Diana D’Souza

Professor McLeester

ANTH 50.05

15 March 2022

Regional wine consumption and social status at Jinsha site in Chengdu, China (ca.1200-600 BC)

Introduction

There is evidence of regional separation in Jinsha, an archaeological site located in Chengdu, China, dating to the Shierqiao culture (ca. 1200-600 BC) (D’Alpoim Guedes 2013: 288). The northern part of Jinsha appears to be residential. This portion of the site contains large numbers of houses, buildings, storage pits, disposal pits, and kilns. On the other hand, the southern part of Jinsha appears ritualistic (D’Alpoim Guedes 2013: 294). Excavations have uncovered human burials and caches of offerings containing gold, bronze, jade, ivory, and tens of thousands of pottery vessels and sherds (Qing et al 2002: 9). This study focuses on Jinsha’s pottery and its implications for status in the Chengdu Plain. Specifically, do ceramic drinking vessels at Jinsha contain rice and millet species, indicative of wine consumption? Are these rice and millet species located in drinking vessels from both the northern residential area and the southern sacrificial area? Finally, what can this tell us about the relationship between regional alcohol consumption and social status?

These questions can make significant contributions to archaeological research situated in the late Bronze Age of China. Ceramics have played an essential role in the Chengdu Plain since their introduction in c. 1600 BC (Britannica). In the broadest sense, ceramics can shed a lens into how humans prepare and store food and drink. They can also tell us about how humans allocated resources, organized labor, managed distribution, and cooperated in economic activities (Lin 2013: 1). Most importantly for this study, the contents of ceramics help us fill a fundamental gap in research at Jinsha. Ceramic residuals provide us with a more nuanced understanding of the inhabitants that occupied Jinsha by allowing us to trace the relationship between regional wine consumption and social status. This study will ultimately help researchers better understand the social context of Jinsha, a site that has been buried and understudied for more than 3,000 years (Jinsha Site Museum).

Background

The background section of this paper is divided into four parts that will let us better understand connections between alcohol consumption and social status at the Jinsha site. First, I will provide general information about Jinsha, ranging from the transition from Sanxingdui to Shierqiao culture and site layout. Second, I will trace evidence of social stratification through burials and pottery. This will provide relevant context for thinking about social status at Jinsha. Third, I will give a brief overview of how alcohol consumption has been used to trace status in ancient societies, before providing an example based in China. Finally, I will explain my rationale for why Jinsha residents most likely drank rice and millet wine.

Chinese archaeologists discovered the Jinsha site on February 8, 2001, in an area spanning about five square kilometers (Jinsha Site Museum). Jinsha is located in the Chengdu Plain, a landscape that has fostered the emergence of several complex civilizations (Flad et al 2013: 119). The Shierqiao culture of Jinsha (1200-600 BC) was preceded by two pre-imperial cultures of the Chengdu Plain—the Baodun culture (2700-1700 BC) and the Sanxingdui culture (1700-1200 BC) (Qing at el 2002: 12). The transition from the Sanxingdui to Shierqiao culture is notable because it brought about social hierarchy and power changes. Scholars attribute the collapse of the Sanxingdui state to increased competition between the secular and religious elite (Sun Hua 2013: 166). Sangxingdui was eventually abandoned around 1200 BC, and a new state, centered around Jinsha, was established at Chengdu. As secular elites at Jinsha brought spiritual matters into their own hands, Jinsha emerged as a political, economic, and cultural center.

As previously mentioned, Jinsha has a unique layout with a northern residential area and a southern sacrificial area, and there is evidence of pottery use in both regions (D’Alpoim Guedes 2013: 289; Qing et al 2002: 9). In fact, pottery vessels account for most of the relics unearthed at Jinsha (Wang 2006). Some of the most common ceramics include the narrow flat-bottom jar, long-stem cup, tri-leg wine *he* vessel, small cup, long-neck jar, long-stem cup-shape vessel, ring-foot jar, ring-foot cup, narrow-waist vessel base, and flask. However, the appearance of pointed-bottom vessels, such as *jiandizhan* saucers, *jiandibei* cups, and *jiandiguan* jars, mark the arrival of the Shierqiao culture and were unique to Jinsha in both everyday and burial contexts (D’Alpoim Guedes 2013: 287). Researchers have taken advantage of Jinsha’s extensive ceramic assemblage, studying the relationship between pottery and burials. In 2002, archaeologists discovered 300 burials primarily distributed in Lan Yuan, Tiyu Gongyuan, and Yansha Tingyuan at Jinsha Village (Qing et al 2002: 7). Their findings revealed that about half of the burials did not contain burial goods. Only a few items were found in graves with burial goods, most of which were pottery wares. Still, there were a few graves well adorned with pottery as well as bronze and jade artifacts, suggestive of high-status burials. Based on this evidence, some scholars believe that the Shierqiao culture of Jinsha was stratified.

Thus far, we have established that ceramics in burial contexts and the transition from Sanxingdui may reveal signs of social stratification at Jinsha. However, ceramics also contain residues that can tell us about alcohol consumption and social inequalities of ancient societies.

For example, *chicha* alcohol production transformed social relations in the Andes by structuring the rhythm of agricultural communities and legitimizing the power of ruling elites (Wang et al 2021: 1). From a more egalitarian perspective, ritualized feasts with fermented beverages helped foster unity among hunter-gatherers in the Near East. There have even been studies based in China, although very few, that use ceramic residues to study the social context of alcohol. One such example involves archaeological investigation at Qiaotou, China (ca. 9000-8700BC) (Wang et al 2021: 2). Archaeologists conducted starch and phytolith analysis on pottery residual remains, ultimately discerning that these vessels held beer made out of rice. Furthermore, they concluded that the site was a ceremonial place for funerary rituals involving alcohol consumption, which later led to the emergence of complex farming societies in southern China. The findings in Qiatou have the potential for application in Jinsha, especially since archaeologists have uncovered ceramic drinking vessels specifically used for wine consumption, including the tri-leg wine *he* vessel and pointed-bottom *jiandibei* cup (Wang 2006).

At this point, we know that stratification may have existed at Jinsha. Moreover, designated wine vessels at the site can examine social status during the Shierqiao culture. The final missing piece explains the two-fold rationale behind why we are testing for rice and millet species. First, we looked at existing research examining the assemblage of Sanxingdui, a culture that directly preceded the Shierqiao culture of Jinsha. Researchers at Sonjiaheba, a Bronze Age site in the Chengdu Plain, used macrobotanical analysis and concluded that subsistence heavily focused on rice (Flad et al 2013: 136). Foxtail millet was the second most represented species, followed by peach pit and wild grape. Given the significant representation of rice and millet in the Sanxingdui assemblage, it appears likely that these species were used in Shierqiao wine. Second, we located species that had been previously identified in ancient Chinese alcohol. A

2004 study of liquid samples from bronze vessels located rice and millet species in fermented beverages (McGovern 2014: 1). These samples dated to the Shang/Western Zhou Dynasties (ca. 1250-1000BC), overlapping with the Shierqiao culture of Jinsha (ca.1200-600 BC).

Research Gap

There are studies of status and alcohol consumption in Neolithic China (Wang et al 2021), but there is a lesser amount of research linking these topics in Bronze Age China. This research fills a gap by focusing on the Bronze Age Shierqiao culture of the Jinsha site in Chengdu. Moreover, research on Jinsha has been limited to zooarcheological analysis of subsistence practices (He 2012) and macrobotanical analysis on plant-based dietary patterns (D'Alpoim Guedes 2013). Therefore, this proposal is novel in two ways. First, this research separates the northern residential region from the southern sacrificial region, providing much-needed knowledge on regional differences at Jinsha. Second, this research accounts for the overwhelming number of ceramic vessels and evidence of social stratification at Jinsha. Given this wealth of information, it is surprising that alcohol consumption and connections to status have not been thoroughly explored and applied to the Jinsha site.

Methods

The methods portion of this paper outlines the procedures needed to answer the following two questions: *Do ceramic drinking vessels at Jinsha contain rice and millet species, indicative of wine consumption? Are these rice and millet species located in drinking vessels from both the northern residential area and the southern sacrificial area?* We plan to select 30 vessels for analysis, 15 from the northern residential area and 15 from the southern sacrificial area. These samples will not be chosen randomly. As stated in the background section, the Chengdu Plain fostered many great Chinese civilizations (Flad et al 2013: 119). To ensure that the ceramic assemblage is from the Shierqiao culture of Jinsha, a majority of these ceramics will be those identified as unique to Jinsha wine consumption—namely the pointed-bottom vessels, including the *jiandizhan* saucers, *jiandibei* cups, and *jiandiguan* jars (Wang 2006). These vessels will remain unwashed and taken directly from the Jinsha site for phytolith analysis. Microfossil residues or phytoliths will be scraped from the interior surfaces of the vessels with a razor blade (Wang et al 2016).

This research relies on phytolith analysis. Phytoliths or “plant skeletons” occur in the stems, leaves, and stalks of plants (Pearsall 2000: 312). Silica that forms phytoliths is carried up from groundwater as mono-silicic acid before being deposited in other cells of the growing plant. In this study, we primarily focus on identifying rice and millet phytoliths. Rice phytoliths are distinguished by a fan-like shape and numerous small fish-scale decorations on the lateral side (Huan et al 2015) (Figure 1). Domesticated rice tends to have more fish-scale decorations than wild rice (Figure 2). Millet phytoliths are distinguishable by distinctive husks or the silica body shape (Harvey et al 2005). For instance, foxtail millet phytoliths are cross-shaped, and common millet phytoliths are bilobe-shaped (Figure 3).

There are several advantages of using phytolith analysis at Jinsha. For one, phytoliths are abundant in the environment (Dunn 1983: 287). They are deposited in the soil through plant decay, burning and manuring, and are widely dispersed by wind and water. Another benefit of working with phytoliths is that they can be preserved longer than other plant remains. This is because phytoliths are inorganic and do not decay. Phytolith residues are particularly well-preserved in the pores and crevices of pottery, which is an excellent benefit at Jinsha (Hart 2011). The assumption behind sampling vessel residues is that repeated preparation results in some drink permeating the vessel walls (Soleri 2013: 349). The walls later protect the sample over long periods. Finally, phytoliths can survive in a wide range of environments without mechanical breakage (Pearsall 2000: 311). Thus, phytolith resilience is suitable for sites like Jinsha with poor preservation of macroremains or pollen. Scholars have previously used phytolith analysis at sites in South China dating to 10,000 BP. At this time, researchers struggled to find macrobotanical remains; however, they were able to successfully analyze phytoliths from wild and domesticated rice (Huan et al 2015).

Despite the many benefits of phytolith analysis, this proposal outlines potential challenges and solutions we may encounter. Some studies document the transfer of residues from the surrounding soils to nearby artifacts, suggesting that artifact contamination may be an issue (Hart 2011). In one such study, quartzite, flint, and stone tools buried in a shell midden contained residues associated with both the original tool use and the surrounding shell midden. This challenge can be addressed by systematically removing soil associated with the surrounding environment from the sampled artifacts. Another alternative solution is to collect control samples from the vessels’ exterior surfaces and conduct a Mann-Whitney U test, which compares the phytolith counts in residue samples with control samples (Wang et al 2021: 8). If control samples yield significantly lower amounts of microfossils than residue samples, we can reasonably conclude that the presence of microfossil residues is due to cultural practices associated with artifacts rather than natural processes or contamination.

Perhaps a more daunting challenge is identifying species given a phytolith sample. The only diagnostic features for identifying phytoliths are shape and size (Dunn 1983: 288). Shapes are varied, including circular, rectangular, elliptical, or oblong forms. The real challenge is the microscopic size of phytoliths, ranging from 2 to 1,000 microns, with most between 10 to 200 microns. Size is a significant factor in the wide dispersal of phytoliths and makes documentation of place of origin and date of deposition difficult. As a result, many phytolith types are not diagnostic of taxa, even at higher taxonomic levels (Piperno 1991: 162). The accuracy of phytolith morphology identification can be improved by referring to multiple datasets. Potential starting points include a reference collection from over 1,000 Asian and European economically important plant specimens (Wang et al 2016: 1) and existing published literature (Piperno 2006; Lu et al 2009). However, the most comprehensive way of identifying phytoliths is by combining morphological and morphometric analysis. Morphometric analysis often improves taxonomic resolution by measuring the shapes and sizes of phytoliths (Ball et al 2015). Researchers initially seek to distinguish between taxa through simple linear measurements, such as length, width, or a distinctive part of a phytolith. If simple linear measurements prove to be unrevealing, researchers can turn to computer-assisted programming to obtain more complex measurements on size and shape, ranging from the perimeter, fiber length, radius length, roundness, and convexity. Morphometric analysis has been proven to successfully differentiate between rice and millet species (Pearsall et al 1995; Zhao et al 1998; Lu et al 2009, Zhang et al 2011) (Figure 4).

Results

We expect to find rice and millet species in wine drinking vessels from both the northern residential and southern sacrificial areas. Rice and millet were plentiful during the Shierqiao culture, comprising 100% and 60% of samples, respectively (D'Alpoim Guedes 2013: 300). Based on existing research that has confirmed the existence of Jinsha wine-drinking vessels (Wang 2006), Jinsha residents most likely used surplus rice and millet for wine production. Still, Jinsha residents may have used other species for wine production. The Shierqiao culture also marked the introduction of three new cultigens in the Jinsha diet, namely, soybean, wheat, and barley (D’Alpoim Guedes 2013: 300). Morphological and morphometric phytolith testing will be needed to determine if these species are present in Jinsha wine drinking vessels.

The most challenging part of this research proposal is discerning what phytolith residuals tell us about regional alcohol consumption and social status. Suppose we find high concentrations of rice and millet phytoliths in vessels located in the southern sacrificial area compared to the northern residential area. In that case, there may be connections between alcohol consumption, ritual, and social status. For example, alcohol may have been used to connect Jinsha elites. This was the case in the northern Loess Plateau in China, where beer was likely consumed during large public ceremonies and helped facilitate cooperation between elites (Liu 2021: 14). Another possibility is that alcohol was used to foster exclusivity at Jinsha. The specialized knowledge involved in making alcohol often provided a path for elites to facilitate ritual and political authority in early China through feasting events (Liu 2021: 14). On the other hand, suppose we find low or equal concentrations of rice and millet phytoliths in vessels located in the southern sacrificial area compared to the northern residential area. This may suggest a more egalitarian Jinsha society. For example, the sudden shift between cultures for Yangshao societies along the Neolithic Yellow River was accompanied by intensified communal drinking practices (Wang et al 2022). However, based on the evidence of Jinsha as a stratified society, as established in the background, this egalitarian explanation seems less likely.

This proposal recognizes there is limited research examining regional alcohol consumption and social status in Bronze Age China. We plan to fill this gap in knowledge through phytolith analysis of ceramic drinking vessels in Jinsha, a Chinese archaeological site in the Chengdu Plain. Future research is needed to confirm the species represented in Jinsha drinking vessels before making conclusions about social status.

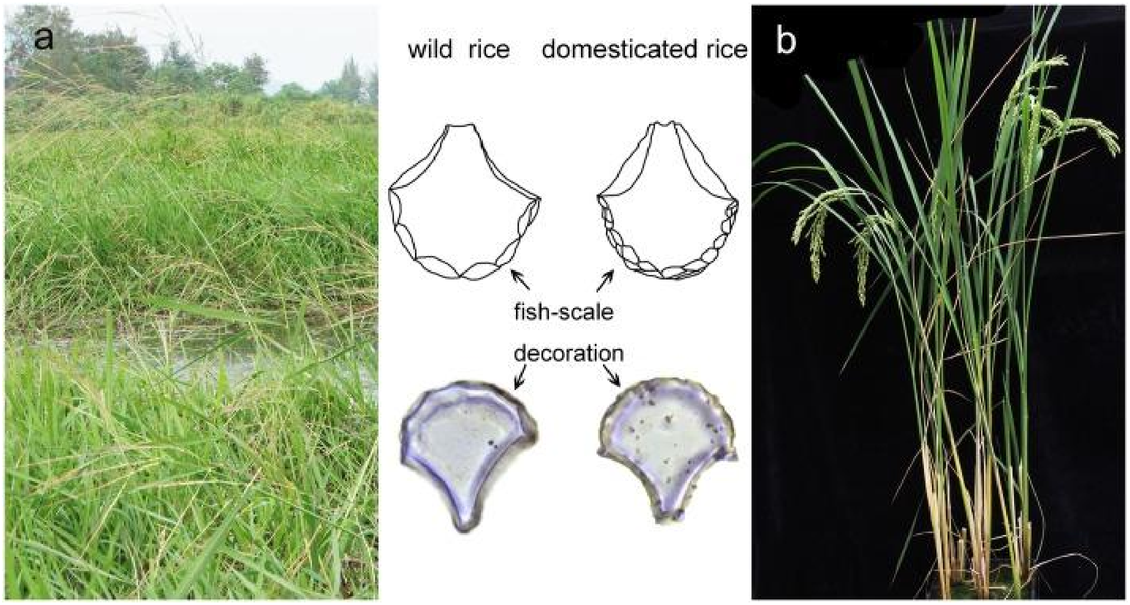

Figure 1: Phytoliths of wild and domesticated rice (Huan et al 2015).

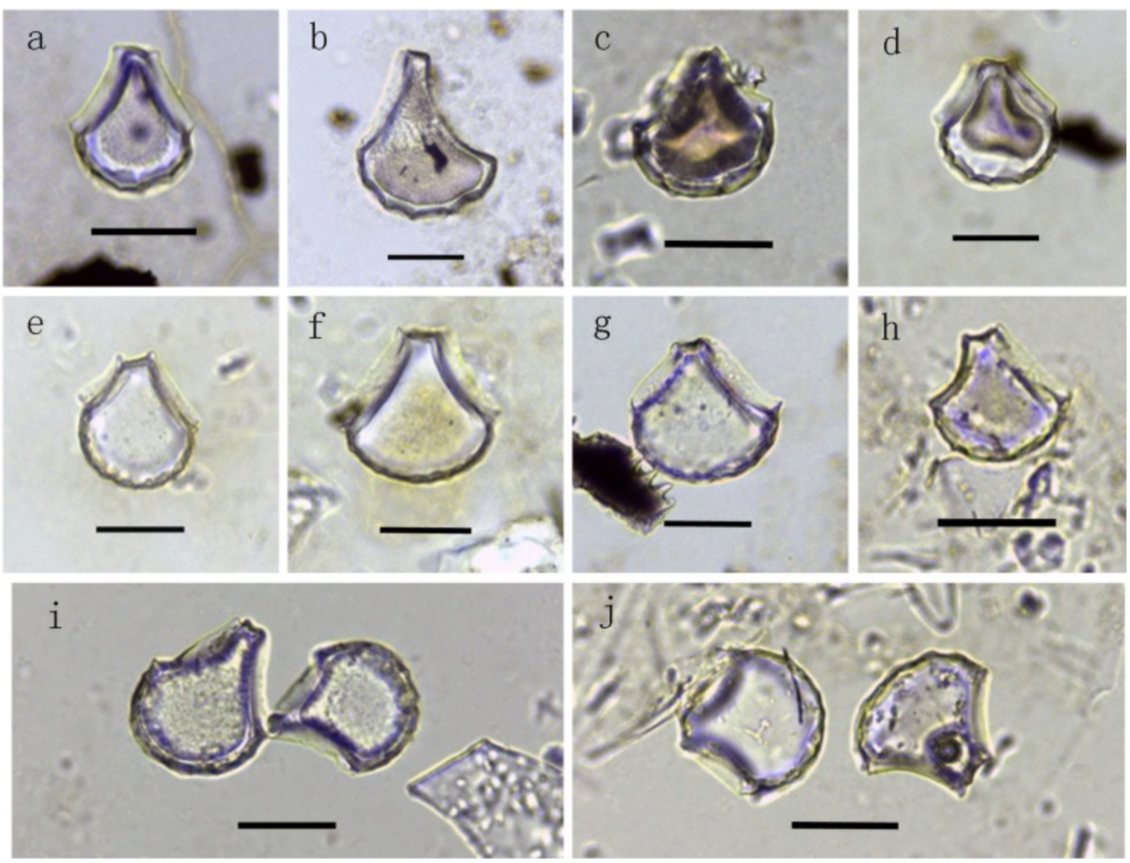

Figure 2: Different variations of rice phytoliths (Huan et al 2015).

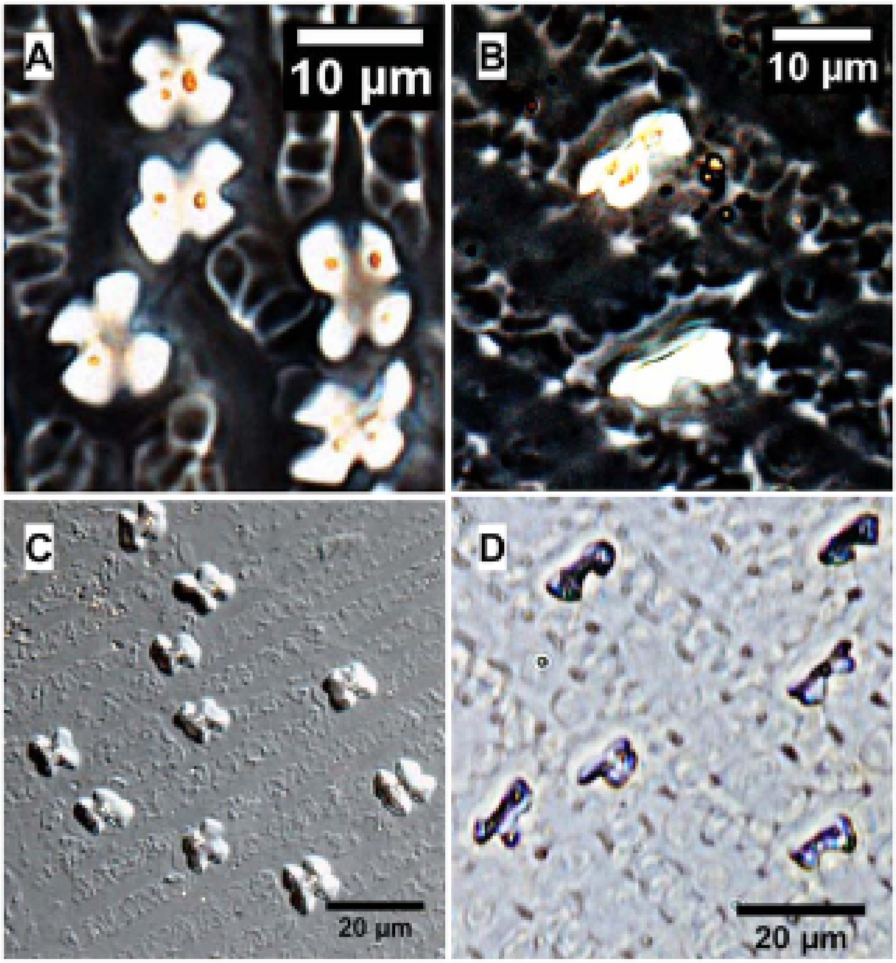

Figure 3: (A & C) Cross-shaped phytolith of foxtail millet, (B & D) Bilobe-shaped phytolith of common millet (Lu et al 2009).

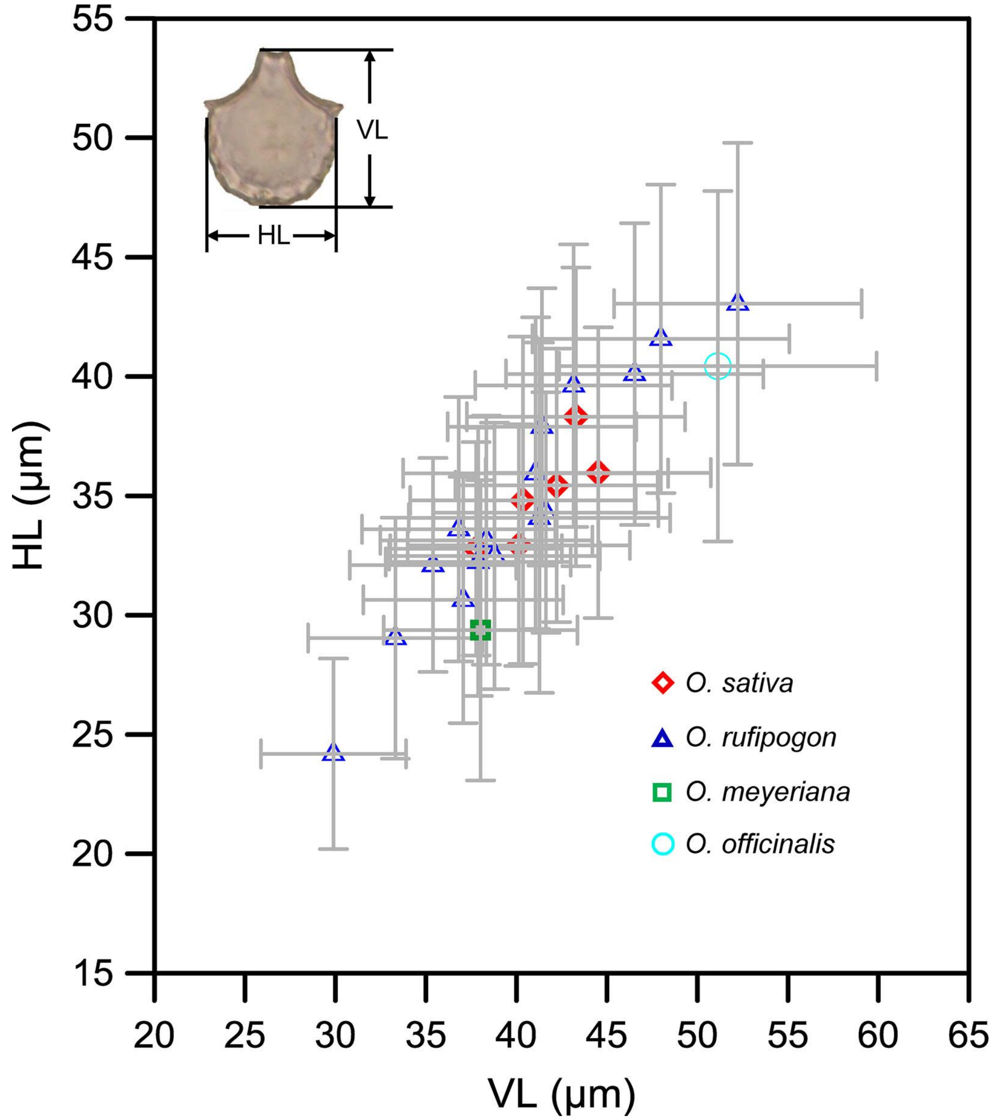

Figure 4: Morphometric analysis findings. *Oryza* phytolith measurements from studied species. VL, vertical length; HL, horizontal length of rice phytolith (Wang et al 2019).

References

Ball, T. B., Davis, A., Evett, R. R., Ladwig, J. L., Tromp, M., Out, W. A., & Portillo, M. (2016). “Morphometric analysis of phytoliths: Recommendations towards standardization from the International Committee for Phytolith Morphometrics.” *Journal of Archaeological Science*, 68, 106–111. https://doi.org/10.1016/j.jas.2015.03.023.

“Chengdu.” Britannica. https://www.britannica.com/place/Chengdu.

Chiang, P. (2015). “Pottery Production and Social Complexity on the Chengdu Plain, Sichuan, China, 2500 to 800 BC.” https://openresearch-repository.anu.edu.au/bitstream/1885/15722/1/Chiang%20Thesis%202015.pdf.

D’Alpoim Guedes, J. (2013). “Adaptation and Invention during the Spread of Agriculture to Southwest China.” https://1library.net/document/rz389nmq-adaptation-invention-spread-agriculture-southwest-china.html.

Dunn, M. E. (1983). “Phytolith Analysis in Archaeology.” *Midcontinental Journal of Archaeology*, 8(2), 287–297. https://www.jstor.org/stable/20707913?seq=1#metadata_info_tab_contents.

Flad, R., Horsley T. J., Guedes J.D., Kunyu H., Bennett G., Chen, P., Shuicheng, L. & Zhanghua, J. (2013). “Survey, Excavation, and Geophysics at Songjiaheba—A Small Bronze Age Site in the Chengdu Plain.” *Asian Perspectives*, 52(1), 119–142. https://www.jstor.org/stable/24569883?seq=1#metadata_info_tab_contents.

Hart, T. C. (2011). “Evaluating the usefulness of phytoliths and starch grains found on survey artifacts.” *Journal of Archaeological Science*, 38(12), 3244–3253. https://doi.org/10.1016/j.jas.2011.06.034.

Harvey, E. L., & Fuller, D. Q. (2005). “Investigating crop processing using phytolith analysis:

The example of rice and millets.” *Journal of Archaeological Science*, 32(5), 739–752. https://doi.org/10.1016/j.jas.2004.12.010.

He, K. (2012). “On the subsistence practices of the Shi’erqiao Culture: Focused on zooarchaeology.” *Chinese Archaeology*, 12(1), 189–194. https://doi.org/10.1515/char-2012-0023.

Hua, S. (2013). “The Sanxingdui Culture of the Sichuan Basin. In A Companion to Chinese Archaeology” (pp. 147–168). John Wiley & Sons, Ltd. https://doi.org/10.1002/978111 8325698.ch8.

Huan, X., Lu, H., Wang, C., Tang, X., Zuo, X., Ge, Y., & He, K. (2015). “Bulliform Phytolith Research in Wild and Domesticated Rice Paddy Soil in South China.” *PLoS ONE*, 10(10), e0141255. https://doi.org/10.1371/journal.pone.0141255.

Jinsha Site Museum. (2006). http://english.jinshasitemuseum.com/About/Introduction.

Kuei-chen, L. “Pottery Production and Social Complexity of the Bronze Age Cultures on the Chengdu Plain, Sichuan, China.” https://escholarship.org/uc/item/3hs2d6k8.

Liu, L. (2021). “Communal drinking rituals and social formations in the Yellow River valley of Neolithic China.” *Journal of Anthropological Archaeology*, 63, 101310. https://doi.org/10.1016/j.jaa.2021.101310.

McGovern, P. E., Zhang, J., Tang, J., Zhang, Z., Hall, G. R., Moreau, R. A., Nuñez, A., Butrym, E. D., Richards, M. P., Wang, C., Cheng, G., Zhao, Z., & Wang, C. (2004). “Fermented beverages of pre- and proto-historic China.” *National Academy of Sciences*, 101(51), 17593–17598. https://doi.org/10.1073/pnas.0407921102.

Pearsall, D. M. (2016). *Paleoethnobotany: A Handbook of Procedures* (3rd ed.). Routledge. https://doi.org/10.4324/9781315423098.

Piperno, D. R. (1991). “The Status of Phytolith Analysis in the American Tropics.” *Journal of World Prehistory*, 5(2), 155–191. https://link.springer.com/article/10.1007/BF00974678.

Portillo, M., Ball, T. B., Wallace, M., Murphy, C., Pérez-Díaz, S., Ruiz-Alonso, M., Aceituno, F. J., & López-Sáez, J. A. (2020). “Advances in Morphometrics in Archaeobotany.” *Environmental Archaeology*, 25(2), 246–256. https://doi.org/10.1080/14614103.2019.1569351.

Soleri, D., Winter, M., Bozarth, S. R., & Hurst, W. J. (2013). “Archaeological residues and recipes: exploratory testing for evidence of maize and cacao beverages in postclassic vessels from the valley of Oaxaca, Mexico.” *Latin American Antiquity*, 24(3), 345–362. https://www.jstor.org/stable/23645680?seq=1#metadata_info_tab_contents.

Qing, Z., Zhiqing Z., & Zhangyi Z. (2002). “Discovery and Studies of the Jinsha Site.” http://www.chinesearchaeology.net/en/Chinese%20Archaeology/Discovery%20and%20Studies%20of%20the%20Jinsha%20Site.pdf.

Wang, C., Lu, H., Zhang, J., Mao, L., & Ge, Y. (2019). “Bulliform Phytolith Size of Rice and Its Correlation With Hydrothermal Environment: A Preliminary Morphological Study on Species in Southern China.” *Frontiers in Plant Science*. https://www.frontiersin.org/article/10.3389/fpls.2019.01037.

Wang, J., Jiang, L., & Sun, H. (2021). “Early evidence for beer drinking in a 9000-year-old platform mound in southern China.” *PLoS ONE*. https://doi.org/10.1371/journal.pone.0255833.

Wang, J., & Liu, L. (2022). “Introduction: Alcohol, rituals, and politics in the ancient world.” *Journal of Anthropological Archaeology*, 65, 101397. https://doi.org/10.1016/j.jaa.2022.101397.

Wang, J., Liu, L., Ball, T., Yu, L., Li, Y., & Xing, F. (2016). “Revealing a 5,000-y-old beer recipe in China.” *National Academy of Sciences*, 113(23), 6444–6448. https://doi.org/10.1073/pnas.1601465113.

Wang, P. *Jinsha Site: A 21st Century Discovery of Chinese Archaeology*. (2006). Chengdu Institute of Cultural Heritage and Archaeology.

Zhang, N., Dong, G., Yang, X., Zuo, X., Kang, L., Ren, L., Liu, H., Li, H., Min, R., Liu, X.,

Zhang, D., & Chen, F. (2017). “Diet reconstructed from an analysis of plant microfossils in human dental calculus from the Bronze Age site of Shilinggang, southwestern China.” *Journal of Archaeological Science*, 83, 41–48. https://doi.org/10.1016/j.jas.2017.06.010.