ABSTRACT. Alcohol consumption is not just a current phenomenon; archaeological findings demonstrate that many ancient civilizations around the world also made fermented beverages from a variety of products, including maize. However, the archaeological study of fermented beverages is not straightforward because the raw materials used in alcohol production are recovered only under exceptional conditions of preservation and the equipment remains are fragmentary. In this paper, our aim is to consider how ethnographical and ethnohistorical data may be used to better interpret the potential archaeological evidence for the production of fermented beverages. Here we use as an example the Middle Horizon site of Marayniyoq, from the Peruvian central highlands to discuss the production of fermented beverages.

KEYWORDS: production, maize, beer, Wari, Ayacucho, Peru.

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TÍTULO: Producción de bebida fermentada en un sitio Wari del valle de Ayacucho, Perú.

RESUMEN. El consumo del alcohol no es un fenómeno actual; la evidencia arqueológica demuestra que muchas de las antiguas civilizaciones alrededor del mundo también produjeron bebidas fermentadas de una variedad de productos, incluido el maíz. Sin embargo, el estudio arqueológico de las bebidas fermentadas no siempre es directo debido a que la materia prima se recupera sólo ocasionalmente y bajo condiciones excepcionales, mientras que los instrumentos y utensilios empleados en dicha producción son fragmentarios. En este trabajo, es nuestra intención destacar cómo evidencia etnográfica y datos etnohistóricos pueden ser útiles para una mejor interpretación de la evidencia arqueológica relacionada con la producción de bebidas fermentadas en el pasado. Aquí utilizamos la evidencia proveniente del sitio de Marayniyoq, perteneciente al Horizonte Medio y ubicado en la sierra central del Perú como un ejemplo para discutir la producción de las bebidas fermentadas.

PALABRAS CLAVE: producción, bebida fermentada, cerveza, maíz, Wari, Ayacucho, Perú.

FOOD AND FERMENTED BEVERAGES ARE AMONG THE MOST ordinary aspects of human life (Pollock 2003: 18). Likewise, “food is intrinsically social” and that “social relations are defined and maintained through food” (Gumerman 1997: 106). Equally, fermented beverages play a crucial role in the economic and political arenas of every society, past and present. Indeed, it is from competitive social interactions that involve drinking that emerge “future leaders, future spouses, and future rivals” (see DeBoer 2001: 230). Therefore, “one wonders how history would have progressed without fermented beverages to toast successes, dull the pain of failure, and in general the establishment of interpersonal relations” (Morris 1979: 21).

The production and consumption of fermented beverages is widespread (Heath 1987: 99; Dietler 1990: 359, 2006: 232; Valdez 2006: 73) and as old as the earliest civilizations (Morris 1979; DeBoer 2001; Dietler 2006; Dietler & Herbich 2001). Of particular interest is that many of the staple crops around the globe, such as rice, barley, wheat, maize and manioc provide the raw materials for the production of alcohol (Jennings et al. 2005), leaving open the possibility that plant domestication perhaps was tied to the production of fermented beverages (Katz & Voigt 1986). The widespread acceptance of fermented beverages is highlighted by the fact that by the time of European colonial expansion, most of the world’s populations consumed some kind of alcohol, North Americans and some inhabitants of the Pacific being the few exceptions (Dietler 2006: 232). Underlining the impor-
Fig. 1. Location of the Middle Horizon site of Marayniyoq in the Ayacucho Valley, Peru.
tance of fermented beverages, among many cultures, the most sacred rituals often include the drinking of some kind of alcohol, and additional occasions to toast a drink are plentiful (Heath 2000; Bray 2003).

For western South America there is tantalizing archaeological and ethnohistorical evidence for the production and consumption of maize beer during Inka times (Cobo 1956 [1653]; Guaman Poma 1980 [1615]; Pizarro 1965 [1571]; Morris 1978, 1979; Morris & Thompson 1985; Murra 1980, 1986; Rowe 1946). For the Inka it is argued that the drink, called chicha or aqa (in Quechua), was made from maize and was available at every main Inka settlement within the empire (Morris & Thompson 1985: 70). Furthermore, drinking chicha had such social, religious, and political connotations that the Inka capital city of Cuzco was recognized as aqa mama or mother beer (Espinoza 1987). Spaniards such as Cobo (1956 [1653]: 218) and Pizarro (1965 [1571]: 192), for example, note that during imperial celebrations, even the mumified bodies of former leaders were dressed in fine clothing and brought into the plaza and offered a toast of chicha. Such was the importance of this beverage that according to Cobo (1956 [1653]), drinking water was a form of punishment.

Furthermore, chicha was an instrument of the Inka political organization. Indeed, the Inka administration understood that by providing chicha the State could mobilize the labor critical for supporting the State infrastructure through the construction of temples, agricultural terraces, roads and bridges (Bray 2003, 2009; Costin & Earle 1989; Morris 1991; Moseley 1992). Due to the vital role of chicha, the Inka administration established at every main Inka site specialized areas dedicated to the production of this beverage (Morris 1979: 27). Such an activity was the responsibility of the aqllas, or chosen women (Cobo 1956 [1643]: 235; D’Altroy 2002: 251). As in the past, across the highland region of the Central Andes, chicha drinking continues to be an important aspect of every social and ritual activity (Abercrombie 1998: 362; Arnold 1993: 120; Meyerson 1989: 49).

The question to ask is whether this relationship between mobilizing labor and maize beer consumption was an Inka invention, or was it already in practice prior to the Inka Empire. Building upon earlier assessments that assert that maize beer consumption in the Central Andes predates the Inka Empire (Gero 1990; Moseley et al. 2005; Valdez 2002, 2006; Valdez et al. 2001), here we further address this issue using archaeological evidence coming from a Middle Horizon (ca. AD 500-1000) Wari site in the Ayacucho Valley of the Peruvian central highlands (fig. 1).

Because of the fragmentary nature of the archaeological evidence for the study of the production and consumption of fermented beverages, it is also our aim to put forward the usefulness of ethnographic and ethnohistorical data as a way of aiding archaeological interpretation. For a region such as the Central Andes, with a long cultural continuity, ethnographic and ethnohistorical accounts provide valuable insight about maize beer production. Indeed, ethnohistorically maize beer production in the Central Andes is associated with a variety of large sized vessels – useful for boiling, cooling, fermenting, and transporting – and grinding equipment – critical for crushing the raw material (Arnold 1983: 57, 1985: 150, 1993: 120). Likewise, ethnohistorical records (Cobo 1956 [1653]: 243), and additional archaeological studies carried out at Inka settlements, continuously associate maize beer production with large sized vessels and grinding equipment (Morris 1979: 28; Morris & Thompson 1985: 74; Hastorf 1990: 168). Dietler (2006: 233) also asserts that the archaeological evidence for alcohol use includes traces of consumption, production, and trading represented in the form of vessels ideal for brewing, transporting, serving, and drinking. As discussed in this paper, the archaeological evidence discussed below parallels the above instances.

**WARI AND THE PERUVIAN MIDDLE HORIZON**

Before presenting the archaeological evidence, we consider timely providing with some reference about the Andean Wari culture. Centuries before the Inkas established the largest empire ever built by a pre-Industrial and pre-Capitalist society in the Americas, the central Andes was the center of the development of the Wari State (circa AD 550-1000). The Wari State was established in the central highland valley of Ayacucho, and around AD 600 managed to expand over a large territory with diverse geography, establishing political authority over many different cultures with varied customs. Within Peruvian archaeology, this period is recognized as the Middle Horizon (Menzel 1964; Lumberras 1974; Isbell 1988; Isbell & McEwan 1991; McEwan 1996; Schreiber 1987, 1992). Wari expansion was followed by profound changes that included the introduction of Wari-style artifacts and standardized architectural complexes into the newly conquered territories, whose indigenous inhabitants often were also relocated as measures to exercise political and economic control by the Wari administration (Schreiber 1992).

The newly incorporated regions and the recently established provincial centers were linked by a network of roads, segments of which were reused centuries later by the Inka Empire. A growing number of Andeanist schol-
ARS assert that several features of Inka sociopolitical organization are analogous to the Wari State, and recently Glowacki and Malpass (2003: 437) have argued that Inka institutions may be rooted in the former Wari institutions (Valdez 2006: 74). This includes the production and distribution of fermented beverages.

AN ARCHAEOLOGICAL APPROACH TO MAIZE BEER PRODUCTION

In an influential paper published almost three decades ago, the late Craig Morris (1979: 27) pointed out that the archaeological evidence for the production and consumption of chicha is not straightforward. Morris correctly noted that the archaeological evidence is often indicated by the broken vessels and abandoned equipment used by the ancient chicha makers. Therefore, few will disagree that without the written records left by the Spaniards, our understanding about maize beer production and consumption during Inka times would be also limited. Because there are no similar records for the earlier cultures that flourished in the Central Andes prior to the Inka Empire, the production and consumption of fermented beverages must be assessed from the analysis of the fragmentary remains uncovered from the archaeological sites. As correctly summarized by Morris, the archaeological evidence consists of the broken vessels and abandoned equipment used by the ancient chicha producers.

Archaeological excavations carried out at the Middle Horizon Wari site of Marayniyoq, in the Ayacucho Valley of the central highlands of Peru, uncovered large concentrations of broken vessels as well as grinding equipment (Valdez 2002, 2006; Valdez et al. 1999, 2001). Both artifact types were uncovered directly over a well preserved and compact floor made of a mixture of diatomite and volcanic ash (Valdez 2006: 60). Consequently, as discussed below, the vessels and the grinding stones are temporally and functionally associated. In addition, it is vital to point out that in two different contexts the fragmented pieces of a polychrome cup (fig. 2) that stylistically has been identified as Chakipampa 1B (Menzel 1964) were found with the remains of broken vessels. The presence of such an artifact in two different contexts with large concentrations of broken vessels further indicates that these two contexts are contemporaneous. A second cup decorated in the Wamanga style (Anders 1989) was also found right above the floor and in association with several large sized vessels and a well polished rocker (the active element of the grinding stones). Within the same enclosure, there also were several grinding stones with polished surfaces (figs. 3 & 4). Moreover, the active parts of these slabs (fig. 5) have been recovered from the same contexts. A series of radiocarbon dates for the various contexts associated with the compact floor and the broken large sized vessels range between AD 780 and 900 (Valdez 2006: 66), therefore well within the time of climax of the Wari State.

Considering form – and therefore function – the vessels from Marayniyoq can be best categorized into two main groups: the first consists of large sized wide-mouth jars and the second of large sized narrow neck jars (Valdez 2006: 63). On the basis of additional attributes, vessels of the first group can be divided into three subgroups. The first is neckless, with a conical base and ovoid body form. The second has a short neck, conical base and ovoid body form. The third variant has a short neck, globular body form and a flat base. Smaller variants of wide-mouth vessels are also present, and overall vessels of this type are plain and with uneven surfaces. Wide-mouth vessels often were uncovered inside small rooms and narrow passages. In several cases, round holes made into the compact floor were found at those locations and in some in-

Fig. 2. A polychrome cup decorated in the Chakipampa 1B style found at Marayniyoq.
stances the lower section (the conical base) of the vessels were still inside the holes, clearly suggesting that wide-mouth vessels were set into such holes. From ethnography, vessels of this type are ideal for storing grains and for cooling and fermenting chicha (Valdez 2002: 78).

The second form of large sized vessels, the narrow neck jars, on the basis of additional attributes can also be divided into two subgroups. The first one is a narrow neck jar, globular body and conical base, which was manufactured following the same criteria used for the wide-mouth vessels. As for the former group, narrow neck and conical base jars were never decorated, and were often found at the same locations as the wide open vessels. This association strongly indicates that both vessel types were used for similar purposes. However, it must be pointed out that these narrow neck jars were already broken and restored in the distant past, thus modifying totally their initial function (fig. 6). We return to this aspect further below.

In contrast, the second variant of the narrow neck jars is different in several instances. The first notable difference is the flat base. In addition, vessels of this subgroup were better manufactured, with a painted and decorated smooth surface, and some even displayed molded faces around the neck. There are smaller versions of jars of this subgroup as well. Overall, the better finished vessels are smaller, suggesting that functionally these may have been intended for a different role. Ethnographically, jars of this type are used for transporting beverages, including chicha (Valdez 1997: 72, 2002: 78, 2006: 63), which leaves open the possibility that the flat based jars from Marayniyoq were used for similar purposes.

In addition to the ceramic vessels, the other equally important evidence uncovered at Marayniyoq is the cut stones, interpreted here as the passive element of the grinding equipment. The cut stones, placed in groups at different locations within the excavated area, are of different sizes. Some are small, measuring on average 60 x 60 cm, but others are truly massive and measure on average 120 x 60 cm. At the time the cut stones were set in place, their surface was flat, except for a small ridge found at one end on the larger slabs. As discussed below, this flat surface was used as the base for grinding, which resulted in some cases in well polished and smooth surfaces, while in others in hollow depressions (Valdez et al. 1999, 2001). Based on ethnographic evidence, we interpret the polished surface and the depressions as the direct outcome of grinding activity. Furthermore, the pol-
ished surface and in particular the depressions must be evidence and outcome of the long and perhaps continuous grinding activity carried out at the site.

Validating the use of ethnographic evidence to interpret the archaeological finds from Marayniyoq, the active component of the grinding equipment was also found at the same locations and thus in association with the stationary stone blocks called maray (Valdez 2002: 77, 2006: 68). The active element, a rocker grinder (also known as milling stones) is locally recognized as tunay. Despite their morphological differences, these two artifact types are functionally complementary (Hastorf & Johannessen 1993: 126; Weismantel 1988: 137). Ethnohistorical accounts also indicate the functional association of these artifact types (Cobo 1956 [1653]: 243). Consequently, the finding of these artifact associated is not at all surprising; instead, this evidence indicates grinding was an important activity carried out at this site.

As discussed elsewhere (Valdez 2006), rocker grinders and their respective passive component occur at many archaeological sites (Hastorf 1990: 163), including the Wari sites. In contrast to the evidence from Marayniyoq, however, such findings consist usually in isolated artifacts. From an ethnographic perspective, such occurrences are consistent with contemporary uses of grinding equipment at household levels. Indeed, across the highland region of Peru, grinding slabs and their active element continue to play a vital role for food processing (Escobar 1976; Meyerson 1989; Weismantel 1988).

For the Inka site of Huánuco Pampa, Morris (1979: 28) uncovered grinding equipment and argued that these were used to crack *qora*, the raw material for *chicha* making (Moore 1989). Father Cobo (1956 [1653]: 243) also provides descriptions about the use of such equipment by the Inka. Compared to the evidence from Marayniyoq, the use of grinding equipment by the Inka is modest. The quantity and size of the grinding equipment uncovered at Marayniyoq clearly suggests that not only massive labor was invested in setting up this facility, but also this center was obviously intended to function for a considerable period of time and produce at a larger scale. The presence of the hollow depressions in the slabs suggests that the facility operated continuously and for a considerable time. Furthermore, the grinding stones (fig. 7) were set up in groups likely because the process of grinding was intended to be carried out as a group work, allowing at the same time social interaction between the working personnel.

Finally, several spindle whorls were found at these locations. From ethnographic and ethnohistorical records it is well known that spinning is an activity with a distinctive female orientation (Gero 1990: 54; Murra 1962: 711, 1983: 107; Rowe 1946: 141). For the case of the Inka site of Huánuco Pampa, Morris (1979: 28; Morris & Thompson 1985: 70) found spindle whorls and concluded that *chicha* production at this site was carried out by women, the *aqllas*. The evidence coming from Marayniyoq points in the same direction, suggesting at the same time that institution such as the *aqllas* perhaps were originally established by the Wari State (Valdez 2006: 74).

Because maize beer production requires large amounts of *qora* (Allen 1988: 140; Meyerson 1989: 49; Moore 1989: 686); see also Jennings and Chatfield 2009; Hayashida 2009) and more importantly *qora* needs to be crushed, the presence of an establishment such as Marayniyoq strongly indicates that maize beer consumption...
such, these jars were no longer useful for storing liquids, such as *chicha*, although that may have been their original function. It is important to point out that according to ethnographic records, cracked jars are not just easily discarded; instead, fractured vessels are often tied with ropes to keep the piece together and used for storing grains and other dry products (Valdez & Valdez 2009). Because vessels used for such purposes are not moved around so frequently, a cracked vessel can function efficiently as any other jar. This appears to have been the case at Marayniyoq, particularly considering the grinding activity carried out at the site.

MAIZE BEER PRODUCTION DURING WARI TIMES

Scholars have long argued that maize beer was produced and consumed during the time the Wari State flourished in the Central Andes. These suggestions were made on the basis of indirect evidence, such as the finding of large ceramic vessels and drinking cups (Anders 1991: 190-191; Cook 2004: 156; Glowacki 2002: 276; Isbell & Cook 1987: 28, 2002: 277; Isbell *et al.* 1991: 43-44; Knobloch 2000: 398; Ochatoma & Cabrera 2002: 236). As discussed by Dietler (2003) and others (DeBoer 2001; Dietler & Herbich 2001; Gero 2003), large sized ceramic vessels are often associated with the production of fermented beverages (see also Arnold 1983). In addition, the location of many Wari highland sites near or in maize producing zones has been considered as further evidence for the consumption of maize beer (Raymond 1992: 22; Schreiber 1984: 76, 1992: 149). Because the finely decorated Wari urn vessels often depict maize (Lumbreras 1980: 44; Menzel 1964: 26), this was another instance used to argue for the consumption of maize beer during Wari times.

Because previous discussions about maize beer consumption during the development of the Wari State was based on less direct evidence, the evidence coming from Marayniyoq is the best archaeological proof for *chicha* production and consumption during pre-Inka times in the Central Andes (Valdez 2002, 2006).

It is timely to stress that human bone residue analysis confirms that maize constituted the subsistence base in the Ayacucho Valley during the time of development of the Wari State. More importantly, according to Finucane (2009: 539), the “carbon isotope values of collagen from Marayniyoq are significantly greater” than those coming from other Wari sites from the same valley and suggest that more maize was consumed at Marayniyoq. It may be that the workers who processed *qora* at Marayniyoq regularly received *chicha*. The finding of serving and drinking vessels (fig. 8) at Marayniyoq strongly indicates that *chicha* was indeed consumed at the site.

As pointed out earlier, the undecorated narrow neck jars, as well as some of the decorated narrow neck jars, were already broken and restored in the distant past. As
many segments of the “Inka Royal Highway” already existed prior to the Inka Empire and there is tantalizing evidence that indicate that at least some of these segments were built by the Wari State (Schreiber 1984: 89).

Therefore, it appears that as many other early civilizations, the Wari State was not an exception when it came to the production and consumption of fermented beverages. The Wari State participated directly in the production and distribution of maize beer as a means of mobilizing labor, a strategy adopted later by the Inka Empire. The presence of a large grinding center in the vicinity to the main Wari capital city and the overwhelming occurrence of oversized ceramic vessels at such location needs to seen as the testimony of the particular importance of maize beer for the Wari administration.

Early ethnohistorical sources such as Cobo (1956 [1653]: 267) argue that in addition to maize beer, chicha made from molle (Shinus molle), known as chicha de molle, was also used during Inka times. Cobo further notes that this type of beverage was actually regarded as being stronger that maize beer. Ethnographic evidence from Ayacucho Valley indicates that in contrast to maize beer preparation that requires boiling, the making of chicha de molle does not require boiling (see Cook and Glowacki 2003: 180; Valdez 2006: 75). Recently, researchers at the Wari site of Cerro Baúl have argued to have uncovered evidence for the production of chicha de molle at that site and suggest that fermented beverages made from molle berries were also used during Wari times, at least at Cerro Baúl (Goldstein et al. 2009). However, the interpretation provided by Goldstein, Coleman and Williams (2009: 147-148; see also Goldstein and Coleman 2004: 527) is not consistent with any known ethnographic evidence regarding the preparation of chicha de molle, that according to these authors requires boiling. Goldstein and Coleman (2004) further note the use of sugar in the preparation of this beverage. Consequently, we caution the interpretation provided for the evidence coming from Cerro Baúl. At the same time, we want to point out that the presence of molle berries at a site does not necessarily imply production of chicha de molle. Molle berries have many different uses. For instance, molle berries combined with chili peppers and fire is a powerful weapon that produces similar effects as tear gas.

DISCUSSION AND CONCLUSION

This paper, first of all, illustrates the usefulness of ethnographic and ethnohistoric information to interpret the
potential archaeological evidence for the production of fermented beverages. As discussed throughout this paper, the uses of such sources allows the identification of the Wari site of Marayniyoq as a specialized facility which function was associated with the production of maize beer. Further archaeological information from know Inka sites provides further comparative information to better interpret the archaeological remains from Marayniyoq. As noted, the Central Andes is rich when it comes to ethno graphic and ethnohistoric accounts, and those accounts have the potential of providing valuable interpretative insight for occupations and activities that occurred centuries earlier and for which there is no written records.

The use of such information as analogy is critical for activities such as the production of fermented beverages that normally leave obscure evidence. It is from that approach and the contextual study of the remains discussed in this paper that we have identified a pre-Inka maize beer production center. Because there are many parallels between the way the better known Inka State produced maize beer and the new evidence discussed here, there also is the possibility that the Inka State perhaps adopted practices and institutions previously established by the Wari State. In particular, it is very likely that maize beer production during Wari times was already an activity carried out by women, who more than likely were the predecessor of the aqllas. As noted, in the Andes and beyond the Andes, the production of fermented beverages implies the use of large sized ceramic vessels. Likewise, every account, that is ethnographic, ethnohistorical, and archaeological findings denote the use of grinding for the preparation of maize beer.

Nonetheless, we are aware of the limitations of this approach, and we are not attempting “to make archaeological data ‘fit’ ethnohistorically known patterns” as Moore (2005: 5, 218) cautions. While we find interesting parallels between the ethnohistorical and ethnographic accounts concerning maize beer production and the archaeological evidence from Marayniyoq, our interpretation is largely based on the contextual association of the archaeological remains, complemented with the functional assessment of the artifacts.

While there are tantalizing parallels between the way maize beer was produced during Wari and Inka times, no Inka facility similar to Marayniyoq has been so far identified. Such absence leaves open the possibility that the

Fig. 8. Serving and drinking vessels uncovered associated at Marayniyoq.
importance and use of maize beer perhaps was more widespread during Wari times than during the development of the Inka State. The major emphasis in occupying grain-producing ecological zones across the highland region is further evidence of the major reliance on maize cultivation by the Wari State. Such emphasis could not be necessarily due to the vital role of maize in Wari subsistence system, but more likely because of the widespread use of maize beer by the Wari State.

In summary, it can be argued that maize beer was an integral part of Wari political organization perhaps in the same ways the Inka used maize beer to mobilize labor, so critical for the building of State infrastructures. We anticipate that future research may reveal the presence of maize beer production establishments at the provincial Wari sites. Furthermore, there may be other instances demonstrating the heavy reliance on maize, which may be a direct result of maize beer consumption. When such information become available, it is possible that we will perceive better the role of fermented beverages within the process of formation, expansion, and consolidation of political organizations such as the Wari State. What has become evident is that this pre-Inka political organization was actively involved in the production and distribution of maize beer, and that the use of this fermented beverage for political ends goes back at least to the Middle Horizon and definitely predate the emergence of the Inka State.

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