; Shamaoshan is located more or less at the mid-point between Jinlianshan and Xueguanbao, at the northeastern edge of the central lakes region and thus very close to the mountains of Qujing, where Xueguanbao can be found. By mere distance, it is much closer to Yangfutou, Tianzimiao, and Shibeicun (all clustered together at the northeastern edge of Lake Erhai) than to either of the other sites. As Yao (2016:143-163) has shown, located in between the Dian and the Chengdu basins as well as the middle Yangzi, the Qujing Valley and its inhabitants became crucial in local and supra-local exchange relations, both with Sichuan and with the encroaching Han. Shamaoshan may thus have been a node in this network connecting the Dian basin with the outside world.

A further site that needs to be discussed here is Mayutian (5th -4th c. BC), one of the few sites in southwest China where isotope analysis has been conducted. It is located outside of the main study area of this paper, about 260 km south of Kunming but less than 100 km north of the border to Vietnam and therefore potentially on an access route toward Southeast Asia (Yunnansheng et al. 2013). The site holds modestly-equipped rectangular shaft-pit tombs with single interments accompanied by at most one round-bodied ceramic cauldrons similar to finds at Shamaoshan, and on occasion a single stone tool or a simple bronze weapon or tool. The latter show some similarities with assemblages found in other parts of southern Yunnan and northern Vietnam, but

the connections with the central lake region are remote in terms of object assemblages. Isotope analysis suggests that most of the individuals in the graves were locals living of a mixture of C3 and C4 resources, but the individual occupying the largest and richest grave, M12, was clearly non-local – potentially from the Emeishan basalt region north of Dali – but had lived in the Mayutian region for an extended period of time (Zhang et al. 2014). The burial custom is nevertheless clearly local, showing that the absence of foreign goods or customs cannot be taken to prove a local origin of the individual thus interred – but maybe they can suggest local acculturation or full acceptance by the locals at least, especially considering the comparatively lavish equipment of one ceramic vessel and five bronze items (arrowhead, spear, axe, and hoe).

3.4 Human Bones at Shamaoshan

The good preservation of the human bones allowed for a number of direct observations (Yunnansheng et al. 2012). For 25 skeletons, deliberate extraction of the two upper front teeth could be discerned, a not identified at any other site in Yunnan. Eight individuals from six graves had been injured, four by arrows and six by blunt trauma which may have been fatal, suggesting that they may have died in armed conflict or were killed as grave offerings.

In terms of health, tooth decay is common, suggesting a considerable proportion of starchy foods in their diet. Signs for bone disease have been identified as well such as hyperostosis and rheumatism which are both rather common, likely caused by exhausting physical labor and/or the damp climate and living conditions in semi-subterranean or stilt houses close to the water.

To gain further insights into differences in both dietary patterns and place of origin of various individuals, we conducted isotope analysis. Only very few high-quality human remains were available for sampling, but we aimed at choosing graves covering the range of measurements (excluding the largest and the two smallest which for which no suitable samples were available) and burial treatments. We extracted enamel samples from 18 human teeth from 18 different individuals. Samples were taken from four single interments (M11, M24, M51, M52), 4 layered interments (M3, M5 (2 samples), M6, M30 (2 samples)), and 3 single-layered multiple interments (M22, M28 (5 samples), M57 (2 samples)) (**Appendix III**). Male and female specimens in the age range from 14 to 45 were sampled, the majority being in the adult to mature age range. We furthermore ensured that the whole range of object types was represented in the graves chosen for sampling, including also two graves that held no objects (M51, M57).

Three of the chosen graves are remarkable for the inclusion of large amounts of cowrie shells (M3, M5, M6) combined with a few ceramics and up to 15 bronze weapons resembling finds from Shizhaishan and Lijiashan but no iron objects. These also happen to be some of the largest graves among those sampled with the largest number of objects (when counting coins as batches, not single items), though not the largest or most richly equipped in the site and rather modest in comparison to graves at Shizhaishan, for instance. Likewise noteworthy are M22 with its 145 *wuzhu* coins and three iron weapons in a three-person interment, and M30 with its five composite weapon and considerable number of ornaments in the form of beads of semi-precious stone and bronze buttons and bracelets. Of the vessel types with potential connections to the stone-cist graves in Sichuan, short-stemmed bowls occur in M28 and M52 and M52 holds a jar with constricted neck and outward-curving rim. Single-handled round-bottomed jars of distinct local flavor were found in M6 and M22.

4. Multi-isotope Analysis on Tooth Enamel

4.1 Methodological Background

Dental enamel is the most highly mineralized substance in the human body (ca. 96% mineral) and is comprised mostly of calcium hydroxyapatite ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) (Hillson 2005). A combination of various properties of dental enamel – the fine crystalline structure, avascular nature, and low organic content – prevent substantial remodeling or in vivo alteration of the inner core enamel and also make it highly resistant to diagenesis or post-mortem alteration. Therefore, the isotopic signal contained in dental enamel reflects the biogeochemical environment where it formed via the incorporation of elements from consumed food and water during the period of crown mineralization (Bentley 2006). Carbon and oxygen isotope analysis of enamel is one of the significant methods of ancient bone chemical analysis as it reflects directly past diets and environments (Bryant and Froelich 1995; Fricke et al. 1995) and thus provides evidence on human migration, eating habits, and even breast feeding customs (Longinelli 1984; Schwarcz et al. 2010; Sponheimer and Thorp 1999; Ventresca Miller et al. 2017; Wright and Schwarcz 1999). In China this type of research is still in its beginnings, but the success of isotope research of human skeleton unearthed from Mayutian (Zhang et al. 2014) and Zhongshui (Zhang et al. 2018) shows that this method of research has great potential when applied to material from southwest China.

4.1.1 Strontium isotope analysis

Strontium isotope ratios ($^{87}\text{Sr}/^{86}\text{Sr}$) of tooth enamel reflect the geological conditions of the area from which food and drink were sourced during childhood (Bentley 2006; Ericson 1985; Budd et al. 2000). Strontium has four stable isotopes (^{84}Sr , ^{86}Sr , ^{87}Sr and ^{88}Sr) of which ^{87}Sr is radiogenic and results from radioactive decay of the isotope ^{87}Rb . Depending on the rubidium content of a rock and its age, the $^{87}\text{Sr}/^{86}\text{Sr}$ ratio varies among geological units between about 0.7000 and 0.7500 and occasionally above. When rocks and soils weather, strontium is released into water and becomes biologically available. Due to their similar ionic radii and chemical properties, strontium can substitute for calcium and is transferred through food chains without any significant isotope fractionation. In animals and humans, strontium is primarily incorporated into hydroxyapatite ($\text{Ca}_{10}(\text{PO}_4)_6\text{OH}_2$), the inorganic component of teeth and bones. Because the enamel of tooth crowns forms during certain time intervals in childhood, does not remodel afterwards and is very resistant to post-mortem alteration (Hillson, 2005), its $^{87}\text{Sr}/^{86}\text{Sr}$ ratio records the geologic signature of an individual's childhood landscape (Slovak and Paytan 2012).

4.1.2 Carbon isotope analysis

Carbon isotopes of bone hydroxyapatite and collagen reflect human diets (Deniro and Epstein 1978; Lee-Thorp et al. 1989; Sponheimer et al. 2013; van der Merwe and Vogel 1978). The study is based on the difference in carbon isotope ratios of crops that use either the C_3 or C_4 photosynthetic pathway. Crops (rice; wheat; barley) using the C_3 pathway have $\delta^{13}\text{C}$ average value -26.5‰ ; Crops (millet; maize; sorghum) using the C_4 pathway have $\delta^{13}\text{C}$ average value -12.5‰ . Human enamel $\delta^{13}\text{C}_{\text{VPDB}}$ ranges approximately from -14‰ for purely C_3 diets to approximately 0‰ for purely C_4 diets (Ambrose and Norr 1993). Substantial research on the agricultural practices of northern China, as well as archaeological evidence from pollen, phytolith and plant flotation studies found that millet (C_3 -plant) and rice (C_4 -plant) agriculture was established in northern and southern China respectively and became the dominant grain for human

food in Neolithic and Bronze Age (Zhao 2011). Thus we can evaluate the geographic origin of one human individual through his dietary feature.

4.1.3 Oxygen isotope analysis

Oxygen isotope compositions of hydroxyapatite of human bones and teeth are derived primarily from drinking water (Longinelli, 1984; Luz et al., 1984; Luz and Kolodny 1989). Rainfall is the major source of drinking water (Schwarcz and Schoeninger 1991). Oxygen has three stable isotopes (^{16}O , ^{17}O , and ^{18}O). We focus upon the two most abundant isotopes, ^{18}O (99.8%) and ^{16}O (0.2%), because of the large relative mass difference between these, ^{18}O being 12.5% heavier than ^{16}O . Because water molecules are mainly oxygen by weight, H_2^{18}O is 11% heavier than H_2^{16}O . Heavier water molecules are more difficult to evaporate than the lighter water molecules and, once in the atmosphere, lighter molecules remain longer than the heavier molecules. When the temperature is higher, there is more energy to keep both molecules in the air, but when the temperature is cold, the heavier molecules are preferentially removed and the remaining moisture becomes isotopically lighter. Thus the oxygen isotope content of rainfall depends on climatic and environmental variables such as temperature, humidity, altitude, and distance from the sea where clouds form (Ayliffe and Chivas, 1988; Stuart-Williams and Schwarcz 1997). Its light stable isotopes fractionate during metabolic processes and incorporation into the biological hard tissues. However, due to the constant body temperatures of mammals, this happens at constant rates and linear regression equations can be used to estimate the isotopic composition of the imbibed water from the oxygen isotope ratios found in teeth and bones.

4.2 Analyses

4.2.1 Strontium Isotope Analyses

For strontium isotope analysis, using an established procedure, about 7-10 mg of tooth enamel was cut from each individual with a dental drill. We mechanically cleaned any visible dirt or contamination and removed dentine with a surgical steel scalpel, and then soaked the sample for eight hours in weak (5%) acetic acid. Enamel powder was then dissolved in 3N HNO_3 on a hot plate. Strontium was purified from this solution by cation exchange chromatography in Teflon columns with Eichrom Sr-spec resin and nitric acid as the mobile phase. The Sr-Spec resin was presoaked and flushed with H_2O to remove any Sr present from the resin manufacturing process. The resin was further cleaned in the column with repeated washes of 18-MegOhm MilliQ H_2O and conditioned with 3N HNO_3 . Purified Sr was extracted with 3N HNO_3 acid. $^{87}\text{Sr}/^{86}\text{Sr}$ ratios were measured on the Neptune Plus system at the CAS Key Laboratory of Crust-Mantle Materials and Environments, School of Earth and Space Sciences, University of Science and Technology of China. The strontium carbonate standard NBS 987 yielded a $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of 0.710248 ± 0.000012 (2SD, $n=100$) (**Tab. 4**).

Tab. 4 Strontium, Carbon and Oxygen Isotope Data of Human Tooth Enamel of Shamaoshan Site

Lab No.	Tomb No.	$^{87}\text{Sr}/^{86}\text{Sr}$	$\delta^{13}\text{CVPDB} \%$	$\delta^{18}\text{OVPDB} \%$	Burial style
ZY-9228	M3-3	0.711856	-12.3	-4.1	Multilayer burial
ZY-9229	M5-2B	0.712857	-12.7	-6.3	Multilayer burial
ZY-9230	M5-4	0.713609	-12.6	-5.2	Multilayer burial

ZY-9231	M6: A	0.713229	-11.5	-5	Group interment
ZY-9232	M11	0.710124	-12.2	-6.7	Single burial
ZY-9233	M22-1A	0.713457	-12.1	-6.1	Multilayer burial
ZY-9234	M24: A	0.710731	-12.5	-7.6	Single burial
ZY-9235	M28: A	0.713195	-12.2	-4.4	Group interment
ZY-9236	M28: B	0.713722	-12.1	-5.3	Group interment
ZY-9237	M28: C	0.713591	-12.5	-4.1	Group interment
ZY-9238	M28: E	0.713962	-12.7	-4.7	Group interment
ZY-9239	M28: H	0.715239	-12.3	-5.6	Group interment
ZY-9240	M30-2D	0.71229	-12.1	-4.6	Multilayer burial
ZY-9241	M30-4	0.713598	-12.6	-4.2	Multilayer burial
ZY-9242	M51	0.70971	-12.6	-6.9	Single burial
ZY-9243	M52	0.71349	-11.9	-6.2	Single burial
ZY-9244	M57: A	0.712676	-11.6	-6.6	Group interment
ZY-9245	M57: B	0.713534	-11.1	-6	Group interment

4.2.2 Carbon and Oxygen Isotope Experiments

For carbon and oxygen isotopes, powdered enamel samples were prepared in the Archaeometry Laboratory, University of Science and Technology of China by selecting a few milligrams of finely powdered enamel, which were sent without further treatment to the Isotope Laboratory of the Third Institute of Oceanography, SOA. The $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ of tooth enamel carbonate were measured using an automated carbonate preparation device (KIEL-III) coupled to a gas-ratio mass spectrometer (Finnigan MAT 252). Powdered samples were reacted with dehydrated phosphoric acid under vacuum at 70°C in the presence of silver foil. The isotope ratio measurement is calibrated based on repeated measurements of NBS-19 and NBS-18 and precision is $\pm 0.1\text{‰}$ for $\delta^{18}\text{O}$ and $\pm 0.06\text{‰}$ for $\delta^{13}\text{C}$ (1 s). The carbonate- CO_2 fractionation for the acid extraction is assumed to be identical to that of calcite (**Tab. 3**).

4.3 Results

The 18 human samples from Shamaoshan yielded $^{87}\text{Sr}/^{86}\text{Sr}$ ratios ranging 0.709710~0.715239, with an average 0.712826 ± 0.0014 (1sd, n=18). These samples exhibit a $\delta^{13}\text{C}$ ratios range of -12.7 to -11.1‰, with an average of $-12.2 \pm 0.44\text{‰}$ (1sd, n=18), showing a $\delta^{18}\text{O}$ ratios range of -7.6 to -4.1‰, with an average of $-5.53 \pm 1.07\text{‰}$ (1sd, n=18). Overall, we can thus see subtle variation (**Tab. 4; Fig. 8**).

4.3.1 Strontium Isotope Analysis

Usually, besides human skeletons, we also analyze the animal bones or teeth accompanying them to reconstruct the local bioavailable $^{87}\text{Sr}/^{86}\text{Sr}$ range (Price et al. 2002); however, in this study no animal bones or teeth were available, so we evaluated the local strontium background through an analysis of the local geology. The bedrock of Shamaoshan region is mainly Paleozoic sandstone and shale. The $^{87}\text{Sr}/^{86}\text{Sr}$ range of Nanpan River water flowing through such geological region is 0.71181~0.71356 (Xu

and Liu 2007). The $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of river water reflect the result of mixed rock weathering, representing the local bioavailable $^{87}\text{Sr}/^{86}\text{Sr}$ ratio background (Bentley 2006; Hoogewerff et al. 2001).

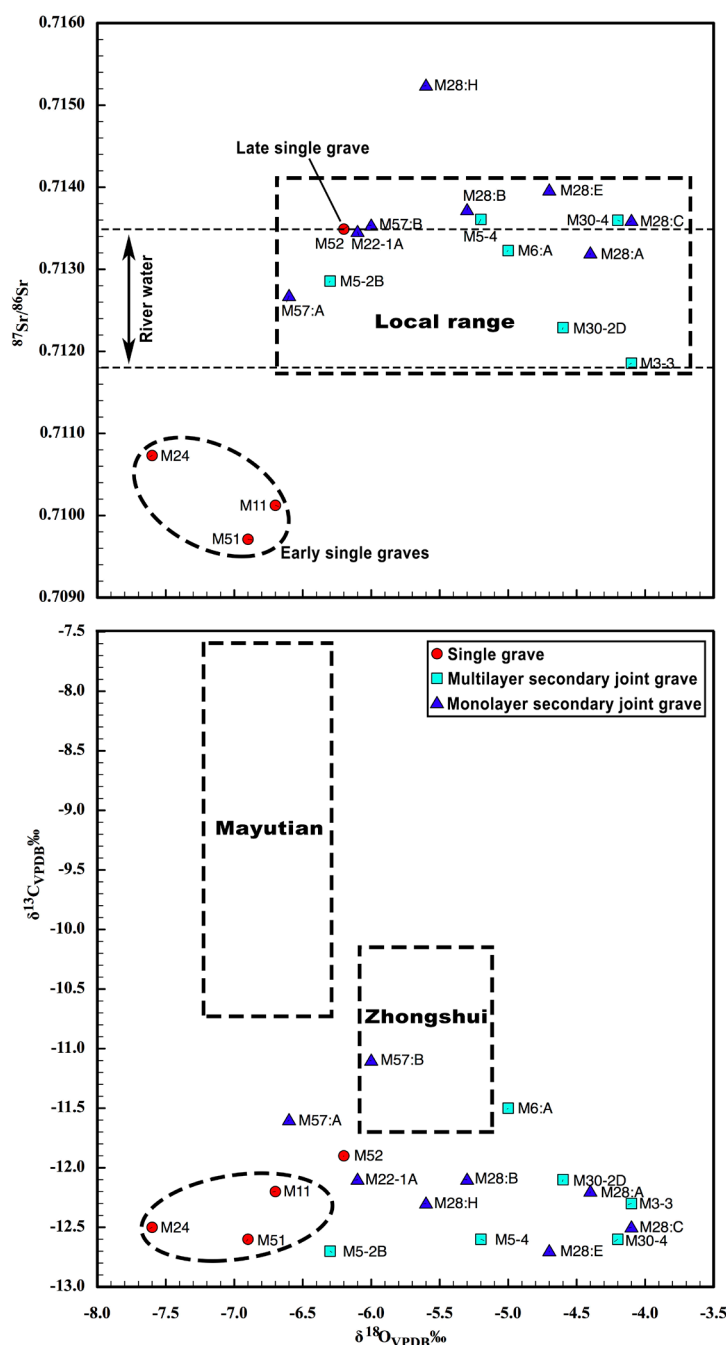


Fig. 8. Scatter Plot of $^{87}\text{Sr}/^{86}\text{Sr}$ vs. $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ vs. $\delta^{18}\text{O}$ for the Shamaoshan Burials

On account of the limited excavation area, it is unclear if the people buried at Shamaoshan lived close-by and what living quarters may have looked like. A site of similar date and Dian cultural affiliation, Jinlianshan cemetery, likewise in Chengjiang County, is located at less than 100 m distance of the settlement site of Xueshan (Jilin et al. 2010), suggesting that the living and the dead were occupying adjacent spaces. Therefore, we assume that the Shamaoshan people lived – and ate, drank, and breathed – close to where they came to rest in death; thus, the local geology can be used as a

proxy for their living environment. The $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of the 18 Shamaoshan individuals fall into three distribution range from small to large. The first $^{87}\text{Sr}/^{86}\text{Sr}$ ratio range is 0.709710-0.710731, and the average value is 0.710188 ± 0.0005 (1sd, $n=3$). The individuals of M11, M24, and M51 fall into this range. The second $^{87}\text{Sr}/^{86}\text{Sr}$ ratio range is 0.711856-0.713962, and the average value is 0.713219 ± 0.0006 (1sd, $n=14$) with 14 individuals falling into this range. The third $^{87}\text{Sr}/^{86}\text{Sr}$ ratios range is above 0.7150, only including one individual of M28:H ($^{87}\text{Sr}/^{86}\text{Sr}$ value=0.715239) (**Table. 5; Fig. 8**). The $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of 14 individuals in the second range corresponds with the $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of the water of Nanpan River, indicating these people were most likely local. The $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of the individuals in the first and second group are beyond the local $^{87}\text{Sr}/^{86}\text{Sr}$ range, which indicates that they must have come from at least two places other than the surrounding area. What is noteworthy is that the individuals of M11, M24, and M51 in first range are all early owners of single burials. By contrast, 13 out of the 14 individuals identified as local were interred in secondary group burials with only the individual in M52 occupying one of the late single burials.

Mayutian site is located in the Red River Basin 200 km south of Shamaoshan (Fig. 3). The bedrock of Mayutian mainly consisted Triassic limestone and dolomite. The $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of local human of Mayutian range 0.709116~0.710056 (Zhang et al. 2014); Zhongshui sites are located in the junction of Yunnan and Guizhou Province 270 km northeast of Shamaoshan (Fig.3). The bedrock of Mayutian mainly consisted Permian limestone, where the human $^{87}\text{Sr}/^{86}\text{Sr}$ ratios range 0.709546~0.710963 (Zhang et al. in print). The $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of Shamaoshan M11, M24: A and M51 falls into Mayutian and Zhongshui ranges.

4.3.2 Oxygen isotope analysis

For the Shamaoshan samples, the values of $\delta^{18}\text{O}$ range -7.6 ~ -4.1‰, with an average of $-5.53 \pm 1.07\text{‰}$ (**Table. 5; Fig. 8**), while those of Mayutian site averaging $-6.75 \pm 0.46\text{‰}$ (1sd; $n=14$), with far less variance and lower values than Shamaoshan (Zhang et al. 2014). The latest $\delta^{18}\text{O}$ values of Zhoushui sites are close to Shamaoshan, averaging $-5.56 \pm 0.48\text{‰}$ (1sd; $n=39$) (Zhang et al. in print). The range of $\delta^{18}\text{O}$ of three individuals from single burials M11, M24, and M51 dating to the early phase of Shamaoshan is -7.6 to -6.9‰, obviously lower than that of the individuals from the multiple burials (-6.6 to -4.1) (**Table. 5; Fig. 8**), but similar to Mayutian. As $\delta^{18}\text{O}$ values reflect large-scale geographic changes, the results of the strontium analysis described above suggest that these three individuals came from a place fairly far away from Shamaoshan. The $\delta^{18}\text{O}$ values of the individual from a single burial of the late phase fall within the range of those of individuals in multiple burials. Considering the result of the strontium analysis, it therefore can be concluded that these people were local. The individual with higher $^{87}\text{Sr}/^{86}\text{Sr}$ ratios from M28: H does not show any differences in $\delta^{18}\text{O}$ value from the occupants of the multiple burials, indicating that even though he may be non-local, he would have come from not too far away.

4.3.3 Carbon isotope analysis

The range of $\delta^{13}\text{C}$ values is -12.7 to -11.1‰, averaging $-12.2 \pm 0.44\text{‰}$ (1sd; $n=18$) (**Tab. 4; Fig. 8**). According to Cerling et al. (2003; 2004), the $\delta^{13}\text{C}$ values in bioapatite are generally 12‰ less concentrated than that of foods ingested by humans; thus the range of $\delta^{13}\text{C}$ values of human diets in Shamaoshan is -24.7 to -23.1‰. The range of $\delta^{13}\text{C}$ values of C_3 plants is 32-24‰ (Cerling and Harris 1999) but due to fossil fuel combustion, the $\delta^{13}\text{C}$ values of modern plants are enriched by over 1.5‰ compared

to ancient plants. Therefore, we conclude that all individuals from Shamaoshan lived on C₃ plants as their principle food source. Previous carbon isotope analysis on the coetaneous bone collagen from Jinlianshan (**Fig.3**), a contemporaneous site not far from Shamaoshan, has shown that the consumption of C₃ plants accounted for 85.85-94.87% of the diet of the people buried there (Zhang Zhijun 2011), suggesting a close similarity in dietary patterns in Central Yunnan. The group of C₃ crops includes rice, wheat, and barley. Related archaeobotanical research has shown that during the Bronze Age (3400-2300 BP) crop-use patterns on the Yunnan-Guizhou Plateau were varied, with millet, rice, wheat, and barley planted simultaneously (Li et al. 2016). Among the botanical remains (wheat, barley, rice, millet) unearthed from the late Bronze Age Xueshan site only 30 km away from Shamaoshan wheat and rice account for 64.7%, while millet only accounts for 2.25% (Jilin 2010; Li Xiaorui 2016; Wang 2014; Zhang 2017 et al.).

The three individuals of single burials with lower $^{87}\text{Sr}/^{86}\text{Sr}$ and $\delta^{18}\text{O}$ values comparing with those of individuals of multi-burials, are in accord with those of individuals of multi-burials in $\delta^{13}\text{C}$ ratios, belonging to the range of C₃ plants. Therefore, we suppose these three individuals came from the areas where the rice and wheat are stable food. The average $\delta^{13}\text{C}$ value of the enamel carbonates of the individuals from Mayutian is $9.14 \pm 1.6\text{‰}$ (1sd; n=14), and Zhongshui is $-10.73 \pm 0.77\text{‰}$ (1sd; n=39), showing a mixture of C₃ and C₄ plants in their diets (Zhang et al. 2014), which indicates that the proportion of millet consumption in the Red River Basin and junction of Yunnan and Guizhou Province is higher than in the central Dian area (**Fig. 8**). Although the $^{87}\text{Sr}/^{86}\text{Sr}$ and $\delta^{18}\text{O}$ values of three single burial individuals fall into Mayutian range, however, there are obvious differences in diets among these sites. Thus, we can exclude the three individuals origin from Red River Basin or the junction of Yunnan and Guizhou Province.

The $\delta^{13}\text{C}$ values of human bone of Qin-Han period from Guanzhong Region show a predominant C₄ diet (Ma et al. 2016; Zhang et al. 2013), indicating millet is still a stable crop in north China until Han Dynasty. Hereby, the three individuals unlikely came from north China. Moreover, the principle plant food in Yangtze River basin has been C₃ crops (rice) since the Neolithic. Hence, these three individuals in single burials could have come from somewhere in Yangtze River basin, however, as a mixed crop practice with a predominance of rice is common in various parts of Yunnan as well, such patterns could also have developed there with uneven access to various types of crops for people of different status.

5. Discussion

After this separate analysis of textual, material, and scientific evidence for the Han imperial expansion and other forms of human movement into Yunnan from the Bronze Age to the Han period, it is time to combine the three strands of evidence. Considering first the finds from Shamaoshan, it has become clear that the site is in a unique geographic location at the northeastern edge of the central lakes region and thus very close to the early center at the northern edge of Lake Erhai and on the one side and the mountains of Qujing on the other. Similarities in burial customs and assemblages with both areas as well as with locales on the northern edge of Lake Fuxian and to a lesser extend Lake Xingyun suggest that Shamaoshan was well connected with the rest of the central lake basin and may even have been node in the network connecting the Dian basin with the outside world – albeit a minor one. Likely through the communities burying at Yangfutou and Tianzimiao, Jinlianshan was furthermore connected to

groups in the mountains of northwest Yunnan and southwest Sichuan, a connection that other sites in the immediate central lakes area seem not to have shared. Shamaoshan was thus exceptionally well connected but may not have been particularly rich or important, as the limited size of its graves and burial goods and the lower quality of its metal objects compared to many other cemeteries both large and small.

At the same time, the site exhibit marked local particularities such as the large percentage of complex multilayer burials with various forms of body treatment combining primary extended supine or flexed burials, secondary interments, and potential human sacrifices in up to six layers. While other contemporary sites show evidence for multilayered burials as well, they are by far not ubiquitous and occur nowhere in as high a percentage as at Shamaoshan. They furthermore decrease in prevalence over time even at Shamaoshan. Instead, at first multiple burials increase in number. Especially during the middle and late Western to early Eastern Han (Shamaoshan Phases 4-5), the number of primary interments increases significantly, a potential sign of the arrival of Han immigrants. At the same time, Han-style items become increasingly more common. This does not necessarily mean Han immigration from the Central Plains, though.

Here, the object assemblages and the isotope data provide seemingly conflicting information. As expected, the cowrie shells in early graves with Dian-style metal items and ceramics of distinct local style (M3-3, M5-2B, M5-4, M6) (**Appendix IV**). The largest observed amount of Han items, however, among them 145 *wuzhu* coins in one grave, were placed in the graves of individuals of local origin as well (M22-1A; M30-2D, M30-4). There are four individuals of non-local origin, one identified as having come from not too far away (M28:H, male, age: 25-30) and buried secondarily in a single-layer group burial with eight other primary and secondary interments. Considering the large number of interments, the grave, though not small, was poorly furnished, containing only one loom weight and a low-stemmed bowl resembling finds from stone-cist graves in Sichuan. A similar bowl, associated with a jar with constricted neck and outward-curving rim likewise suggesting a southwest Sichuan connection and a Dian-type bronze *ge* halberd but also six cowrie shells appeared in a single grave holding one of the non-local individuals coming from further away (M52; male, age: 30-35). The other two non-locals were likewise laid to rest in extended-supine position in individual graves and accompanied by two ceramic loom weights in one case (M24, female?, age: 40) and a combination of a generic jar and various bronze weapons, tools, personal ornaments, and a stone net weight in the other (M11, male, age: 25-30), all simple in form and fairly generic with no clear sign of a foreign origin of object or type.

When considering all 57 excavated graves, there is no clear correlation between specific object, grave, burial, or interment types and also sex and age do not seem to be playing a decisive role. Han coins do thus not occur exclusively in single primary or even group interments, but also in local-style multilayer interments. Conversely, cowrie shells occur in just as high a number in multilayer burials as in single interments – with the exception of M1, by far the largest and richest grave with its nearly 2000 items, among them 1042 beads and 700 cowries in a multilayer burial. Contrary to most other Dian sites, cowries and Han coins furthermore do not exclude each other. The largest graves do indeed not contain Han coins but always cowries, and even the second-tier graves do not have Han coins although they do contain the occasional iron or composite weapon. Among the smaller graves, however, Han, stone-cist grave, and local style objects and customs are happily mixed together. Additionally, there is a chronological component at play, the largest grave, M1, being the earliest and thus naturally devoid

of Han items, medium-sized graves appearing through all phases and with a variety of assemblages, and the smallest graves tend to be late. It is also noteworthy that the graves with non-locals seem to be dating between the 3rd c. BC and 1st c. AD, so mid to late Western to early Eastern Han, meaning some of them arrived before the Han conquest.

Overall, it thus appears that already from the mid-Western Han at the latest, foreigners arrived and were integrated into the community burying their dead at Shizhaishan, some from close-by, others from further away, although the precise place of origin is unknown. They seem to have been buried exactly the same way as the locals, merrily mixing local burial customs and objects with items from the northwestern mountains as well as from the Central Plains. It is also noteworthy that the number of immigrants seems to be relatively high, four out of a sample of 18, however, as these were chosen mostly based on preservation condition from a sample of 299, this may be not entirely representative. It is also remarkable that both male and female adults were representing, precluding unilateral marriage patterns. The three non-local individuals in the single burials do differ in dietary patterns, though, having had a diet more reliant on C3 plants than the other individuals at the site who – like also the immigrant coming from a place closer by – relied on a mixture of C3 and C4 plants. In the mountainous parts of Southwest China, from the Neolithic a mixed subsistence of C3 and C4 crops is common, usually with a stronger reliance on millet and wheat in the later periods, while people in the Dian basin tend to rely more heavily on rice, i.e., a C3 plant, although not as exclusively as they do in the Yangzi River basin or the Chengdu Plains. These three individuals are thus more likely to have come from a lower-elevation local with a focus on rice agriculture than from the surrounding mountains.

If some of these foreigners were Han, they may have come from Shu, Lingnan, or the middle Yangzi, not necessarily from the Central Plains. They furthermore likely did not come in a large group as they seem to have been integrated fully into the local community without trying to stand out or being set apart from the locals in death, be it in attire or burial custom. The only point that suggests a Han-connection of these individuals is the gradual emergence of single interments as main form of burial at least from the late Western Han onward, and that the non-local individuals in M11, M24, and M51 were among the early owners of single burials, albeit in the form of southeast-northwest oriented earth-pit graves as the local custom dictated. If they were of Han origin, they may thus have found a compromise between their own and local traditions, adopting at also the local dress and object repertoire – or at least their community did when burying them, signaling the acceptance and integration of the immigrants into their midst, but potentially respecting their wish to be buried individually. However, there are many other possible reason to bury an individual alone, especially considering that single interments appeared at Shamaoshan already from Phase 2 onward with no inclusion of Han items.

Even though the cemetery continued to be used probably until the 1st c. AD, no actual Han graves appear, though, suggesting that no large-scale immigration of Han colonialists took place at this specific locale. Both the changes in burial customs and the addition of Han-style items to the grave assemblages may thus have occurred through intermediaries from closer-by who may or may not have had Han ancestry but surely had been in contact with Han and Han customs in some way. The case of Shanmaoshan thus shows that the encounter with the Han as individuals and through their objects and customs, both prior to and after the Han annexation of the areas took many different forms and led to a variety of reactions both by locals and non-locals. It also shows that the arrival of non-locals presumably used to different customs of dress

and eating both in life and death may not leave a clear signature in the archaeological record; however, archaeological evidence may help to interpret the scientific results and prevent us from jumping to quick conclusions on long-distance migrations solely based on the identification of individuals as non-local. At the same time, the presence of Han objects are by no means a clear sign of foreign origin of the dead whom they accompanied, but they were chosen deliberately by both locals and non-locals alike in an eclectic fashion, combining them with local items to have both the rare and the familiar in the last resting place of locals and non-locals alike.

6. Conclusion

Now it is time to revisit the larger questions asked in the beginning of this study and assess how much progress the multi-disciplinary and multi-source approach taken here has made toward answering them.

Firstly, the case of Shamaoshan specifically has shown that the presence of Han items alone is not a clear sign of a foreign origin of the people interred with them, nor is the use of single primary burials. Even though immigration clearly took place, in death there is no clear pitching of the local against the foreign but an eclectic mix of elements from several worlds (Han, Shu, stone-cist grave complex, local) among locals and immigrants alike.

Zooming out from Shamaoshan both spatially and chronologically, it has furthermore become clear that the various groups inhabiting Southwest China were part of long-distance contact networks that commenced in the late Neolithic at the latest and intensified during the Bronze Age. These networks at first mainly ran in North-South direction, expanding over time into the northern Steppe and Southeast Asia and from the late Bronze Age onward also to the West and East, even all the way to the Central Plains, albeit first through intermediaries in Sichuan and the middle Yangzi River region. Many of these contacts likely were indirect in the form of down-the-line trade and short-distance migrations rather than long-range movements and direct contact. This changed already during the Qin period when colonists were sent into Sichuan and Lingnan where Chinese objects and burial customs were adopted quite readily already during the Qin period (Allard 2005; Yang Yong 2011). Even before the Qin, there was a local elite present in the central lake region on Yunnan; their wealth and power were gained from control of these exchange routes as well as raw materials needed to produce prestige goods, ritual items, and also weapons for the increasing number of conflicts over resources the region experienced even before the Han were encroaching.

In the beginning, this control was rather nominal or at least indirect, keeping things as they were in terms of local power structures but controlling the local elite. Soon, however, a more direct approach seems to have been taken, leading to the movement of large numbers of people into the area. While in Lingnan and Sichuan textual and archaeological evidence see the emergence of Han-style buildings and graves that soon come to replace local forms prior to the 2nd c. BC, in Yunnan there is a time lag between conquest and the occurrence of actual Han graves and houses in the central lake area, let alone in the surrounding mountains. The first census in Yizhou Commandery at AD 2 shows that at that point there must have been a certain amount of administrative control through Han officials on the ground, but only the second census at AD 140 shows an immense increase in population, reflecting a real flood of immigration – fueled both by state incentives to make people move and by upheaval in the center during the time of Wang Mang – as well as an increasingly tight control of

local matters by Han officials.

The relatively late onset of actual Han control even in the central lakes region is made even more clear by the settlement material. Large Han settlement appear from the 1st c. BC onward, but only at the edge of the basin, not in its heart, and supported by garrison posts throughout the Qujing Valley reflecting worries of military control – well justified worries, as the many upheavals suggest – rather than administrative or economic considerations in terms of agriculture or resource extraction which seems to have been in the hands of the locals into the Eastern Han. In spite of historical texts claiming large-scale intensification of agriculture in the Dian Basin by the Han, extended forest clearing took place already prior to the Han conquest and a real dip in pine coupled with a large spike in grains occurred only during the late Tang (AD 618-907). Changes in subsistence and general local economy, though likely influenced by the large inroad of immigrants especially during the 1st and 2nd c. AD, were thus been moved by an interplay of locals and new arrivals, Han and non-Han inhabitants of the central lake area, over a long period of time.

In the burial material, the 1st c. AD switch from indirect to direct control, even colonialization can be observed as well. Han items start appearing in greater number and in smaller, more moderately equipped graves throughout wider parts of Yunnan from the 1st c. BC onward. They become very common in the early eastern Han, now also including ceramic models. At this point, actual Han-style brick graves in North-South alignment appear in greater number, albeit with local particularities. That they are at first in the form of simple vertical pits with or without bricks, sometimes cutting them into stone if no bricks are available, suggests either a reliance on locals for constructing the graves or a certain amount of intermingling (maybe even intermarriage) leading to the adoption of local customs. In terms of grave construction, the former explanation seem more compelling, especially considering that the strained relations between Han and locals expressed in upheavals. In terms of burial objects, however, it is clear that the Han immigrants imitated local customs by including large numbers of metal weapons, tools, and ornaments, participating in a competitive form of conspicuous consumption, so to speak. Returning to one of the questions asked in the beginning, Western Han period immigrants seem to have adopted local burial customs while later arrivals with clear connections to the Han (either by ethnicity or Hanification of their community of origin) largely kept to Han customs, adding on a few local modifications.

At the same time, locals included increasingly more Han items in their graves, continuing a tradition started already during the Western Han to show their ability to access foreign goods. Of course, the meaning of including such items changed its meaning, given that the Han were there, right next to them, and not in the far-away Central Plains. Adding Han-style objects to grave assemblages could display a connection with those in power, though, and may therefore have continued to be attractive.

This attractiveness seems to have worked largely on the lower to intermediate levels of society, though, while the upper ranks of Dian society rejected Han objects, even more so in earlier centers of power that had been diminished in importance such as the area around Yangfutou. Here, the Han seem to have been kept at arm's length at least in death as the separate burial areas and object assemblages indicate. The Han approach to control the local elite through culture by teaching them Han customs thus seems to have not been particularly successful as the few seals with phantasy characters

and the appearance of inkstones without other writing utensils in a few elite graves at Lijiashan indicate (Yao 2016: 192-4).

At lower levels, however, people may have been less aware of the political implications of including aesthetically attractive items that happened to be of Han style. The inclusion of clay models show an intermingling of locals and Han on a deeper level, though, initiating an adaptation of Han objects and finally grave forms and interment customs at an increasingly rapid pace. By 100 AD, in the middle of a large wave of Han immigration, in the central lake basin, Dian-style items had all but disappeared from the graves, while in the western mountains the change took place only around the 3rd c. AD, largely due to the geographic remoteness and inaccessibility of the area. While in the beginning it was the upper echelons of society who were in contact first with the Qin and then the Han, in the end it was thus the lower and middle classes of both Han and locals who finished the Hanification of the Dian. The case of Shamaoshan indicates earlier middle- or lower-class immigrants to the region – be they Han or from other regions – may actually have been Dianified, and only when the Han arrived in large numbers, they Hanified the locals instead, but from the bottom up instead of exclusively from the top down as originally planned.

This multi-disciplinary study of archaeological, textual, and scientific evidence, first analyzed separately and then interpreted jointly, has thus managed to address all questions posed in the beginning, both specific ones (e.g., the meaning of the presence (or absence) of Han items in graves in Southwest China in general, Shamaoshan in particular; the ways in which Han did or did not change their burial customs after immigrating to Yizhou Commandery) and more general (strategies of Han administration, migration, and settlement work in Southwest China; the role of various classes of society in Han-local interactions; the process of Hanification vs potential Dianification). By taking this combined approach, we have managed to make progress toward explaining these various aspects of Han immigration and colonialization on many levels and as conducted and perceived by locals and Han in various locals and at different social levels, thus avoiding jumping to simplistic explanations of human movement but instead providing a nuanced view on the past.

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Figure Captions

Fig. 1. Han Administrative Division

Fig. 2 Map of Dian and Shamaoshan in Relation to the Western Han Empire

Fig. 3. Sites Mentioned in the Text.

Fig. 4. Han-style and local-style objects from Yunnan:

- A. Han-style bronze artifacts (top left): 1., 5. hu jars (Xiaosongshan, Chenggong; Shizhaishan, Jinning); 2. xi basin (Shizhaishan, Jinning); 3. mou cauldron (Yangfutou, Kunming); 4. jiaodou heating implement (Lijiashan, Jiangchuan); 6. steamer basket (Yangfutou, Kunming); 7. fu cauldron (Shamaoshan, Yiliang); 8. incense burner (Lijiashan, Jiangchuan); 9. zhi container (Lijiashan, Jiangchuan); 10. xi basin (Yangfutou, Kunming); 11. crossbow mechanism (Lijiashan, Jiangchuan); 12. mirror (Xueguanbao, Luliang); 13. wuzhu coin (Shamaoshan, Yiliang); 14. belt hook (Jinlianshan, Chengjiang);
- B. Han-style ceramic objects (top right): 15. hu jars (Yangfutou, Kunming); 16. well model (Yangfutou, Kunming); 17., 19. paddy field model (Yangfutou, Kunming; Lihuacun, Songming); 18. guan jar (Muyi, Guangnan); 20. cattle figure (Yangfutou, Kunming); 21. oven model (Yangfutou, Kunming);
- C. Local-style bronze objects (bottom left): 22., 23. cowrie shell containers (Shizhaishan, Jinning); 24. yue battle axe (Lijiashan, Jiangchuan); 25. forked implement (Lijiashan, Jiangchuan); 26. sword (Lijiashan, Jiangchuan); 27., 29., 30., 31., 34., 35. belt buckles (Shizhaishan, Jinning; Yangfutou, Kunming); 28. ge dagger axe (Lijiashan, Jiangchuan); 32. hoe (Shizhaishan, Jinning);
- D. Local-style ceramic objects (bottom right): 36.-38. zun vessels (Yangfutou,

Kunming; Wutaishan, Kunming); 39.-41., 43. guan jar (Xueguanbao, Luliang; Yangfutou, Kunming; Shamaoshan, Yiliang).

Fig. 5 Geological Map of Central Yunnan

Fig. 6 Layout of the Shamaoshan cemetery (Are all the white ones multiple burials? The legend has to make that clear. Also, what do the red numbers mean?)

Fig. 7 Profile, Photos of the Three Layers, and Bronze Objects in grave M3

Fig. 8. Scatter Plot of $87\text{Sr}/86\text{Sr}$ vs. $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ vs. $\delta^{18}\text{O}$ for the Shamaoshan Burials

Table Captions

Tab. 1 Basic Statistics of Grave Measurements

Tab. 2 Interment Types at Shamaoshan

Tab. 3. Number of Burial Objects at Shamaoshan by Type

Tab. 4. Strontium, Carbon and Oxygen Isotope Data of Human Tooth Enamel of Shamaoshan Site

Appendixes

Appendix I. Skeletons by grave and layer.

Appendix II. Graves by phase, listing grave measurements and object assemblages.

Appendix III. List of Skeletons by Sex, Age, Burial Mode, and Layer

Appendix IV. Details of Assemblages in Sampled Graves