Early Horizon gold metallurgy from Campanayuq Rumi in the Peruvian south-central highlands

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Early Horizon (800–200 cal. B.C.) gold artifacts are well known because of their artistic and technological sophistication. This article presents new data for Early Horizon gold metallurgy from the Peruvian south-central highlands by providing descriptions of a gold artifact and ceramic casting mold recovered from the site of Campanayuq Rumi. These objects indicate a technological innovation from techniques employing simple hammering common in Initial Period metallurgy from the south-central highlands and could have related to the pan-regional influence of the Chavín phenomenon.

Los artefactos de oro en el Horizonte Temprano son conocidos por su sofisticación artística y tecnológica. Este artículo presenta nuevos datos sobre orfebrería de la sierra centro-sur del Perú, incluyendo un artefacto de oro y un molde de cerámica para metalurgia descubierto en un contexto del Horizonte Temprano en Campanayuq Rumi, Ayacucho. Esos artefactos evidencian una innovación tecnológica de la técnica del martilleado,conocida durante el Periodo Inicial en la sierra centro-sur y que podría haber estado relacionada conpatrones pan-regionales del fenómeno Chavín.

The objective of this paper is to examine the evidence for Early Horizon metallurgy recovered from a ritual context at Campanayuq Rumi, a large scale ceremonial center in the Peruvian south-central highlands. Evidence of gold metallurgy in the central Andes and adjacent regions can be traced back to the Late Preceramic (2500–1800 B.C.) and Initial Periods (1800–800 B.C.) and is known from sites on the central coast, south-central highlands, and south highlands. In the early 1970's, Joel Grossman discovered dozens of small hammered gold foils as well as an associated tool kit from Initial Period contexts that dated to approximately 1500–1000 cal. B.C. at the small village site of Waywaka in the south-central highlands (Figure 1) (Grossman 1972a, b). This tool kit consisted of a stone anvil and three hammer stones that were probably used to produce thin gold foil from locally available placer gold (Burger 1992: 127; Grossman 1972a: 275). Although this was originally considered to be an isolated example of early Andean metallurgy, more recent investigations have demonstrated other examples of Initial Period metal working. Richard Burger's investigations at the Initial Period center of Mina Perdida found copper and gold foils in the Lurín Valley (Burger and Gordon

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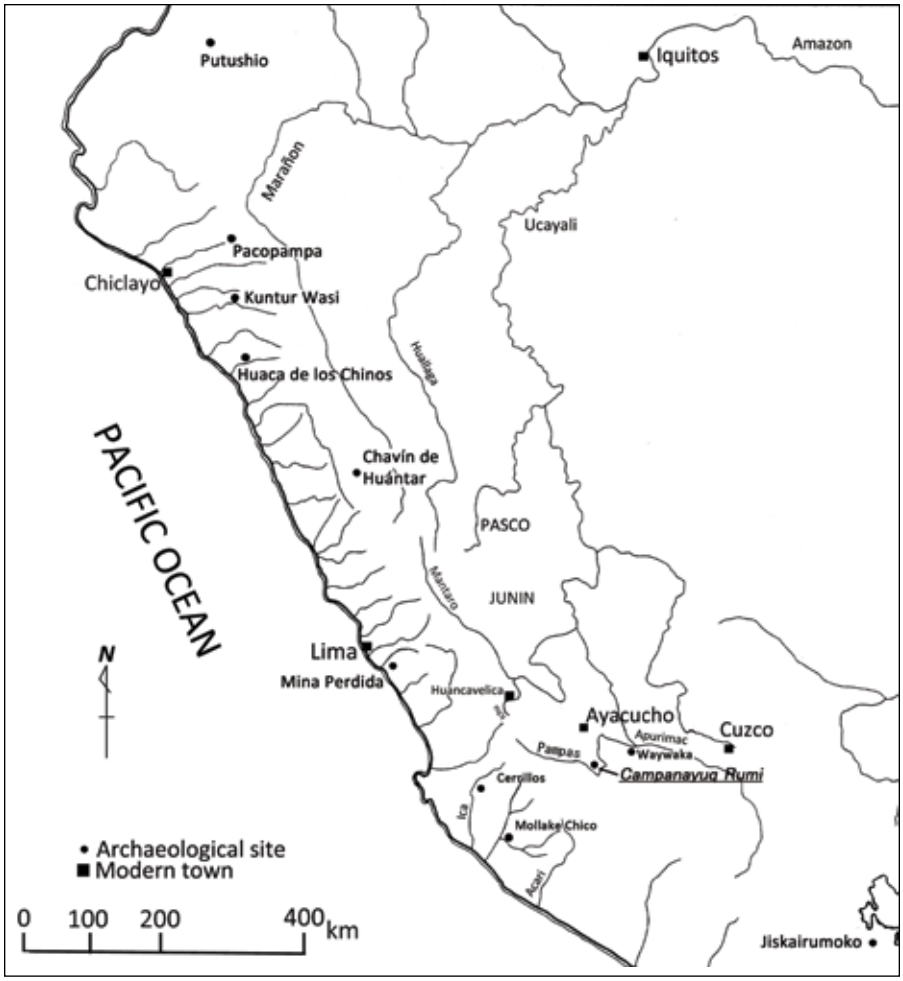

Figure 1. Map of Peru, showing the location of archaeological sites mentioned in this article (Redrawn from Burger and Matos 2002, Figure 1).

1998). Burger and Gordon(1998: 108–9) demonstrated that the gilding and annealing technique had already existed during the Initial Period around 1400–1100 cal. B.C. Further south in the Lake Titicaca Basin,recent research at Jiskairumoko by Mark Aldenderfer and others recovered the earliest known metal working in the Andes (Aldenderfer et al. 2008). A necklace composed of gold and turquoise beads was discovered from a burial dating to around 2200–1900 cal BC. Their research established that the earliest gold working in the Andes dates back to the Late Preceramic Period and was probably used as an early status marker. Although the gold beads were fabricated by hammering and bending native gold, no evidence of annealing was recognized.

In the southern Ecuadorian highlands, Rehren and Temme (1994: 277–278) reported evidence for gold metallurgy at the site of Putushio. They recovered "(T)wo fragments of a ceramic mold" that were associated with a habitation floor dated to 3420+/-235 B.P. Although the large error range made it difficult to specify their chronological position, the age can be estimated to date to approximately 2100–1300 cal. B.C. While gold artifacts were not recovered in association with the mold, gold residues or splashes on the surface suggest "the casting of molten metal into a well-prepared form" (Rehren and Temme 1994: 279).

Ancient metallurgy technology changed radically in the Early Horizon (800–200 cal B.C.). As Burger (1992: 201) observed, "during the Early Horizon large objects of forged and annealed gold and silver with complex Chavín style motifs were produced by a number of techniques which have no known antecedents." In addition, alloys of gold-silver and gold-silver-copper are recognized and metalworkers could have applied the knowledge of different melting points for joining multiple parts (Lechtman, in Burger 1996: 59). Al-

though Early Horizon metallurgy has been discussed mainly based on looted objects and/or museum pieces (e.g., Alva 1992; Lothrop 1941, 1951), new discoveries from the north highlands sites of Kuntur Wasi (Kato 1993; Onuki 1997; Onuki and Inokuchi 2011) and Pacopampa (Seki et al. 2010) suggest that these technological innovations occurred in large scale ceremonial centers coeval with Chavín de Huántar (Burger 1996; Lechtman 1984a).* However, even with an increasing corpus of data, the nature of Early Horizon metallurgy is poorly understood. While artifacts mainly came from the north highlands, it is well known that large amounts of gold artifacts were looted from the north coast, including the Piura, Lambayeque, and Zaña drainages (e.g., Alva 1992; Elera 1992;Kaulicke 1998; Lothrop 1941, 1951). Recent findings at Huaca de Los Chinos in the lower Moche Valley (Pleasants 2009) also demonstrated that gold artifacts existed on the north coast at the beginning of the Early Horizon. In any case, most of the known metal objects are concentrated along the northern region of Peru, and thus it is difficult to discern whether the technological innovations known from this area occurred at a pan-regional level or was instead limited to a few large—scale centers in the north and central highlands such as Chavín de Huántar, Kuntur Wasi, and Pacopampa. In addition, the lack of manufacturing evidence (workshops, tool kits, etc.) makes it difficult to understand the process of Early Horizon metal production.

In our excavations at the Early Horizon center of Campanayuq Rumi in the Department of Ayacucho, a gold piece with Chavín-related iconography and a probable casting mold were recovered from a rich ritual refuse deposit associated with the public architecture (Matsumoto 2010b: 237–238). Since this piece is the southernmost example of a gold artifact with obvious Chavín related iconography, it is important to consider this object in relation to both the Chavín phenomenon and the antecedents of gold metallurgy in southern Peru.

Excavations at Campanayuq Rumi

Campanayuq Rumi is an Initial Period/Early Horizon ceremonial center in Vilcashuaman, Department of Ayacucho, and is located at an elevation of 3600 m asl (Figure 1). Our excavations at the site in 2007 and 2008 demonstrated that Campanayuq Rumi is the largest known ceremonial center in the Peruvian south-central highlands dating to the first millennium BC. While the other contemporary centers in the Ayacucho region such as Wichqana and Chupas (Lumbreras 1974, 1981) are modest in size, the platform complex of Campanayuq Rumi (Figure 2) extends more than 3.5 ha in area and is associated with an additional 11 ha of domestic/residential occupations (Matsumoto 2010b). The only south-central highland example comparable to Campanayuq Rumi in terms of size is Atalla in Huancavelica (Burger and Matos 2002). However, even in the case of Atalla, the extension of the monumental architecture was around 1.5 ha.

The monumental architecture at Campanayuq Rumi is strongly reminiscent of Chavín de Huántar and consists of three stone masonry platforms arranged in a U-shape layout open to the northwest and a platform that encloses a sunken rectangular plaza that measures 33 x 24m in size. Each platform had an extension of at least 65 x 50m and 3 to7m in height.. This type of architectural layout shows strong parallels to the "New Temple" (Rowe 1967) at Chavín de Huántar. The stone masonry used for these architectural elements shows a combination of worked rectangular stones and flat stones which also reminiscent of Chavín de Huántar and is very different from other contemporary centers of the region including Wichqana, Chupas, and Atalla.

One of the most surprising findings was the discovery of a subterranean gallery located in the south platform (Matsumoto 2010b: his Figure 3–13, 14; Matsumoto and Cavero 2010: their Figure 6). The entrance measures 120cm in height and 80cm in width and massive stone beams measuring at least 100cm by 30cm by 30cm were placed across the side walls to form the ceiling. They were carefully quarried or cut to form square columns.In contrast, the side walls were coarsely made with quarried stones and thick mortar. Except for Chavín de Huántar, Campanayuq Rumi is the only known example with the combination of these architectural elements.

Material evidence also suggests that this site maintained close ties with Chavín de Huántar from its

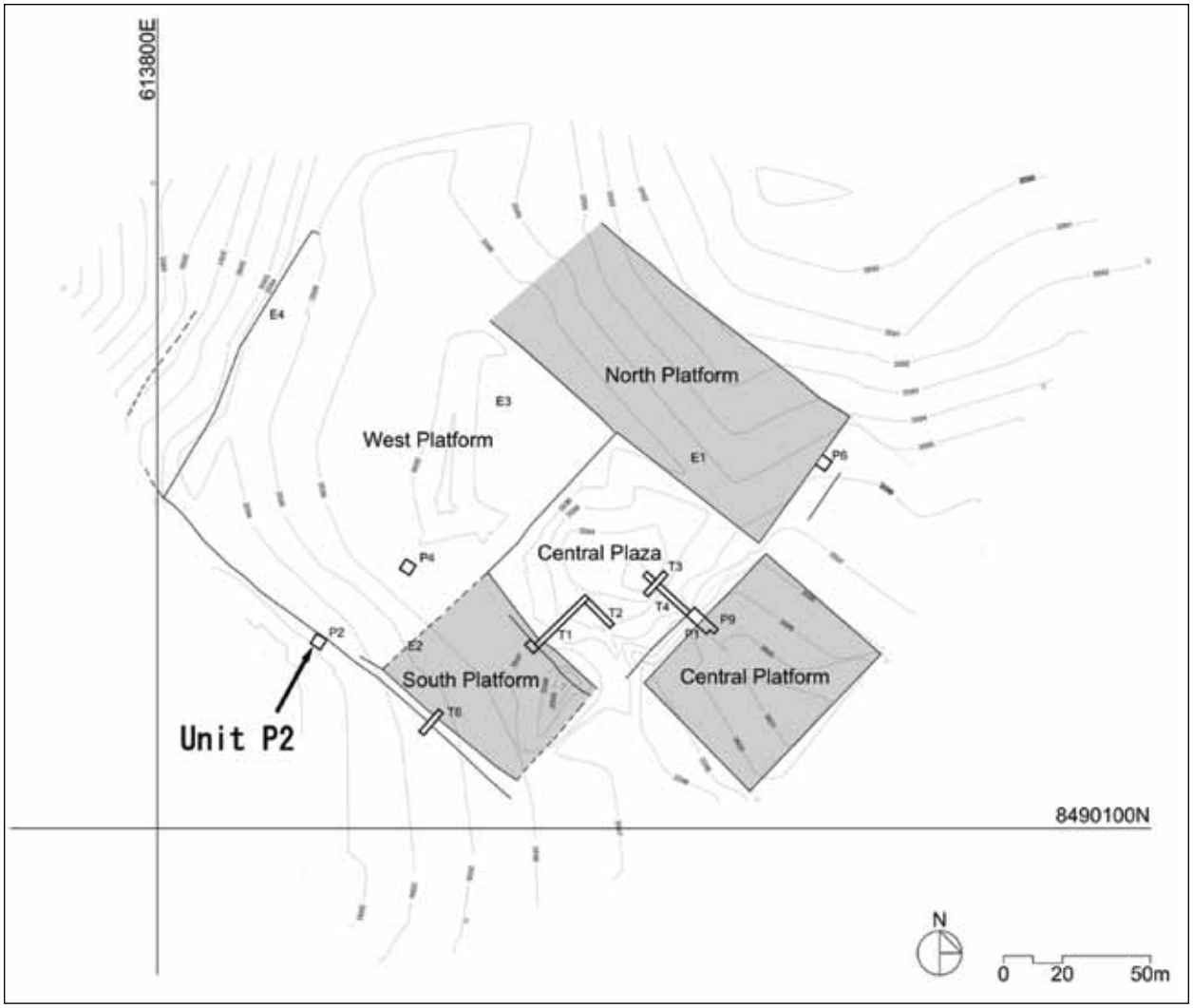

Figure 2. Map of the U-shape platform complex of Campanayuq Rumi showing the location of Unit P2.

foundation around 1000 cal. BC to its abandonment at 500 cal. BC. As we argued elsewhere (Matsumoto and Cavero 2010), the history of Campanayuq Rumi as a ceremonial center is divided into two phases:the Campanayuq 1 Phase (1000–700 cal. B.C.), and the Campanayuq 2 Phase (700–500 cal. B.C.) based on pottery analysis, relative architectural sequence and associated radiocarbon dates.

At the beginning of the Campanayuq 1 Phase (1000 cal. B.C.), a complex of ceremonial architecture was constructed with a U-shaped platform layout, fine stone masonry, gallery and sunken rectangular plaza. Despite the strong similarities to the architecture of Chavín de Huántar, the pottery styles of the Campanayuq 1 Phase closely relate to pottery traditions distributed over a wide geographic region in the south-central highlands and south coast (Matsumoto 2010b; Matsumoto and Cavero 2010). However, in the Campanayuq 2 Phase, the pottery style radically changed and stylistic elements from Chavín de Huántar became more prominent in the material culture of Campanayuq Rumi. Almost all of the pottery styles of the Campanayuq 1 Phase were replaced by forms and decorations typical of the Janabarriu Phase at Chavín de Huántar (Burger 1984). These materials were also associated with a pottery assemblage that is closely related tothe Early Paracas/OcucajePhase 1–4 (e.g., Menzel et al. 1964) style that also shows stylistic affilia-

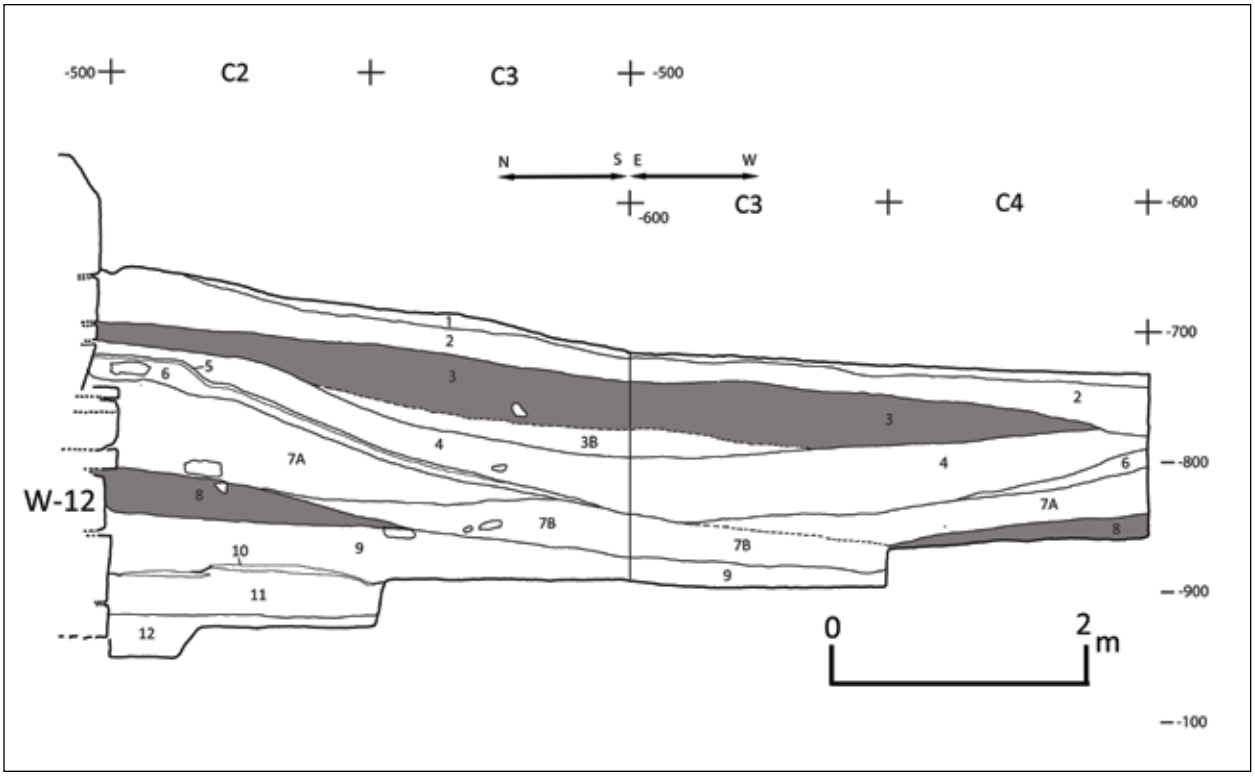

Figure 3. Stratigraphy of Unit P2.

tions to Janabarriu Phase pottery (Burger 1988, 1992). The presence of large amounts of the Early Paracas pottery indicates that Campanayuq Rumi was in contact not only with Chavín de Huántar, but also the societies around the Ica and Nazca drainages as well asthe Paracas Peninsula. In considering the diachronic change of social organizations at Campanayuq Rumi, the most important difference between the Campanayuq 1 and Campanayuq 2 Phases seems to be the appearance of personal ornaments and burials with offerings in the Campanayuq 2 Phase suggesting that asymmetric distributions of wealth emergedaround 700 cal. B.C. In this case, the changes occurring in the Campanayuq 2 Phase fit well with Burger's modeling of the Chavín phenomenon, that is, the emergence of a pan-regional religious network centered on Chavín de Huántar referred to as the Chavín sphere of influence (Burger 2008; Matsumoto 2010b). In this scenario, intensification of interregional interaction with Chavín de Huántar caused a radical socio-economic transformation at Campanayuq Rumi,including the emergence of a social hierarchy with an elite/priestly class.

Evidence of Gold Metallurgy from Campanayuq Rumi

Excavations of Unit P2

A rich midden was recovered from the southwestern area of the platform complex (Unit P2: Figure 2). Although only one 4 by 4m excavation unit was placed because of time and budget constraints, a high density of surface materials were recognized in the area to the south of a platform wall with an approximate extension of 10m (E-W) x 8m (N-S), which might suggest the original extension of the midden deposit. Unit P2 was composed of stratified layers (Figure 3) that contained a large amount of animal bones and pottery sherds as well as ritual paraphernalia (Matsumoto in press). Although radiocarbon dates directly associated with this unit are not yet available, the associated pottery style clearly demonstrates that all the layers of this context date tothe Early Horizon/Campanayuq 2 Phase.

While this midden was mainly composed of a large amount of animal bones, charcoal remains, pottery

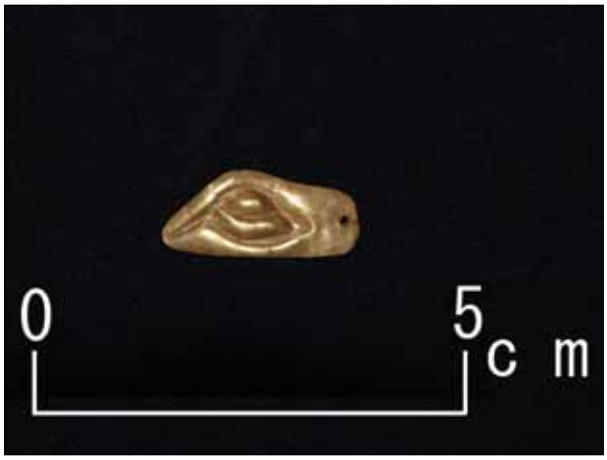

Figure 4. Gold artifact from Unit P2, frontal face.

Figure 5. Gold artifact from Unit P2, back face.

sherds, and obsidian flakes, several unique artifacts that were not recognized in the other excavation units were also recovered. For instance, an unusually high quantity of ritual paraphernalia such as bone snuffing spoons were recovered, suggesting that the midden of Unit P2 was closely related to ritual activities that occurred in the platform complex at Campanayuq Rumi (Matsumoto 2010a, in press). This interpretation is supported by the presence of other unique objects including complete obsidian points, and personal ornaments such as ceramic ear-spools, sculpted bone pins, and a green stone bead. As Matsumoto indicated (Matsumoto in press), this context could have been a "ceremonial trash" deposit (Walker 1995) where objects from ritual activities were deposited for the purpose of desacralizing them.

Figure 6. Pottery sherds from Unit P2, Layer 3.

Gold Artifact

A gold object with Chavín related serpent iconography (Figure 4, 5) was recovered from Layer 3 of Unit P2 (Figure 3 highlighted). As mentioned above, the materials association with the same layer (Figure 6) clearly indicates that this gold piece dates to the Campanayuq 2 Phase.

The gold artifact measured 2.3cm by 1.1cm and wascut from a gold sheet in a serpent-head shape and a lateral face with an eye was rendered in relief. This relief decoration was achieved by an embossing technique that compressesa metal sheet with tracing tools from the back to raise the metal in relief on the front surface (Lechtman, in Burger 1996: 52). This is a new technique that seems to have been introduced in the Early Horizon and has not been recognized from theLate Preceramic and Initial Period. Generally, this technique seems to be an innovation that occurred in the Early Horizon and was frequently used to express complex religious images (e.g., Burger 1996; Kato 1993; Lothrop 1941, 1951; Onuki 1997). Although theimplements used for this technique are not well known, some of the bone artifacts recovered from P2 might have been utilized as tracing tools. Ofthe 113 bone artifacts recovered from P2, 31 specimens were categorized as needles/*tupus*, 27 awls, and 16 spatulas (Matsumoto 2010b: 305–307). Although these implements may have been used for pottery or textile productions, it seems probable that some these bone implements were also used as tools for embossing. In particular, the category of needles/*tupus* include both sharp

Figure 7. Bone artifacts from Unit P2, Layer 4.

Figure 8. Gold nose ornament from KunturWasi, showing small animal heads hanging from the main iconography (KunturWasi Archaeological Project).

and blunt pointed implements that could have used in a different manufacturing stages of gold artifacts. For example, while the sharp pointed bone needles could have been used to draw iconography on a gold sheet, the blunt pointed ones were used as pressuring tools for creating three dimensional reliefs on the surface (Figure 7). Use-wear analysis of these objects will be useful to test this hypothesis in the future.

The type of serpent on this piece is one of the common motifs in Chavín iconography and is found on both the Lanzón and Raimondi Stone sculptures at Chavín de Huántar (e.g., Rowe 1967: his Figure 6 and 10) and can be seen in several other Early Horizon gold artifacts fromthe north coast (e.g., Alva 1992: 42, 49, 56, 57; Lothrop 1941, 1951).The hole near the distal end of this piece suggests that it came from a composite artifact, possibly one similar to a nose ornament recovered from Kuntur Wasi (Figure 8; Onuki and Inokuchi 2011: 126–127). Therefore, it seems highly probable that this piece was a part of a larger ornament such as a nose pendant, pectoral or crown, and was connected to it with a narrow metal band or string (Figure 8). In general, the serpent motif tended to be used in marginal parts of the iconography such as hair, eyebrows or beards of the main iconographic figure as seen in the cases of the Lanzón and Raimondi stone sculptures. Following this line of thought, it seems probable that this serpent could have been one of many similar pieces that represented hair or a beard and surrounded the main iconography such as the feline god in the Chavín pantheon. This idea seems resonant with our hypothesis that this gold artifact was a part of a larger object.

In addition, the artifact's association with other ritual paraphernalia indicates that special costume elements were involved in the ritual ceremonies carried out at the ceremonial core of Campanayuq Rumi (Matsumoto 2010a). In sum, this gold piece implies that the emerging elite class of the Campanayuq 2 Phase carried out religious ceremonies wearing special costumes with personal ornaments including gold objects. As Matsumoto (2010a) discussed elsewhere, it seems reasonable to assume that people at Chavín de Huántar and Campanayuq Rumi shared specific religious experiences generated by similar ceremonies, which reflects the embracing of the religious ideology of Chavín de Huántar referred to as the "Chavín cult" (Burger 1988, 1992).

Figure 9. Ceramic gold working crucible (1).

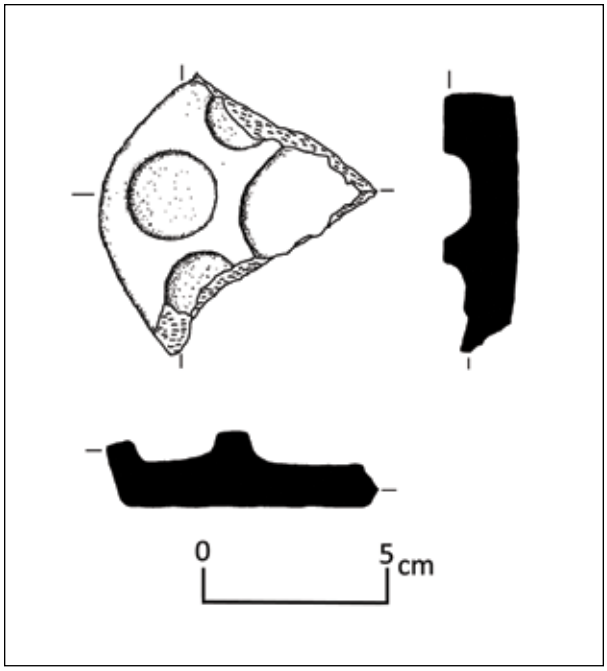

Figure 10. Ceramic gold working crucible (2).

Ceramic Casting Mold

A unique ceramic artifact (Figure 9, 10) was recovered from Layer 8 of Unit P2 (Figure 3 highlighted). It presented a form of ceramic plate measuring 2cm in thickness. Although the original form was difficult to reconstruct, it could have had a rectangular shape with rounded corners. Four circular depressions were placed on the surface. A large depression was located at the center and the other smaller depressions surrounded it. While the large depression could have measured at least 4cm in diameter, the other ones measured 2.5cm in diameter. While the depth of small depressions is 0.7–0.8cm, the large one measured 0.9 cm deep. It is possible that the large depression was semi-rectangular in shape with rounded corners instead of a circle. The surface was evenly smoothed and finished with a matte surface treatment though the bases of the depressions were rougher than other parts. The back surface was flat and smoothed as the frontal surface. The paste was coarse grained and included high amounts of feldspar showing a dark grey color caused by reduced firing.

Recent publication of the Early Horizon site of Cerrillos in the mid-valley of the Ica drainage (Splitstoser 2009; Splitstoser et al. 2010) provides an important clue to interpret this ceramic object from Campanayuq Rumi. Very similar objects were found from contemporary contexts (Ocucaje Phase 3) at Cerrillos (Figure 11, 12), and the investigators interpreted them as "paletas de ceramic para trabajo en oro (ceramic palettes for goldworking)" (Splitstoser et al. 2010: 230). Jeffrey Splitstoser (2009: 8–9) noted that the two palettes were ceramic, and contained "tiny gold prills (a small aggregate of a material formed from a melted liquid)". The Cerrillos ceramic artifact shows a partially vitrified surface (Splitstoser et al. 2010: Fig 15 c-d) that could have been formed by repetitive exposure to high temperature. These traits suggest that the "palettes" are casting molds for gold working and Splitstoser believes that they represent the earliest known indirect evidence of metallurgy on the south coast (Splitstoser 2009: 8–9). The two specimens of Cerrillos presented by Splitstoser (Splitstoser 2009: 923–924) had one circular depression at the center and the others surrounding it (Figure 11), which is the same pattern as the artifact from Unit P2. According to Splitstoser (personal communication), the ceramic molds from Cerrillos show close similarity to the piece from Campanayuq Rumi. Although no gold "prills" were

Figure 11. Ceramic artifact from the Cerrillos site (Courtesy of Dwight Wallace).

Figure 12. Profile of the ceramic artifact from the Cerrillos site (Courtesy of Dwight Wallace).

recognized in the P2 specimen, white sediments coat the bases of the depressions in the Campanayuq Rumi specimen (Figure 9), which could have caused by the fabrication of gold artifacts. According to the Reheren and Temme (1994: 277), the ceramic mold used for early gold metallurgy at Putushio was covered with "carbonate sinter". We now think that the sediments observed in the object from Campanayuq Rumi could represent something similar. Later evidence of copper metallurgy from northern Argentina and Chile also provides important clues to interpret the white sediments (e.g., González 2010; Niemeyer et al.: 349; Raffino et al 1996). Casting molds recovered from Sitio 15 in northwest Argentina showed "baño blanquecino" (white coat) in the interior and it mainly consisted of hydroxyapatite (González 2010: 56–57), which suggests the use of bone ash to line molds to protect the mold surface from erosive action by melted metal (González 2010: 57) and to help remove the ingots (Niemeyer et al.1993: 349). It is worth noting that a photo of the Cerrillos specimen (Figure 11) also shows probable white sediments similar to the case of Campanayuq Rumi specimen. In the future, it will be important to conduct technical analysis such as X-Ray Diffraction (XRD) and Energy Dispersive Spectroscopy (EDS) of these ceramic objects of Campanayuq Rumi and Cerrillos to obtain comparable data to the Argentine examples. These data, though indirectly, suggest that, the depressions in these objects were used as molds to melt gold down and create ingots for the purpose of fabricating gold sheets.

Ceremonial Trash and Gold Metallurgy

Although the available data set is limited, it is necessary to consider the reason why the gold artifact and casting mold appeared from Unit P2 in association with other ritual paraphernalia including bone snuffing spoons. As discussed above, this context represents a "ceremonial trash" deposit for the disposal of ritually charged artifacts (Matsumoto, in press; Walker 1995), which might suggest that the production of gold artifact contained a ceremonial character.

From the same context, large amounts of obsidian flakes, cores and hammer stones were accompanied by many complete obsidian points (Matsumoto 2010b: 582, in press). Since these obsidian points were different from the highly deformed points recovered from domestic contexts, it was hypothesized that they were made for specific ceremonial events and then discarded with their production debris (Matsumoto 2010a, in press). As William Walker (1995) suggested, special treatment in discarding and de-sacralizing religious objects are recognized cross-culturally. This might partially explain why all the evidence of gold metallurgy at Campanayuq Rumi appeared from this context.

As Heather Lechtman stated (1984b: 9), "in the Andes, metals performed in the realm of the symbolic, in both the secular and the religious spheres of life". In addition, all the Early Horizon gold objects seem to have used as parts of ceremonial costumes representing religious iconography (e.g., Alva 1992; Burger 1996; Burger 1996; Onuki and Inokuchi 2011; Seki et al. 2010).Therefore, it seems reasonable to assume that the fabrication process of metal artifacts contained ceremonial dimensions.

Recent investigations in the Lake Titicaca Basin by Carol Schultze also suggest that Pre-Hispanic metallurgy in the Andes was tied to ceremonial centers (Schultze 2008; Shultze et al. 2009). Her excavations at the site of Huajje demonstrated that silver working was carried out at a U-shaped ceremonial center as early as the first century A.D. until the colonial period. She and her colleagues conclude that their data "alter our understanding of U-shaped structures and indicate that along with their ceremonial functions, the structures also were used for industrial metal working" (Schultze et al. 2009: 17283). However, it seems alternatively reasonable to hypothesize that the data from Huajje suggest a ritual-ceremonial character embedded in Pre-Hispanic metallurgy in the Lake Titicaca Basin.

Although we are not making direct analogies between these examples and the Early Horizon South Central Highlands, the ritual character of gold metallurgy at Campanayuq Rumi seems to be a good working hypothesis to partially explain the association of the gold artifact and casting mold with other ritual paraphernalia.

Discussion

Although the gold artifact from Campanayuq Rumi showed strong stylistic affiliation to Chavín iconography, it is difficult to know without sourcing analysis whether it was brought from another northern center such as Chavín de Huántar or locally fabricated. However, the presence of the casting mold suggests local fabrication of the gold artifact.

As the data from Waywaka demonstrated, the Peruvian south-central highlands had a tradition of gold metallurgy beginning in the Initial Period (Grossman 1972a). Campanayuq Rumi is located in close proximity to Waywaka, approximately 60km to the west of the site, and the Initial Period (the Campanayuq 1 Phase) pottery assemblage at Campanayuq Rumi included large numbers of specimens similar to the MuyuMoqo style of the Waywaka site (Grossman 1972b; Matsumoto 2010b; Matsumoto and Cavero 2010). Therefore, it is possible that people at Campanayuq Rumi had known of the technology of early metallurgy recognized fromWaywaka, such as fabrication of gold foils before the Early Horizon.

However, the use of a casting mold is a significant technological leap in metallurgy from the relatively simple technique recognized at Waywaka. Although metal working evidence from Mina Perdida demonstrated the presence of the annealing technique in the Andes during the Initial Period (Burger and Gordon 1998), and Grossman pointed out the possible presence of the same technique in the Waywaka specimens (Grossman 1972a: 275), there is no evidence of the use of casting molds for metal working.

In contrast, it seems certain that the Early Horizon metallurgy of the north and north-central highlands represented by Chavín de Huántar and KunturWasi (Burger 1996; Kato 1993; Lechtman 1984a) included the technique of soldering, welding, and making binary or ternary alloys using gold, silver, and copper. In addition, gold needed to be melted down to form ingots large enough for the manufacture of objects with complex iconographies thatwas well beyond the technical limitations of hammering placer or natural gold (Burger 1996: 60).

A plausible hypothesis would be that the people at Campanayuq Rumi and Cerrillos learned advanced metallurgical techniques from northern centers on the basis of local traditions of gold working that developed by the beginning of the Early Horizon around 800–700 cal. B.C.

Burger argued that the central Andes witnessed the emergence of complex societies in relation to the expansion of religious ideology from Chavín de Huántar during the Early Horizon and that this phenomenon was associated with technological innovations in metallurgy, stone working, engineering, and textiles with religious iconography that show clear affiliations

to those of Chavín de Huántar (Burger 1988, 1992). Since both Campanayuq Rumi and Cerrillos present strong influence associated with the Chavín phenomenon (Matsumoto 2010b; Splitstoser et al. 2010), the casting molds and gold artifacts might be interpreted as a result of their participation in the Chavín sphere of influence (Burger 2008). This hypothesis also partially explains the gap between the local early metallurgy of Waywaka and the more advanced technology and sophisticated iconography recognized in the data from Campanayuq Rumi and contemporary sites in the south coast.

However, the possibility of local technological achievement in the Early Horizon needs to be evaluated as an alternative hypothesis, since no manufacturing tools have been discovered at Chavín de Huántar or other north highland centers, and the direct evidence of metallurgy at these sites is still scarce. As Matsumoto observed (2010b: 277), although both the Early Paracas and Campanayuq 2 Phase pottery can be categorized as "Janabarriu related ceramics" (Burger 1992: 213), no typical Early Paracas style pottery specimens with negative painting or resin painting were recognized at Chavín de Huántar. With the abundant presence of the Early Paracas style pottery in the Campanayuq 2 Phase, it is highly probable that the relationships between Campanayuq Rumi and the contemporary south coast culture (Early Paracas) were much stronger than those between Early Paracas and Chavín de Huántar. Therefore, it seems possible that interregional interactions between Campanayuq Rumi and societies of the south coast facilitated local technological advances. In this case, the use of casting molds with circular depressions could have been a regional technology that was limited to the south coast and south-central highlands, which reflects regional differences in metallurgy that coexisted within the more notable pattern of shared metallurgical techniques in the Chavín sphere of influence. A similar style of casting mold shared between Campanayuq Rumi and Cerrillos might rather suggest intensified contacts between the south-central highlands and south coast. However, their interactions began with the appearance of the Chavín-related elements in architectural, pottery, and textile styles and thus are still related to the Chavín phenomenon.

Concluding Remarks

Considering its artistic sophistication and technological advancement (Alva 1992; Lechtman in Burger 1996; Kato 1993; Lothrop 1941, 1951; Onuki 1997), the Early Horizon represents one of the turning points in Andean metallurgy. Our findings from Campanayuq Rumi support the idea of technological innovation in the Early Horizon. However, it is still necessary to evaluate whether this innovation was a local phenomenon or whether it can be tied to the pan-regional pattern of the Chavín phenomenon. Although we think our discussion supports the latter hypothesis, it seems important to consider how Early Horizon metallurgy emerged as a part of a sophisticated art style with advanced technological innovation in northern Peru. The comprehensive framing of the evolution of Andean gold metallurgy is beyond the scope of this article. However, we should at least attempt to place our argument in a broader geographical and historic context.

In this article, we discussed that the use of casting mold could represent a technological innovation in the metallurgy of Peruvian south central highlands and suggested the possibility that it was introduced from large-scale northern centers including Chavín de Huántar. While the gold artifacts of the Early Horizon Andes are well known because of their artistic sophistication and technological complexity (e.g., Alva 1992; Lechtman in Burger 1996; Lothrop 1941, 1951), the antecedents and the regional processes of gold metallurgy before the Early Horizon are not well known.If the use of casting molds at Campanayuq Rumi came from the northern centers, it is tempting to interpret their origins to the early metallurgy at Putushio in the southern Ecuadorian highlands (Rehren and Temme 1994) as a sort of antecedent for the Early Horizon metallurgy in the northern Peru. Although it seems clear that the northern frontier of the Chavín sphere of influence can be delineated to the north of the Lambayeque-La Leche drainage and the societies in southern Ecuador did not participate in the interregional network centered on Chavín de Huántar during the Early Horizon (Burger 1988; 1992; 2003), multiple lines of evidence indicate the presence of interregional interactions between northern Peru and

southern Ecuador before the Early Horizon (e.g., Guffroy 2008). Several archaeologists observed stylistic similarities in pottery styles between Initial Period northern Peru and contemporary Late Formative southern Ecuador (e.g., Elera 1993; Guffroy 2004, 2008;Lathrap et al. 1985; Valdez 2008; Staller 2001).In addition, as Warren Church discussed (1996) the presence of cave sites such as Manachaqui Cave suggests active interregional travel and communication during the Initial Period between northern Peru and the Ecuadorian highlands and coast. Therefore, although the available data are scarce, an early tradition of gold metallurgy might have been shared between southern Ecuador and northern Peru.

Considering the limited corpus of data, this argument is still highly speculative and obviously more data and more technical studies are required before the cultural connections between the southern Ecuadorian metallurgical tradition and that of the Initial Period and Early Horizon Peru can be explored further. Specifically, the data on manufacturing processes and gold sourcing is crucial for the purpose of better understanding the nature of metallurgy in relation to the socio-economic transformations that occurred in the central Andes during the Early Horizon.Future technical analyses of the molds and gold artifact from Campanayuq Rumi and Cerrillos will be a good case study to consider the technological and cultural connections between the Chavín related centers to the north and distant regional centers of the south-central highlands and south coast.

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Note

There is an ongoing debate about the chronology of Chavín de Huántar and the nature of the Chavín Phenomenon (Burger 1992, 1993, 2008; Burger and Salazar 2008; Kembel 2008; Kembel and Rick 2004; Rick et al 2010). Richard Burger argued that Chavín de Huántar was founded around 1000 cal. B.C. and was transformed into the principal civic/ceremonial center of a pan-regional religious network around 500 cal. B.C. (Burger 2008). However, John Rick and colleagues recently concluded that Chavín de Huántar was founded between 1500 and1200 cal. B.C. and collapsed around 500 cal. B.C. (Kembel 2008; Rick et al. 2010). In addition, Rick and his colleagues consider that Chavín de Huántar was not the only center that influenced other coeval centers but rather it was *primus inter pares* (Kembel and Rick 2004).

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