ICONOGRAPHY OF TRANSFORMATION: THE QUESTION OF HALLUCINOGENIC REMNANTS IN RITUAL ARTIFACTS AT CHAVÍN DE HUÁNTAR

by

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ABSTRACT

RYAN MICHAEL NOOE. Iconography of transformation: the question of hallucinogenic remnants in ritual artifacts at Chavín de Huántar. (Under the direction of DR. DENNIS OGBURN)

In a mountain valley of the South American country of Perú rests a site at the core of an ancient and influential culture. That site is known as Chavín de Huántar, a relatively small area which boasts monumental architecture and carved images of supernatural creatures as well as processes of priests transforming into anthropomorphic, non-human animals. The foundation of power at this site, as well as the cause of its unique iconography, has been argued to be the result of hallucinogenic drug-use. However, there is no biological evidence of hallucinogenic plants at the site to support this theory. The concept itself has persisted without any real question or reanalysis based on ethnographic analogy and interpretations of the highly stylized images at Chavín de Huántar. Originally, it was my intention to retrieve samples from Chavín artifacts believed to be associated with the practice of consuming hallucinogenic snuff. However, I was unable to obtain these samples and had to seek data from a culture existing at the same time and believed to have been within the Chavín "sphere of influence". I was successful in obtaining samples from ceramics of the Paracas culture. Three of the samples were then analyzed using Liquid Chromatography Mass Spectrometry. The first round of analysis, utilizing a less complex mass spectrometer, produced results suggesting the presence of multiple alkaloids, including cocaine and ergotaman (ergocryptine). The second round of analysis, utilizing a normal mass spectrometer, produced more complex results with possible molecular mass matches to various amino acids, some alkaloids, and even a few

hormone-related compounds. The implications of these results are unclear, but it *is* clear that the contents of the Paracas vessels are in need of greater analysis. Also, these results suggest that this same analysis can be successfully applied to Chavín artifacts and will most likely produce results that are equally interesting.

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TABLE OF CONTENTS

INTRODUCTION 1

CHAVÍN DE HUÁNTAR 3

METHODS 32

DISCUSSION 51

CONCLUSION 54

REFERENCES 57

INTRODUCTION

Chavín de Huántar is a site in Northern Perú dating to over 3,000 years ago. Among multiple aspects of the site that make it unique, the most well-known is its supernatural iconography, depicting therianthropomorphic beings (part human, part non-human animal in physical form) as well as processes of physical transformation. My purpose for studying this site is to bring to the foreground what I argue to be a weakly supported explanation for the creation of Chavín's imagery. It is currently accepted, and has been for at least a few decades, that the priests who controlled this site as well as local inhabitants and travelers from elsewhere consumed, in some way, plants containing psychedelic chemicals (Burger 1992a; Rick 2005; Burger 2011). And while comparable claims have been tested in some locations of various time periods through chemical analyses, no such study has been done for the site of Chavín. Rather, through interpretation of the site's iconography and analogy with other, even current, examples of hallucinogenic drug-use, it has simply been assumed and accepted that this was also the case for ritual practice at Chavín de Huántar. Initially, my intention was to seek out appropriate artifacts taken from the site such as mortars, pestles, and snuffing spoons/tubes that are argued to have been used in the creation and consumption of hallucinogenic snuff to collect residues for chemical analysis. However, due to numerous obstacles, I was unable to obtain my ideal samples within a reasonable timeframe. I was placed in a difficult situation without any data. If any samples could have been taken from the available artifacts, my plan would have been to analyze them using a mass-spectrometer, which would allow the potential identification of chemicals that signal the presence of either of the two psychoactive plants that might have been used at the Chavín

site: the San Pedro cactus or the Anadenanthera tree. Based on those findings, or lack thereof, I intended to provide a reanalysis of the current explanation of hallucinogenic drug-use at Chavín de Huántar. It is my assumption that there may be another, over-looked explanation that does not involve the use of hallucinogens. The development of that alternative, however, can only be justified if the research I propose is done, if no traces of hallucinogens are found, and if additional evidence suggests another possibility. However, since I was unable to obtain the necessary samples, I chose instead to accept a contingency proposed by my committee chair. This contingency involved the collection of samples from artifacts that belong to the Paracas culture of southern Perú, which has been argued to share similarities with Chavín culture (Menzel et al. 1964). In this work, I intend to introduce the site of Chavín de Huántar and its iconography. In addition, I will point out the flaws with the current explanation as well as cover my analysis of select Paracas ceramics from the Mint Museum in Charlotte, North Carolina. This, in turn, will support my argument for the critical importance of archaeobotanical research at the site of Chavín de Huántar as well as further research at associated sites.

CHAVÍN DE HUÁNTAR

The Early Horizon of Andean Chronology is a time period characterized by the wide-spread political and religious influence of the Chavín Religious Tradition based at the site of Chavín de Huántar. This ideologically-based polity is said to have lasted from around 900 to 200 B.C.E. However, more recent research suggests a primary occupation between 1200 and 500 B.C.E. (calibrated radiocarbon dates) from the start of architectural construction to the site's collapse (Conlee and Ogburn 2005; Rick 2005; Kembel and Haas 2013). The remains of the site are located in the upper Mosna Valley of northern Perú at around 3,200 meters above sea-level (Druc 2004). Existing nearly two-thousand years before the more well-known Inca Empire of the Andes, this ancient ritual site is described by Richard Burger as one "that rivaled Inca Cuzco in grandeur and beauty" (Burger 1992a: 265).

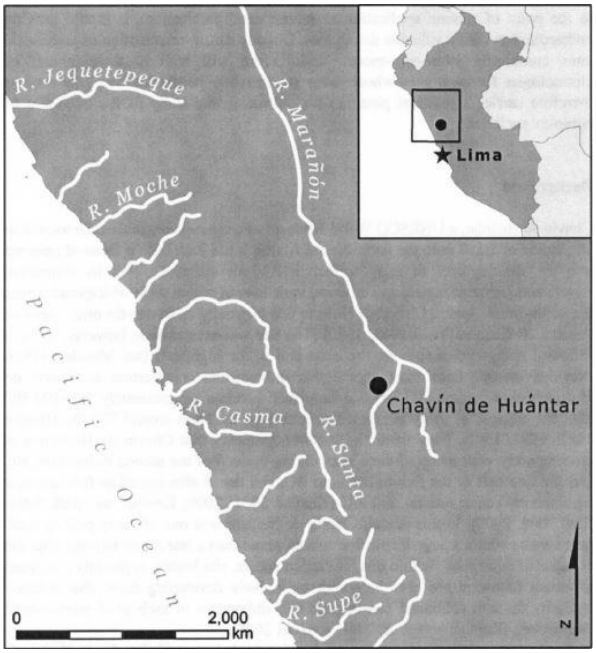

Figure 1. Chavín de Huántar's location in Perú
Source: Feathers, et al. 2008

The Sphere of Influence and Interaction

Chavín de Huántar sits at a natural junction between the Peruvian coast to the west, the tropical forest to the east, and the highlands of the Andean mountain range to the north and south. This makes it a perfect "crossroads" for groups traveling throughout the Andean area of South America (Druc 2004). While Chavín is described as an "invented tradition" based on its collection of concepts and designs from various peoples that passed through the area, it is still its own unique site; unlike any other, and yet, like many others (Burger 1992a). It is also known to have had a significant impact on other cultures and groups in and near the Andes. Richard Burger describes Chavín as an "oracular center with a pan-regional influence comparable to Jerusalem or Rome in the Old World" (Burger 2008). Burger also explains that archaeological evidence suggests interaction between the Chavín "polity" and areas of various climates and resources, including Junin, Pasco, and Huánuco in central Perú as well as the area of Ayacucho in southern Perú (Burger 2008). Chambers containing offerings to the site showed remains of pottery and other artifacts originating from the north coast (the Cupisnique culture and Jequetepeque river drainage), the north highlands (the Pacopampa culture), and the southern highlands from sites such as Kotosh (Burger 2008). In the introduction to a journal volume on early Andean power, Christina Conlee and Dennis Ogburn argue that Chavín artifacts existed in "sites spanning much of central and northern Peru and reaching into coastal Ecuador" (Conlee and Ogburn 2005: 6).

Those who study the Inca Empire are aware of the process of incorporating outside groups, sometimes through force and almost always through display of

technological and religious superiority. All evidence from Chavín de Huántar and associated sites suggests a mostly harmonious interaction between cultures. Not only drawing pilgrims from other areas of the Andean region with its ideology, the Chavín culture also appears to have developed partnerships with other polities located at sites such as Kuntur Wasi in the Jequetepeque valley and Pacopampa in Cajamarca, Perú (Burger 2008). The full reach of Chavín culture is not yet known, but there is no doubt that its influence was very widespread, despite the fact that it did not appear to be a true empire. Burger very clearly sums up the relationship of the Chavín culture to the surrounding region in saying that interactions with other groups "broke down traditional barriers and led to the sharing of ideas and technologies, as well as enhancing the flow of goods. There is no evidence that this 'Chavin horizon' was spread by force and, in fact, warfare appears to have been a very minor part of life" (Burger 2008: 699). One could even make an argument for influence as far south as Tiwanaku in Bolivia, a later site with monumental architecture supposedly built by "giants" (according to some popular sources), having sunken courts and tenon heads, and being a ritual center with supposed hallucinogen-ingesting rulers. We may never fully understand the power that Chavín ideology must have had, but it is clear that something (or a collection of things) justified not only the spread of Chavín styles but also the advantageous interactions of the priest-rulers with other leaders. The question of what supported this power is important to the understanding of the Chavín culture as well as its religious and political center: the site of Chavín de Huántar.

The Site

The core of Chavín de Huántar itself is rather small. Excluding the nearby settlement area (which held a population of around two to three thousand people at the height of Chavín's influence), Chavín is a compact collection of monumental structures (Burger 1992a). Described by most as a "U-shaped" temple, the main structure consists of an "Old" Temple and a "New" Temple (built as an addition to the old temple), between which sits a small, semi-subterranean circular courtyard. Within and beneath this "U-shaped" temple is a series of chambers that were and still are accessible to people. These chambers will be discussed later in regards to the importance of the site's iconography and its connection to the "experience" of entering the labyrinthine chambers. Out in front of the New Temple is another large plaza with two rectangular structures resting on either side of a large, rectangular semi-subterranean courtyard; a gathering place for travelers, traders, and religious pilgrims (Druc 2004). The whole of this architecture also rests near the joining of the Mosna and the Huachecsa rivers, which may have had ritual or spiritual significance as an early example of what the Inca referred to as a "tinkuy" (Burger 1992a; a "tinku" is the meeting of two opposed forces, and a "tinkuy" is the meeting of two sources of flowing water). Some elements of the architecture borrow noticeably from styles that were seen on the Peruvian desert coast during earlier times. However, because of the amount of rainfall in the highlands (not seen on the desert coast), the coastal form of architecture was modified with a complex series of canals that allow the rainwater to flow without damaging the structures. It has been suggested that, as a part of the ritual experiences that I will discuss later, the movement of this water may have created thunderous sounds in the tunnels under the

temples, enhancing the "journey" of an individual traveling through them (Burger 1992a; Contreras and Keefer 2009).

Background

Chavín de Huántar, like most locations when you look beyond the simplified lenses of romanticized history, had no real date of "discovery". The Inca, perhaps the most well-known and certainly the most influential of powers on the west coast of South America, acknowledged the ancient origin of Chavín (Burger 1992a). Early travelers from Spain who interacted with the Inca, such as Pedro de Cieza de Leon, took note that the Inca believed the site of Chavín de Huántar to have been built by giants (Burger 1992a). After such accounts, there is record of multiple visits to the site by local public and religious officials from the late 1500's to the mid-1600's. However, even then, little was written of visits to, or interest in, Chavín until its "re-discovery" in the late 1800's by travel writers such as Ernst Middendorf, Antonio Raimondi (for whom a popular carved stela, or stone slab, was named), and Charles Wiener. Then, in 1919, the site's first archaeological excavation was led by the Peruvian-born Julio C. Tello (considered the "father of Peruvian archaeology"), a man who wrote in length about Chavín de Huántar and tried to determine what he referred to as the culture's "zone of diffusion" (Tello 1943; Burger 1992a). A couple decades later, in 1942, a United States-born archaeologist named Wendell C. Bennett studied in the Andes, including at the site of Chavín (Burger 1992a). His investigations included comparing the Chavín art style to that of other cultures and questioning the position of Chavín in Andean chronology, as well as more extensive works dating up to 1944, which describe excavations and artifacts found at the site (Bennett 1943, 1944, 1953). Since then, the site has received almost constant

attention for its unique architecture, its religious-political system of power, and its iconography.

In the early 1960's, interest in Chavín's unique imagery was revitalized through the publications of Fred Ayres (1961) and John Rowe (1962). Inspired by the carvings at the site previously described by Wendell Bennett, Ayres took rubbings of various "highly stylized designs" that covered stones and slabs found throughout the "Castillo" or "The Castle" (an early name for the partially excavated temples), including the fore-mentioned Raimondi Stela (Ayres 1961). Rowe's publication, a small booklet from The Museum of Primitive Art in New York City, is a primarily visual record of stone carvings, sculptures, small metal works such as spoons and ear spools, and various rubbings, including some from Marino González Moreno, a keeper of the site and early assistant to Julio Tello (Rowe 1962).

In 1969, Luis Guillermo Lumbreras published the book *De los pueblos, las culturas y las artes del antiguo Perú* ("Of the people, the cultures, and the arts of ancient Peru"), which was translated by Betty Meggers and republished with revisions in 1974 under the new title *The Peoples and Cultures of Ancient Peru*. The Peruvian-born Lumbreras, has been referred to as "uno de los arqueólogos más brillantes de América latina" ("one of the more brilliant archaeologists of Latin America") (La Nación 2007). In his book, Lumbreras looks at the aspects and longevity of ancient Andean cultures such as the Huarpa culture, the Huari (or Wari) state, and the Chavín culture, which is referred to as the "first Peruvian empire" (Browman 1976). The translation features updated discoveries and a chronology of different Peruvian cultures. In a 1976 review of the book, David Browman stated that the book is "a major contribution to Peruvian archaeology" as

well as being “useful at the same time to the specialist and the general reader” (Browman 1976). Outside of his written work, Luis Lumbreras is also recognized for the creation of the first school of social sciences in Perú, which included an “arqueología social latinoamericana” (“Latin American social archaeology”). This, Lumbreras stated, “Es más participativa” (“It is more participative”) and “no es sólo la recopilación de datos del pasado” (“it is not only the collecting of data of the past”) (La Nación 2007). Lumbreras also became the director of the Museo Nacional de Antropología y Arqueología in Lima, Perú, received the Humboldt prize for scientific research in 1970, and became the president of the Museo de Lima in 1986. His work at Chavín is not often referenced or accessible, but Luis Lumbreras is certainly known both for his involvement in the study of Andean cultures and for his preservation of Peruvian national history.

Further research at and regarding the site of Chavín de Huántar has, since the early years, spread into multiple subjects and persisted up into the 2000’s, with a significant contributor being Richard L. Burger, who published an article in 1981 on the place of Chavín in Andean chronology based on radiocarbon dates of samples collected during previous excavations by people such as Tello, Bennett, and Rowe. With these data, he argues for the dates of occupation and influence of the site based on evidence of a residential population and significant production during the Early Horizon. The Early Horizon is a period, as defined by John Rowe, lasting from the beginning of Chavín influence to the appearance of polychrome slip-painted ceramics in the Nazca culture (100 B.C.E. to 650 C.E.) of southern Perú (Rowe 1945; Burger 1992b; Proulx 2006). Burger also mentions that the site could have gained more attention after the decline of

coastal sites such as Las Haldas and Caballo Muerto, eliminating some power competition (Burger 1981).

In the 1990's Burger continued his work on Chavín through articles as well as a couple of books. One article, titled "The Sacred Center at Chavin de Huantar" and published in 1992, is largely a review article with no argument or new research. Rather, it introduces the history of the site as well as its layout, location, and productive aspects such as ceramics and stone carvings. Burger also suggests the use of hallucinogenic snuff, through "Elaborately decorated tubes and small spoons", and the appearance of the San Pedro cactus (which contains a psychoactive chemical called mescaline) in iconography (Burger 1992a: 272). That same year, Burger published *Chavín and the Origins of Andean Civilization*, a book connected to his arguments in the 1981 article. In *Chavín*, Burger shows examples of architectural, ceramic, and even iconographic styles appearing to come from preceding cultures on the Peruvian desert coast, in the rainforest to the east, and in the highlands of the Andes. In short, Chavín de Huántar adopted what Anne Paul, a reviewer of *Chavín*, calls a "unique synthesis" (Paul 1993). He then provides a timeline of the progression and eventual decline of the site along with descriptions of rituals involving hallucinogenic drugs, subsistence practices, and architectural constructions, such as the building of a "New Temple" connected to the "Old Temple" (Burger 1992b). Burger is trying to show the evolution of styles and civilization in the Andes, countering any conceptions that a location like Chavín may have simply appeared without forerunners. Regardless of that fact, Anne Paul describes that Burger's argument "in no way diminishes the significance of Chavín de Huántar",

but rather, “it underscores the longevity and tenacity of many of the basic cultural elements that are distinctive of pre-Hispanic Andean civilization” (Paul 1993: 1183).

Also in the 1990’s, Gary Urton (known for work on other Andean subjects such as the Inca quipu communication system) published an article solely on the subject of Chavín imagery entitled “The Body of Meaning in Chavin Art”. In this, Urton analyzes the meaning of strange, often therianthropomorphic, images at the site. He questions John Rowe’s concept of stylization known as “kenning”, which involves the metaphoric replacement of certain visual aspects with things that appear similar, such as the replacement of hair with snakes due to its serpentine shape and flowing movement (Urton 1996). This, Urton argues, is problematic because Rowe was using a literary concept in the artistic realm, and a clear problem in art is that metaphors cannot be visually distinguished (Urton 1996). Arguing against the “kennings” concept, Urton reviews concepts of symmetry, the association of body parts with local non-human animals, symbolism, and cosmology to better understand the almost literal “body” of meaning in iconography at Chavín.

Before the turn of the 21st century, Chavín also saw the start of a new project led by John W. Rick. The Stanford Chavín Project started with fieldwork in the summers of 1995 and 1996, and continuing up to the present. Led by Rick, groups of students mapped out the site, including the architecture, stelas, and internal labyrinth, using theodolite surveying technology during early phases of the project (Stanford University 1997).

The site’s popularity, as well as the diversity of subjects covered, seemed to increase in the 2000’s. Beginning with Isabelle Druc in 2004, her article “Ceramic Diversity in Chavín De Huantar, Peru” provides a good introduction to the site in general

before going into questions of composition and provenience (origin in space and time) of ceramics, drawing both from previous analyses and a current re-analysis of existing samples through neutron activation. Next, a couple of publications from John Rick (not the whole of his works on Chavín) include one article on the analysis of supposed shamanism at Chavín (Rick 2006), for which he felt there was little evidence initially. In a second article, Rick focuses on the power of the "politico-religious" rulers of Chavín and the use of stone carvings and structures such as the underground labyrinth to reinforce that power (Rick 2008). That same year, Feathers, et al., (2008) published an article on their analysis of mortar samples taken from the site's architectural structures. Using luminescence dating (determining the time of last contact with sunlight through analysis of a "natural radioactivity" in the material), Feathers, et al., sought to understand the progression of social complexity at Chavín (Feathers et al. 2008).

As a further sign of diversity, only a year later Contreras and Keefer (2009) published an article entitled "Implications of the Fluvial History of the Wacheqsa River for Hydrologic Engineering and Water Use at Chavín de Huántar, Peru", which focuses on the level of the Wacheqsa (or Huachecsa) River during the period of influence of Chavín de Huántar and what that could mean for the apparent manipulation of water in the site's hydraulic canal system. Finally, there are two additional contributions from Richard Burger on Chavín, returning to the arguments and concepts of his previous articles. The first, published in 2008, is a review article that covers the history of the site as well as its residential population, influence on other locations in the Andean region, and iconography. The second of Burger's articles, published in 2011, is a more detailed explanation of the imagery at Chavín de Huántar, primarily consisting of depictions of

therianthropomorphic beings and transformations from human into non-human animals. Burger argues that these images can be explained through the use of hallucinogenic drugs, but he argues that the plant previously thought to be the source of hallucinogenic snuff (the San Pedro cactus) would have been boiled by its users (based on ethnographic evidence). Thus, to justify the theory of using mortars and pestles to grind a plant with hallucinogenic properties as well as spoons to snuff the resulting powder, Burger proposes the seeds of the Anadenanthera tree as an alternative to the San Pedro cactus (Burger 2011). There are greater details to this argument as well as problems with it, as with the over-arching theory of hallucinogenic drug-use, which I will discuss in later sections. Prior to that, I will discuss the iconography that inspired this theory, then I will detail the currently-accepted theory and why I feel it to be inadequate.

Iconography

One very interesting aspect of Chavín de Huántar is its perplexing iconography, which has been closely tied to interpretations of shamanistic practice and the potential use of hallucinogenic drugs. In turn, these practices are seen as underlying the political and religious power of the site. This tie is argued based on ethnographic analogy (the use of, for example, San Pedro or Peyote cacti in present cultures), the iconography of the site (Burger 1992a; Rick 2005; Burger 2011), and, to be straightforward, a common assumption that mysterious occurrences or creatures can only exist as hallucinations or projections of the human psyche. I make this statement both because I feel that the current explanation raises more questions than it answers and because it still lacks the necessary physical evidence to be supported. I will first give a description of the iconography found at Chavín de Huántar. Subsequently, I will point to a few problems

within the current explanation that provide the impetus for the research that, I argue, needs to be done to gain a greater understanding of this site, its inhabitants, and their beliefs.

Throughout Chavín's monumental architecture, there are many examples of imagery argued to be associated with priestly rituals; an important aspect of the influence and power of the religious tradition during its time. The Old and New temples, especially, showed the command of the ruling priests (Rick 2005). Beneath and within those temples, as mentioned previously, are a series of chambers and passageways. One central passageway ultimately leads to a large stela known as the Lanzon, which is a well-known example of the unique iconography and ritual practice of the site. This stela sticks out from the ground and goes up through a hole in the ceiling of the small room where it is placed, and it is said to represent a connection between the underworld below and the cosmos above (Burger 1992a). Carved into the stone, wrapping around its surface, is the image of an unknown creature with claws, fangs, bent knees, and one hand raised with its palm toward the viewer. Other, similar and also famous examples of Chavín iconography are the Raimondi Stela (named after Antonio Raimondi and pictured below, showing a priest's transformation into what appears to be a cayman) as well as the Tello Obelisk, named after Julio C. Tello, which is a large, "prismatic" stela with depictions of "caymans, plants, birds, seashells, and *human figures*" (Burger 1992a: 268, original emphasis). Other examples of iconography include large reliefs in the circular, semi-subterranean courtyard, carvings in front of the New Temple of creatures that appear half-human, half-predatory bird, and a collection of tenon heads, which are stone heads that were placed in the walls of the temples (only one head remains in situ at the site).

Figure 2. Tenon heads from Chavín de Huántar
Source: Kolar, M. Tuned to the Senses: An Archaeoacoustic Perspective on Ancient Chavín.
Site: http://theappendix.net/issues/2013/7/tuned-to-the-senses-an-archaeoacoustic-perspective-on-ancient-chavin

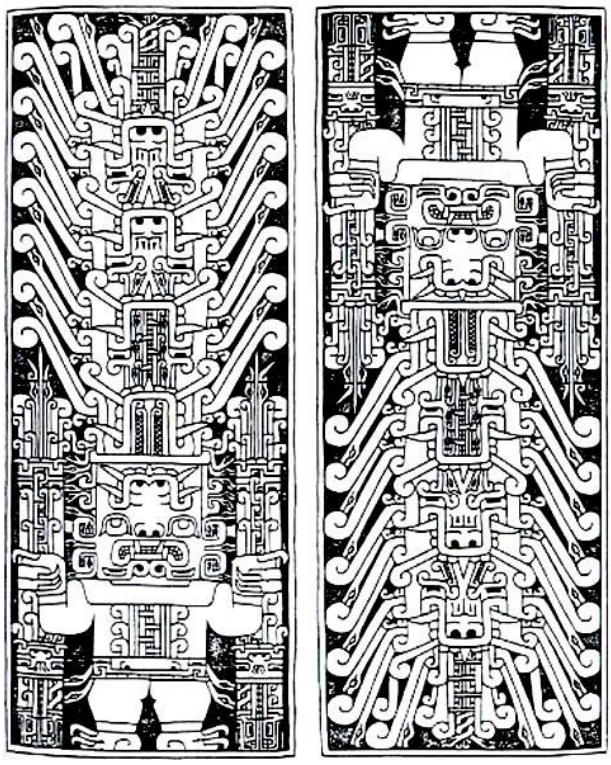

Figure 3. Example of Chavín iconography: the Raimondi Stela (up right and upside down)
Source: Dolan, T. Raimondi Stela.
Site: http://www.miotas.org/blog_body.cfm?id=A263A16E-F04B-16B7-79F79448E476FB97

My focus on iconography concerns the many images at this site which show human figures transforming into non-human animals such as predatory birds, jaguars, and caymans or "caimans" (a subgroup of alligators). In some cases, these carvings depict therianthropomorphic beings (such as the birds on the New Temple). As Isabelle Druc describes it, Chavín boasts "Fringed creatures, supernatural beings with feline, raptorial bird, and snake-like attributes…carved on stone slabs, columns, and monoliths" (Druc 2004: 344). Highly detailed and stylized, all of these depictions are said to be associated with priestly rituals that were common to the religious tradition.

My interest in these images involves their creation and inspiration as well as their importance to the power of the Chavín culture. One explanation for the appearance of these images is that, during the period of the Chavín Religious Tradition, priests would consume, in some way, the San Pedro cactus (*Echinopsis pachanoi* or *Trichocereus pachanoi*) or other species of Echinopsis (Burger 1992a, Rick 2005). These cacti contain the psychoactive chemical mescaline that can cause hallucinations or, in greater detail, "…drowsiness or a dreamy state and a feeling of lethargy ... a slight dizziness ... then a great 'vision'…" (Rudgley 1998, quoting a "shaman"). It is argued that the Chavín priests may have ground the skin of the cactus using mortars and pestles and snorted the powder to bring on these "visions" (Burger 1992a; Rick 2005). Recently, what type of hallucinogenic "snuff" may have been used has been brought into question (Burger 2011), but the theory that the iconography at Chavín and the associated priestly rituals is related to the use of psychoactive substances remains essentially unquestioned in the scholarly literature. It is my opinion, and my argument, that there has not been enough critical evaluation for this explanation. While it is a perfectly logical and potentially

supportable claim (as best as can be supported without actually being present for these rituals), we cannot accept this theory without criticism. This may be the best explanation, but it is easy to be the best when there is *only* one. While conclusions, in the field of archaeology, are dependent upon physical evidence, this hallucination concept seems to have been accepted as the end-all explanation for Chavín's bizarre imagery. That is, it has not been contested, or even mentioned much, in the relevant literature since its proposal over 30 years ago. The newer article by Burger presents the argument that it was not the San Pedro cactus that was used as hallucinogenic snuff, but actually the seeds of the Anadenanthera trees *Anadenanthera colubrina* or *Anadenanthera peregrine*, which contain the psychoactive chemical bufotenine rather than mescaline (Burger 2011). This concept of hallucinogenic drug-use including the Anadenanthera tree was, as far as I have found, first proposed by Alana Cordy-Collins in 1977. According to Burger, such older work has led to an increasing consensus on the concept of hallucinogenic drug-use. However, even Burger himself has contributed to the most common literature of very briefly referencing hallucinogens as if the concept is unquestionably correct, subsequently moving on to another topic and never bringing up hallucinogens again.

In a short paper derived from his dissertation at University of California Berkeley, Matthew Sayre (2014) reviewed the most common plants utilized in the Andean area of South America. Having a high amount of biodiversity, this region would have provided many plants to ancient cultures for consumption and ritual use. At the site of Chavín de Huántar, as mentioned before, the San Pedro cactus is argued to have been used by residents and priests to induce hallucinatory "trips". However, as can be seen in Sayre's work and as I argue in this proposal, there has been little consensus on the topic of

hallucinogenic plant-use at Chavín. For example, some have argued that carvings on the Tello obelisk depict edible plants such as cassava, peppers, and peanuts (Sayre 2014). Sayre states that, "alternatively, some scholars have suggested that the iconography of this obelisk depicted sacred plants/hallucinogens used at the site" (Sayre 2014). Further, he asks whether these supposed hallucinogenic plants were "misidentified…as it is clear that the Chavínos were not obsessed with realism in their depictions of the natural world" (Sayre 2014). In general, it would seem that researchers adopt what David Lewis-Williams refers to as a "gaze-and-guess approach" to Chavín iconography (Lewis-Williams 2002). Of course, we cannot avoid the need to interpret art. If we want to make sense of the images in front of us, we have to at least propose what they may be portraying. However, the weight that we place on those propositions must be questioned and re-evaluated over time. Especially in the case of Chavín imagery where there exists a large amount of stylization, we cannot rely solely on one interpretation of the iconographic evidence.

Immediately upon learning about this archaeological site and the iconography as an undergraduate student, and subsequently hearing the psychoactive substance theory/explanation, I had many questions that remain unanswered involving the process of the specific ritual, the "snuffing" participants, and the stone carvers (these questions will be reviewed later). In general, I argue that this interpretation is a hasty and questionable assumption about the inspiration for, and production of, Chavín's transformational iconography. I feel this to be a good explanation, but no explanation is so good that it should be accepted without question, and such critical evaluation, I argue, is lacking in the relevant literature.

Furthermore, even if the current explanation gained more support, it still embodies a critical mistake in the perception of creatures/entities in the Chavín belief system. That perception is that such beings, or any experiences that occurred during hallucinogenic "trips", are merely metaphors for what we know as "reality". In his study of prehistoric rock art of the San in Sub-Saharan Africa, Thomas Dowson has looked at the significance of shamanic experiences in both the creation of a shaman's identity and the creation of a group's cosmology. In his 1998 publication "Like People in Prehistory", Dowson makes significant points regarding the weight of shamanic experience. Using an account of the experiences of a medicine man named Bull Lodge as an example, Dowson states that "more often than not, very real experiences are effectively written about as abstract concepts, where experience becomes nothing more than a 'metaphor' to explain shamans' relationships to their spirit-worlds" (Dowson 1998: 334). He adds that "…such a perception is not only insensitive, but also somewhat naive." (Dowson 1998: 334). The same could be said for Chavín, assuming that the currently-held explanation is correct. Even if the priests used hallucinogenic plants and their "visions" were only the result of a chemical reaction, the representations of those experiences (the iconography) are not metaphors for reality, but depictions of things that were very real to inhabitants and travelers at Chavín de Huántar. To ignore the subject's sense of reality, you not only take away from their agency as people of history, but also belittle an entire cultural belief system. As Dowson phrases it, "as graphic metaphors these images can only ever have a passive role in our constructions of that socio-political context." (Dowson 1998: 341). To dismiss these images as only the projections of intoxicated priests is to ignore the position of those images as legitimate persons or creatures in Chavín cosmology.

A Critique of the Current Theory

My initial motivation for looking at iconography and ritual practice at Chavín was mostly based in confusion. I stated in the introduction that, when I first learned about the site and its curious iconography, multiple questions came to my mind that developed as I did more research. All of these questions are not easy to answer for archaeologists, but that does not mean that they are worthless to ask or worthless to pursue. For example, what was the focus of the Chavín religious tradition? What was the importance of priestly transformation to local belief? Rituals at the site (including going down to see the Lanzon inside the old temple) would have had increased impact if participants were using hallucinogenic drugs, but hallucinogens do not explain the transformation concept entirely. Rather, it causes some confusion for me in terms of how the iconography was made. Did the sculptors do their work during or after the rituals? Were they using psychoactive drugs during the rituals and then depicting what they saw or were they going on the reports of what others saw? Would the use of such drugs allow someone to view an actual transformation instead of just a sudden change in appearance (a process versus the sudden onset of the drug's psychoactive effects)? Again, regardless of whether or not we can answer these questions, they are still important to ask.

I would argue that the majority of literature on Chavín de Huántar, if it mentions hallucinogens at all, barely delves into the idea, much less addresses the theoretical assumptions behind it. In Richard Burger's article "The Sacred Center of Chavin de Huantar", all reference to "hallucinogens" and "psychoactive" or "psychotropic" substances can be found between two pages, one of which is a half-page of writing (Burger 1992a: 271, 272). And yet, without much discussion, he states that "Some

Chavin sculptures clearly suggest that hallucinogens were employed to facilitate this process", "The ingestion of psychoactive substances was probably only one aspect of the ceremonial activities at the temple", and "These hallucinogenic agents had the transformational effects sought by priests and other religious functionaries in their quest to communicate with the great unseen powers permeating the natural world" (Burger 1992a: 271, 272). John Rick's article "The Evolution of Power and Authority at Chavín de Huántar, Peru" also glances over the hallucinogenic drug-use assumption (Rick 2005). In one instance, he mentions that "A number of site objects and icons suggest the ritual use of psychoactive drugs (Cordy-Collins 1977; Sharon 2001) and perhaps shaman-like transitions between human and animal entities in the form of abundant tenon heads (Burger 1992: 157–159)" (Rick 2005: 79).

In another article, Rick suggests that "Psychoactive substances could obviously be quite helpful in creating credibility of an otherwise rather incredible assertion of connection between certain humans and natural powerful elements, not to mention the non-self-evident message of inequality and difference between conspecifics" (Rick 2005: 80). The concept does not show up anywhere else in the article. Finally, in 2011, Burger's article "What kind of hallucinogenic snuff was used at Chavín de Huántar?" makes the claim that "Since the pioneering work of Alana Cordy-Collins (1977, 1980, 1982) and Douglas Sharon (Sharon 1972, 2000; Sharon and Donnan 1977), there has been a growing consensus among archaeologists that hallucinogens played an important role in the ceremonial life at Chavín de Huántar" (Burger 2011: 124). And yet, for example, Cordy-Collins' 1982 article makes a lot of quick assumptions about a fragmented textile found in Southern Perú, believed to be from the Chavín culture in

Northern Perú. Cordy-Collins states that she has "contended that the Chavin peoples' religion was shamanistic and was based on plant hallucinogens (Cordy-Collins 1977, 1980)", and the concept is then accepted without question for the rest of the article (Cordy-Collins 1982: 145).

In an article titled "Power and Hallucinogenic States of Consciousness among the Moche" (another pre-Columbian Andean culture), Marlene Dobkin De Rios argues that the use of hallucinogens was "pivotal in traditional Moche life" (De Rios 1989: 286). Similarly, I argue that the question of whether or not hallucinogens were used at Chavín de Huántar, or similar locations, is pivotal to the understanding of the local cosmology as well as power dynamics. However, again we encounter the same problem with the Moche as we do with Chavín. De Rios states that "various uprooted cacti are represented in [Moche] art, including the *San Pedro*. Towle (1961) has written that cereus cacti are found frequently among the art of this region" (De Rios 1989: 292, original emphasis). Of course, while the art of a culture is useful evidence in arguing for the use of hallucinogens, is it enough on its own? As Constantino Torres phrases it, "The most direct form of evidence is the finding of plant remains in direct association with human activity. Another type of evidence is that provided by the implements used in the preparation and ingestion of psychoactive preparations" (Torres 1995: 291).

Iconographic evidence, Torres states, is only third-best. So then, before we have found remnants of such hallucinogens, is it safe to assume that they are "pivotal" to the function of a culture? Let me be especially clear in saying that I am not denying the use of hallucinogens in various cultures today or in the past. Rather, I am questioning the practice of many researchers to immediately attribute all supernatural depictions or

accounts to the use of drugs. To propose the concept is harmless, but to allow that concept to become accepted truth for decades without sufficient evidence is both unjustified and, in the long run, potentially harmful to our perception of a culture. Even Torres seems to somewhat go back on his own statements. Later in the same article which refers to "the finding of plant remains" as the "most direct form of evidence", Torres states that "The use of psychoactive inhalants and potions prepared from the mescaline-containing San Pedro cactus were an important feature of Chavin ideology" (Torres 1995: 291, 300). For how much the author seemed to downplay the importance of psychoactive plant imagery compared to biological evidence, he constantly references the presence of such plants in Chavín iconography. Even the statement the author makes above sounds more like an accepted fact rather than a suggested possibility. Put simply, is it safe to say that there is "an active role for psychoactive substances in the development of Chavin ideology" even though iconography represents a "third type of evidence" on Torres' list (Torres 1995: 291, 301)?

Aside from accepting the current explanation almost without question, there is another leap in deduction that, it seems, we are expected to take. Returning again to De Rios' focus on the Moche, the author is correct in saying that "plant hallucinogens were present in northern Peru and available for use by the Moche" (De Rios, 1989: 295). This is true for other pre-Columbian cultures, including Chavín. In addition, the author also states that "Ceramic motifs and the shamanic belief system connected to it parallel those of other drug-using New World cultures where we have independent verification of plant hallucinogenic drug use from ethnohistorical sources" (De Rios, 1989: 295). However, assuming that these sources are correct (which I am not questioning, but we should

always be careful about making assumptions), is it then logical to say that the unexplained images we see in a culture's art must then be entirely the result of drug-use? It does not matter how obvious it may seem for some researchers to draw such a conclusion. If there is no biological evidence to suggest the presence of hallucinogens then it is no more than an untested hypothesis. Analysis comes before results, and results come before conclusions. In addition, the presence of hallucinogens does not inherently explain the supernatural depictions we see at Chavín de Huántar, or at any other site. There must be some kind of argument that seeks to explain why the consumption of hallucinogenic plants can cause mass-hallucinations of, for example, processes of transformation into non-human animals. That alone would be fascinating to understand in terms of individual psychology, group interaction, and the effects of different psychedelic chemicals on the human mind.

Some authors, such as Matthew Sayre (2014), have made legitimate critiques of the current explanation of hallucinogenic drug-use. However, little has been done to truly challenge it; to hold it up against the evidence and see if it actually makes sense. Within the current theory/explanation, there are two basic arguments about the use of plants with hallucinogenic properties. The first, as mentioned before, is that the skin of the San Pedro cactus was ground using mortars and pestles, and then consumed with snuffing spoons or straws. The second, proposed by Burger in his 2011 article, is that the San Pedro cactus was actually boiled (because such action had been performed elsewhere, and the process of boiling would make remnant evidence nearly impossible to find). So, he argues, there must be another plant that was crushed and snorted. For Burger, the likely candidate, or rather candidates, are the seeds of the *Anadenanthera colubrina* tree, which contain the

psychoactive chemical bufotenine (or bufotenin) rather than the chemical mescaline. This conclusion is argued based primarily on iconographic evidence of which, Burger admits, there is a greater amount depicting the San Pedro cactus rather than the pods of *Anadenanthera colubrina*. Burger also points out that the *Anadenanthera colubrina* is not within the "catchment area" of Chavín, which makes the concept more questionable (Burger 2011).

However, regardless of the iconographic depictions (which are questionable considering the visual stylizations of everything else in Chavín art), there is still one great hole in the argument: a lack of direct, physical evidence. This can be summed up, ironically, quite well in Burger's own words. He states that, "Two obvious approaches to identifying the source of psychoactive snuff at Chavín de Huántar are chemical studies of residues and iconographic analysis. While the former has been successfully applied at a range of sites in the dry caves of northwest Argentina and the desert cemeteries of northern Chile (e.g., Torres et al. 1991) they have *yet to yield results for Chavín de Huántar* or other Peruvian sites." (Burger 2011: 125, emphasis added). This is highly problematic because it admits that what is, in my opinion, the most valuable potential evidence to support the current theory/explanation has not yet been obtained. This, more than anything else, makes the research I have proposed critically important to the subject because it could have been done already, and yet it has not been done or at least has not produced any results (or even been published to the best of my knowledge). In his Ph.D. dissertation, Matthew Sayre makes a critical statement that "The research projects conducted at the site over the years have not included a systematic botanical component, even though the site is postulated to have served as a center for ritual induction in to cults

through the use of hallucinogens" (Sayre 2010). In addition, in Sayre's 2014 paper, he states that "archaeobotanical research will provide the contextual data that we need to broaden our understanding of the past, rather than inferring much behavior from stylized depictions of plants on art" (Sayre 2014). An analysis of artifacts such as mortars, pestles, and snuffing spoons from Chavín de Huántar is a theoretical tipping point between supporting the currently-held explanation and showing its lack of compelling evidence.

Furthermore, this is not just as simple as explaining that hallucinogenic substances were the cause of the concept of priestly transformation. If you argued that based on sufficient evidence, an immediate follow-up question would be: why does it (the San Pedro cactus) or why do they (Anadenanthera seeds) do that? What about the chemicals mescaline or bufotenine cause a person to believe they are being transformed into non-human animals? Does this similar experience occur in other locations? What does this say about human psychology if it is seen in multiple, separate groups? What does it say about humanity in general that there is a prevalence of examples of human-to-non-human transformation throughout history in most, if not all, cultures? Perhaps some of these answers exist in the literature somewhere, but the point is that, if anyone is making this argument, such literature should be cited. If it exists and is accessible, then it would be the responsibility of those arguing for the use of hallucinogens to reference it as support. Otherwise, all of these questions remain unanswered and are very relevant to the currently-held explanation.

Finally, we must recognize that the assumption that a culture used hallucinogenic drugs has implications which affect the understanding of that culture. If we assume that all myths and other recorded or depicted phenomena are automatically hallucinations, we

could both oversimplify the experiences of the people involved and overlook any evidence, or lack of evidence, that contradicts our assumption. We do not know everything. We must be open to other possible explanations for the imagery at Chavín.

Chavín and the Paracas Culture

The nature of the analysis in this work is, as stated before, archaeobotanical. However, while I originally sought to retrieve samples from Chavín artifacts, I ended up in a position where my best option was to seek analogous samples both to support the effectiveness of my chosen methods and to improve our knowledge of Chavín as well as the Andean region in general. These analogous samples were retrieved from ceramics belonging to the Paracas culture, which existed in southern-coastal valleys of ancient Perú such as Ica, Pisco, and Chincha (Silverman 1994). There is no lack of literature on Paracas, but there is also no abundance of it. There are at least two things which are agreed upon in the archaeological literature. First is that the Paracas culture lasted from approximately 800-100 B.C.E., occupying the Early Horizon period of Andean Chronology just like Chavín (Vaughn 2005; Unkel et al. 2007). Second is that the Nazca, popularly recognized for the "Nazca lines", are argued to have "originated in the well-known Paracas culture" (De Rios and Cardenas 1980: 234; Silverman 1994). The nature of links between Paracas and Chavín is central to this work, and to my over-arching critique of the current explanation. There is not debate over whether or not the Chavín "sphere of influence" reached far enough south to affect the Paracas culture. However, the extent to which such influence permeated cultures like the Paracas is still being determined.

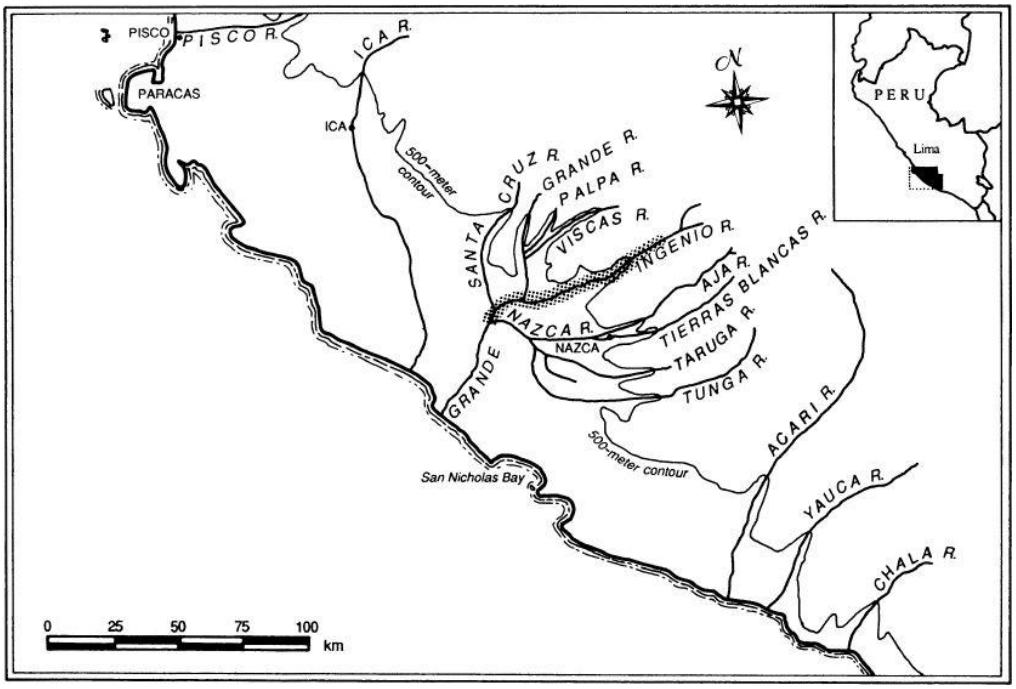

Figure 4. Paracas location in southern Perú
Source: Silverman 1994

In a review of the book *Paracas Cavernas and Chavín* by Alfred Kroeber, Alfred Kidder states that author argues that Chavín pottery styles influenced Paracas styles as indicated by images of a "feline mouth and fangs" (Kidder 1954). Kroeber also argues that the Chavín pottery styles were simply "reinvigorated" in Southern Perú. In a separate review of the same book, Gordon Willey states that "It appears extremely unlikely, on the basis of present evidence, that the Chavinoid stylistic strains in Paracas indicate a Chavin horizon date. The evaluation of a style as to its purity or its adulteration is, of course, a subjective judgment, but I am inclined to see the Chavin-like features of Paracas as being analogous to those of the residual Chavin elements in certain Mochica vases or to the comparable, but quite different, Chavinoid characteristics of Kuntur Wasi ceramics." (Willey 1954: 184). The basic question here is whether or not the Chavín culture

influenced southern cultures. Today, as stated before, we do have a better understanding of Chavín's "sphere of influence", but the question of a relationship between Chavín and Paracas is not a big topic in contemporary archaeological literature. One example of the question exists in Helaine Silverman's 1994 article on the emergence of Paracas from the Nazca valley in southern Perú. In this, the author is arguing that the Nazca culture did not "evolve" directly out of Paracas in the Nazca valley. Rather, there appears to be a greater amount of evidence for the emergence of the Nazca in the Ica valley of southern Perú. As a part of describing Paracas remains, Silverman points to, on many occasions, a "strong Chavin influence" in Paracas pottery and textiles (Silverman 1994: 376). This influence may also have affected the subsequent Nazca culture. As Silverman states, "Ica's participation in the Chavín world may have set the stage for that valley's dramatic growth in cultural complexity in the late Early Horizon" (Silverman 1994: 378).

Another example of possible ties between Chavín and Paracas is hinted at, although not argued, in a book chapter by Schlosser, et al., titled "Fingerprints in Gold". This study is an analysis of gold artifacts from Chavín, Nazca, and Paracas through the use of mass spectrometry. In the article, the authors state that "the general use of metallurgy began with the production of gold ornaments that flourished in the Chavín culture of northern Peru" and include that "In the same period metal began to be worked in the Paracas culture on the Peruvian south coast" (Schlosser et al. 2009: 409). There may be little importance to the appearance of gold metallurgy in both cultures at around the same time, but it does at least point to similarities in practice between Paracas and Chavín. However, in another example, we find something much more relevant to the topic at hand; that being the question of hallucinogenic drug-use. In their article "Plant

Hallucinogens, Shamanism and Nazca Ceramics", Marlene Dobkin De Rios and Mercedes Cardenas argue for the presence of both the San Pedro cactus *and* the seeds of the Anadenanthera tree in Nazca culture based on the interpretation of Nazca ceramics (De Rios and Cardenas 1980). As far as I am aware, no such argument has been made for the Paracas culture, but one might expect that a presence of such hallucinogens in the descendent culture would suggest its presence in the ancestor. Currently, the hallucinogen-use explanation at Chavín suggests that the foundation of the priest-rulers claim to power was dependent upon the use of drugs. If this was also the case in cultures such as the Nazca, Paracas, or other pre-Inca groups, it would be worth investigating how these hallucinogens justified a great amount of power and influence without any evidence of military force.

In a later section, we will cover the specific artifacts used to produce data for this study. All of these artifacts were ceramics, and most had images of feline faces that could best be described as jaguars (taking into consideration the persistent use of spots on the feline faces). These similarities to Chavín iconography only strengthen the association between the Paracas and Chavín cultures. Both are unique, but again it seems that the Chavín Religious Tradition was powerful enough to spread great distances because of its ideology. There is, however, one question that I feel is central to understanding not only Chavín but those groups it influenced: what exactly were the dynamics of power at Chavín de Huántar? If we found evidence of hallucinogens in religious paraphernalia, are we to assume that this both explains the transformative and supernatural imagery as well as the regional influence of the cosmology? I suppose I would also ask, was it *only* the use of hallucinogens (assuming that they are present), or was there some great

performance that went along with it? What did the rulers do over multiple hundred years that attracted so many pilgrims? What power did they truly possess which hallucinogens may, or may not, have helped to legitimize?

METHODS

Original Research Plan: An Analysis of Hallucinogenic Drug Remnants in Religious Paraphernalia

Understanding why the iconography of Chavín de Huántar was created and what it represents is my primary interest in this study. However, the specific focus of this work is to get to such an understanding through confronting the currently-held theory/explanation that Chavín priests and other participants may have experienced periods of transformation as a result of the hallucinogenic properties of either the San Pedro cactus or the seeds of the Anadenanthera tree. The concept of priests or shamans using hallucinogens to achieve altered states of consciousness (ASC's) is not new, and is certainly known in anthropological literature (Goodman 1999). Multiple studies just in the Andean region suggest the presence of hallucinogens in both the past (Pochettino 1999; Glass-Coffin 2010; Niemeyer 2013) and in the present (Bennett 1992; De Feo 2004; Ogunbodede et al. 2010). The problem we encounter here is not a lack of evidence for use of hallucinogens in the past, but instead the constant assumption by archaeologists that any strange imagery or practices must be the result of drug-use. In many cases, no argument is made. It is simply accepted as fact. One need only state that "The consumption of hallucinogenic substances is a long-standing tradition in the Americas" and move on from there (Niemeyer 2013: 398). My original plan was to test this assumption by looking at remnant physical evidence in particular artifacts directly related to Chavín de Huántar. Specifically, I hoped to analyze residues from mortars, pestles, and snuffing spoons/tubes recovered from Chavín de Huántar that, as explained earlier, were said to be used to crush either the skin of the San Pedro cactus or the Anadenanthera

seeds into a snuff-able powder. The fact that hallucinogenic substances have been detected on ancient artifacts on multiple occasions (Torres et al. 1991; Fucci and Chiarotti 1996; Torres 1996; Pochettino 1999) shows that this is a good source of potential evidence; the only limitations being whether any amount of these substances has survived in these artifacts and whether those remnants can be identified properly. If any such residues could be found, this would be critical for supporting or questioning the currently held theory about the use of hallucinogens at Chavín.

One of the first ideas I had was to seek out artifacts that may have served the purpose of preparing hallucinogenic plants. The artifacts I found are all housed in museums and institutions in the United States, and they include the following: a "Jaguar mortar" located at the University of Pennsylvania in Philadelphia, a small collection of gold spoons said to be from Chavín de Huántar and currently located at Dumbarton Oaks Research Library and Collection in Washington, D.C., a "Spoon with Human Figure", "Spoon with Bird", "Spoon(?)", "Feline mortar", and "Pestle" from the Cleveland Museum of Art, and finally a few other spoons also said to be from Chavín located at the Metropolitan Museum of Art in New York. I contacted these locations during the summer of 2014 to see if there may be any possibility of recovering samples to be analyzed (assuming the artifacts have not been too thoroughly cleaned). However, nothing came from this pursuit. The spoons at The Met in New York, I later found, were not the same kind of "spoons" that would be used for hallucinogenic snuff. The artifacts at Dumbarton Oaks, according to the Assistant Curator Juan Murro, were "thoroughly cleaned in several instances in the past". This would have made retrieving any samples unlikely, much less any original remnants from around 3,000 years ago. Finally, I was denied

access to the artifacts at the University of Pennsylvania and at the Cleveland Museum of Art because my "research proposal was not sufficiently developed to support approval" and because I was "too much in the beginning stages of [my] project to warrant moving forward with requesting permission to remove samples from CMA objects".

Another avenue of investigation was to obtain samples from what are thought to be snuffing tubes that had been recently excavated at Chavín de Huántar as a part of the Stanford Project led by John Rick. These tubes are made of mammal and avian bones, and around 200 have been found so far. Unfortunately, I was not able to obtain samples or even gain access to this source either. Given my time constraints, I decided to broaden my scope of analysis to examine residues from other areas of the Andean region that are thought to have been closely associated with Chavín. If hallucinogens and shamanic practice are present in the Chavín culture, and if these practices are the basis of the leaders' power, then the presence of similar practices in relatively close areas might suggest an overlap of influence or a direct causal link.

The analysis utilizes a form of mass spectrometry (MS). A mass spectrometer is a machine that takes in a sample, ionizes it (forces the atoms or molecules to lose or gain electrons), and produces spectra by organizing the found masses of the atoms into a diagram, or histogram, that shows the mass-to-charge ratio of the ions versus their abundance in the sample. In reading the results, one can see "peaks" that may identify the molecular weight of certain chemicals or classes of organic species. In one form known as Gas Chromatography Mass Spectrometry (GC-MS), for example, such identification can be achieved through comparison to a library of previously detected materials (Clifford Carlin, personal communication). Mass spectrometry has been used on

archaeological material in the Andean region, as seen in works of Ogunbodede, et al., (2010) and Fucci and Chiarotti (1996). In the former, the authors used High-Pressure Liquid Chromatography (HP-LC) to determine the concentrations of the psychoactive chemical mescaline in present day cacti belonging to the *Echinopsis* genus. The samples retrieved were prepared for the analysis with the use of water and dichloromethane for extraction. In the latter study by Fucci and Chiarotti, the method of Gas-Chromatography Mass Spectrometry was used to analyze powder from peyote cacti, which was found in small statuettes. These statuettes were discovered in a package confiscated at the Leonardo Da Vinci International Airport in Rome, Italy. This analysis was, as the authors phrase it, a "toxicological examination" with the goal of determining the levels of mescaline in the cactus powder (Fucci and Chiarotti 1996: 165). For the original analysis, the specific chemicals I was looking for were mescaline or bufotenine, but I also planned to watch for other identifying chemical "peaks" of either the San Pedro cactus (such as 3,4-dimethoxyphenethylamine, anhalonidine, and hordenine) or the Anadenanthera tree (such as Catechol, Leucopelargonidol, and Viterine). In both the original research plan and in the analysis done here, it is important to also look for any similar substances, especially those which are present in the Andean region such as coca, which contains cocaine.

There are multiple forms of mass spectrometry, including Gas Chromatography which uses voltage and a gas to produce ions, Matrix-Assisted Laser Desorption/Ionization (MALDI) which uses a laser to ionize solid material, and Liquid Chromatography (LC) in which a liquid (such as water) is used to dissolve a sample that is then sprayed through a small needle and accompanied by 4000 volts of electricity

(Clifford Carlin, personal communication). The last method would be the best for detecting the chemicals of remnant organic substances in the Chavín artifacts of focus: mortars, pestles, and spoons. For the Paracas artifacts, as will be explained, the method was successful and produced identifiable results. So, if samples can be retrieved from any Chavín artifacts in the future, one would need as little as a few micrograms of material (one-millionth of a gram) to allow for analysis through Electro-spray Liquid Chromatography. I had originally planned to analyze my Chavín samples through the use of either a spectrometer local to where I had retrieved samples (if I had been able to take samples from artifacts at a museum) or, most likely, the LC mass spectrometer in the Chemistry department of UNCC. For the analysis of Paracas ceramics, the latter was used under the supervision of Dr. Clifford Carlin.

If no clear results had come from the use of a mass spectrometer, I understand that Attenuated Total Reflectance (ATR) Infrared Spectroscopy (which uses infrared light to reflect off of the sample so that its contents can be interpreted) or the use of an Infrared Spectroscopy (IR) microscope would be possible follow-up methods. Whether or not any results would come of such an analysis would depend upon if there are samples to retrieve (for example, if an artifact has not been too extensively cleaned) and if the chemical structures of any existent samples can be identified.

However, as mentioned before, this is not an analysis based in mere curiosity, but instead a testing and ultimately a critique of the current theory of the consumption of hallucinogens at Chavín de Huántar. Aside from explaining the methods of how I intended, and still plan at some point, to test this explanation, I also wish to explain my reasoning for posing a critique. The successful analysis of Paracas artifacts is what I

would call a "proof of concept", providing evidence that such analysis can be performed for Chavín artifacts. The question of why the bizarre images of transformation and therianthropomorphic creatures exist as a part of the Chavín culture needs to be revisited. More importantly, the research I propose is critical to that question and, given its success with Paracas artifacts, there is no excuse to avoid the execution of such analysis on Chavín religious paraphernalia.

Sampling of Paracas Artifacts

As stated before, my inability to obtain samples from Chavín artifacts led to my decision to pursue samples from ceramic artifacts belonging to the Paracas culture of southern Perú. This is intended mainly as a "proof of concept": the use of my proposed methods on similar artifacts to argue for the importance of analyzing the supposed religious paraphernalia from Chavín de Huántar. Further study of the results from my analysis may also improve our understanding both of the Paracas culture and of any connections there may be between Paracas and Chavín. However, I still argue that this same analysis should be performed for artifacts from Chavín de Huántar in order to support or challenge the current explanation of hallucinogenic drug-use.

I accessed the Paracas artifacts from the collections of the Mint Museum in the city of Charlotte, North Carolina through the collaboration of my committee chair Dr. Dennis Ogburn and the Mint Museum Associate Registrar of Collections and Exhibitions Katherine Steiner. Dr. Ogburn and I were taken to a storage area where Ms. Steiner had collected the pre-determined artifacts to be sampled. Of approximately 19 Paracas artifacts in the museum collections, 10 were available for us. Some of the original 19 artifacts included open bowls, which were excluded from sampling due to the likelihood

that they had been too thoroughly cleaned. Those available to us included various styles of the well-known double-spouted "bottle" as well as a single-spouted bottle, which was more vase-like (Menzel et al. 1964). A total of 12 samples were taken from the ceramic vessels (the extra samples consisted of initial dirt from two of the bottles) using either a small wooden tool supplied by Ms. Steiner or a plastic tool which Dr. Ogburn had brought in. Each sample was immediately closed in aluminum foil and placed in its own slide-lock plastic storage bag with the appropriate catalogue number and date of retrieval.

Table 1. List of Mint Museum artifacts sampled on March 23, 2015

Name	Catalog Number	Date Range	Description
Double-spouted Vessel	1986.75.72	400 B.C.E.-100 C.E.	Double-spouted bottle with feline face
Double-spouted Vessel	1994.106.57	400 B.C.E.-100 C.E.	Double-spouted bottle with feline face
Human-bird Effigy Vessel	1994.106.59	400 B.C.E.-100 C.E.	Double-spouted bottle with human head
Bottle	1994.106.61	400 B.C.E.-100 C.E.	Single-spouted bottle with humanoid figure
Double-spouted Vessel	1994.106.62	400 B.C.E.-100 C.E.	Highly-decorated, double-spouted bottle with feline face
Double-spouted Vessel	1994.106.63	400 B.C.E.-100 C.E.	Double-spouted bottle with feline face
Bottle with Zoomorphic Face	1994.106.64	400 B.C.E.-100 C.E.	Single-spouted bottle with humanoid figure
Double-spouted Vessel	1994.106.67	400 B.C.E.-100 C.E.	Double-spouted bottle with feline face
Human-bird Effigy Vessel	1994.106.68	400 B.C.E.-100 C.E.	Double-spouted bottle with bird's head
Double-spouted Vessel	1994.106.70	400 B.C.E.-100 C.E.	Double-spouted bottle with feline face

Before describing the nature of the samples as well as the process of analysis, I will establish the place of the sampled artifacts in Paracas ceramic chronology based on descriptions by other researchers. In the book *The Paracas Pottery of Ica: A Study in Style and Time*, the authors mention a ceramic artifact referred to as the Wielgus bottle, "a bird-headed bottle with two spouts and a bridge" which they describe as "decorated with a mythical human head with feline attributes" (Menzel et al. 1964: 13). This "bottle" belongs to Phase 2 (800-700 B.C.E.) of the authors' chronology for Paracas pottery, otherwise known as Ocucaje 2 (Menzel et al. 1964; Unkel et al. 2007). The artifacts from the Mint Museum, excluding two single-opening bottles, all had arched bridges and double spouts, which are recurring characteristics of Paracas ceramics throughout most of the phases (Menzel et al. 1964). Most had a combination of a feline face and a bird's head, but the appearances of the bottles are more closely related to later phases. Those with feline faces were all stylistically similar, but still unique. These faces included semi-circular eyes, a nose similar to that of a feline or canine, prominent fangs, rounded ears on top of the head, and circles on the figure's face that may represent the spots of a jaguar. Multiple artifacts also had what Menzel, et al., (1964) would describe as a "shallow" curvature on the bottom (appearing like a slightly flattened sphere). Out of all 10 artifacts that had samples removed, there was at least one representative for Phase 5, Phase 6, Phase 7, and possibly even the Phase 7/8 transition based on the ceramic chronology by Menzel, et al. (Menzel et al. 1964: 322-324). According to Unkel, et al., Phases 6, 7, and 8 are all dated to between 520 and 400 B.C.E., which is relatively close to the dates given by the Mint Museum for all artifacts of approximately 400 B.C.E.-100

C.E. (Unkel et al. 2007). It may also be possible that styles clearly belonging to an earlier phase persisted in use by members of the Paracas culture beyond their general popularity.

Figure 4. “Double-spouted Vessel” (1994.106.57)
Photographed by Ryan Nooe

Multiple bottles also had a hole in them, usually in the neck of the bird’s head, which would be considered “whistling bottles” by Menzel, et al. In the process of removing samples, I suggested that the holes may have been created to allow air into the bottle and improve the flow of liquids from the open spout. It is important to note that none of the artifacts had “pouring lips”, a characteristic found in earlier Phase 3 pottery. In conclusion, most if not all of the artifacts sampled appear to be from what Menzel, et al., (1964) refer to as Phase 5, 6, and 7 or what Unkel, et al., refer to as Ocucaje 5-7 and Ocucaje 8-9 from the middle and late Early Horizon period of Andean chronology (Menzel et al. 1964; Unkel et al. 2007). It is also interesting to note that Menzel, et al., point to a particular artifact of their Phase 2/3 transition, stating that “A mythical profile

head with feline attributes is a common representation in Chavín art, and its presence…is another example of early Chavín influence at Ica" (Menzel et al. 1964: 17). They also state that Phases 1, 2, and the transitional 2/3 all "show strong influences of foreign styles, including the stone-carving style of Chavín" (Menzel et al. 1964: 18). It is clear that the designs of earlier phases carried over into later phases, which is an even greater indication of the level of influence that the Chavín Religious Tradition had on the region.

An Analysis of Samples from Paracas Artifacts

Of the 12 samples taken from the Paracas artifacts at the Mint Museum, three were chosen for analysis using mass spectrometry at the campus of UNCC in Charlotte, North Carolina. It was suggested by Dr. Carlin that a few of the most promising samples be chosen for analysis. After reviewing the samples, I chose to include those taken from three vessels with the largest amount of content. Those three included "Human-bird Effigy Vessel" (1994.106.59 in the Mint collections), "Bottle" (1994.106.61), and "Double-spouted Vessel" (1994.106.70). The first bottle has a relatively small amount of decoration. The back spout is open and undecorated while the front spout is closed and depicts a square, humanoid face. Below the face are a few patterns that may represent clothing. This type of bottle with a square-headed figure and a "shirt" is mentioned in the Paracas ceramic chronology article and referred to as a "spouted bottle with human head" belonging to Phase 6 (Menzel et al. 1964: 61). Upon simply turning the vessel over, a large amount of material came out consisting mostly of small fibers. For analysis, and due to the large amount of material, the sample was referred to as "Jackpot". The second bottle had only one opening, which was flared and similar to a vase. The surface was mostly black, probably the result of being "smoked" with fire to achieve a more

"charcoal black" coloration (Menzel et al. 1964). There was only one decoration on the bottle which depicted a humanoid head, raised ears, and two arms that bend at the elbow and meet by the middle fingers of the hands just below the head. For analysis, the sample removed from this vessel, which was mainly dirt, was referred to as "61" for its catalogued number. Finally, the third bottle was another double-spouted vessel. The open spout, as with the other double-spouted vessels, was in the back (opposite the decoration). The front spout was a bird's head with a "whistling" hole. Below the front spout was a large and complex depiction of a feline face with semi-circular eyes, an ovular nose, rounded ears, noticeable fangs, and "spots". The sample from this vessel also consisted of dirt, but included small chunks of ceramic which were crushed for analysis. The sample was named "70" for its catalogued number.

Figure 5. "Human-bird Effigy Vessel" with "Jackpot" sample (1994.106.59)
Photographed by Ryan Nooe

Figure 6. “Bottle” with “61” sample (1994.106.61)
Photographed by Ryan Nooe

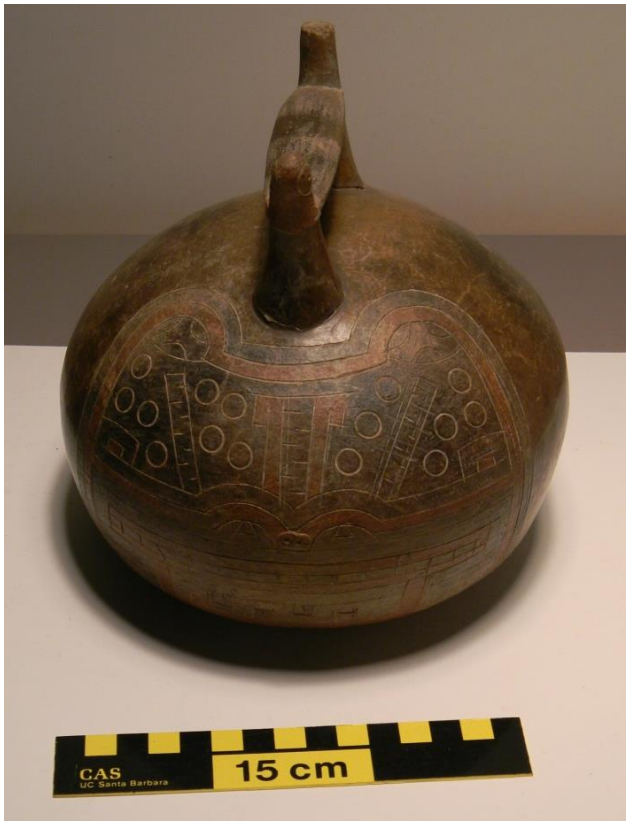

Figure 7. “Double-spouted Vessel” with “70” sample (1994.106.70)
Photographed by Ryan Nooe

Under the supervision of Dr. Carlin in the UNCC Chemistry department, small amounts of each sample (less than a quarter of a gram) were removed from their individual bags and placed in separate beakers. The beakers were then immediately filled with the organic solvent methylene chloride (or "dichloromethane") and isolated. For initial testing with a smaller LC mass spectrometer, the samples were prepared by extracting them through the use of acid. In each beaker, water and acid separated, which allowed for the water to be removed, filtered, and placed in the spectrometer. This process is ideal for desalting the samples, which is important because salt "destroys the mass spec" due to the aggregation of salts in the ionization process (Dr. Carlin, personal communication). The beakers with the sample fluids were re-isolated for future analysis.

Due to the less complex nature of the "small" spectrometer, the results were somewhat chaotic. For the "big" spectrometer, a column would also be used. This is usually a small tube with a solvent and absorbent, which allows for a more thorough separation of the focus chemicals in a sample from any contaminants as it passes from the top of the column into a collection container. Because of the lack of a column in the initial testing, a lot of smaller signatures or "peaks" in the samples were not strong enough to have identifiable masses. After looking at the results, it was both Dr. Carlin's and my conclusion that the highest peaks were contaminants from the solvent. The masses closely matched that of different forms of Benzene, a hydrocarbon and petrochemical found most commonly in oil. The presence of other masses closely matching hydrocarbons such as Anthracene and Phenanthrene assisted in our conclusion that the two highest peaks (with molecular masses 187.01 and 227.89) were contaminants. After looking more closely at the results, it was found that both peaks

show up in small amounts in the “baselines” (periods between introduction of a sample which act as a contrast to the samples chemical signatures). Also, it is important to note that all of the masses in the results are 1 higher than the actual mass of the identified chemical. This is due to the process of protonation, a chemical reaction during ionization in which a molecule gains a proton (Dr. Carlin, personal communication). Therefore, when looking at resulting masses from analysis, you have to subtract 1 to determine the actual mass.

As for the smaller peaks in the initial results, I was able to find close matches to the masses which were interesting as well as diverse. Initially, I had focused on the peaks which were common in each sample. It is possible that all of these peaks represented contaminants. However, one medium-sized peak present in each sample (233.02 or 233.15) closely matched the masses of melatonin, tryptophan, and thiazine. Another, smaller peak present in each sample was within .20 of the molecular mass for cocaine (302.91, accounting for protonation, versus 303.15 in cocaine). This may also match the chemical scopolamine, which is found in the psychoactive plants Brugmansia and Datura. When looking at different masses, 1 can be a big difference. However, a .20 difference is small enough that it would be possible to identify this as cocaine or scopolamine. These different chemicals, except for tryptophan, are all referred to as alkaloids, which are natural compounds that “occur especially in seed plants and are typically physiologically active” (merriam-webster.com). Many alkaloids, such as morphine, are used as drugs. Others, such as melatonin or serotonin, exist naturally as hormones in animals. It is important to point out that the chemicals mescaline and bufotenine are classified as psychoactive alkaloids.

After looking at the common peaks, I tried to find close matches for the unique masses in each sample. For the “Jackpot” sample, some interesting possible matches include fumaric acid for the mass 421.05 (tied to the organic compound furfural, which can be extracted from maize), benzene and fumaric acid for mass 456.81, cholesterol for mass 533.69 (as well as some alcoholic chemicals), and ergotaman for mass 576.45 (from the Ergot family, an alkaloid). The connection of fumaric acid to maize may be important because of the prominence of chicha (maize beer) in the Andean region. Also, from my own previous research on a separate subject, I recognize ergot from the condition of ergot poisoning. This, primarily seen a few hundred years ago, was the result of consuming rye which had grown a fungus. The consumption of the fungus could result in symptoms such as a burning sensation (which is how it also got the name “St. Anthony’s Fire”) or effects similar to those resulting from the consumption of LSD such as hallucinations. For the “61” sample, a few possible matches include tyrosine (an amino acid) and spermidine (a polyamine extracted from sperm) for the mass 433.68, hydrocarbons like hexacosane and methylheptatriacontane for mass 535.57, and another form of ergotaman for the mass 584.33. Finally, the unique masses from the “70” sample included close matches to leucine (an amino acid) for the mass 512.69, tryptophan for the mass 547.82, and estriol (the hormone estrogen) for the mass 577.45.

Table 2. Possible matches for molecular weights in first analysis

"Jackpot" Masses	Possible Matches	"61" Masses	Possible Matches	"70" Masses	Possible Matches
187.14	Anthracene Phenanthrene	187.14	Anthracene Phenanthrene	187.14	Anthracene Phenanthrene
233.15	Melatonin Tryptophan Thiazine	233.15	Melatonin Tryptophan Thiazine	233.15	Melatonin Tryptophan Thiazine
303.91	Cocaine Scopolamine	303.91	Cocaine Scopolamine	303.91	Cocaine Scopolamine
421.05	Fumaric Acid	433.68	Tyrosine Spermidine	512.69	Leucine
456.81	Fumaric Acid Benzene	535.57	Hexacosane Methylheptatriacontane	547.82	Tryptophan
533.69	Cholesterol	584.33	Ergotaman	577.45	Estriol
576.45	Ergotaman				

Although a second analysis using the "big" spectrometer was planned shortly after the initial results, certain complications delayed testing for a few weeks. In that time, sample "61" was accidentally knocked over by a student. However, the "Jackpot" and "70" samples were analyzed using the regular spectrometer, producing much more complex results. Most of the masses were recorded from ranges within the chromatography histogram that were focused on noticeable peaks. I want to reiterate that the masses recorded are all 1 higher due to protonation. The masses listed here are also those taken from the data, not the listed masses for the potential compounds identified, which are available on the website of the National Institute of Standards and Technology (NIST 2011). For the "Jackpot" sample, some interesting possible matches for the molecular masses included fumaric acid (at 323.14 and 421.29), sarcosine (an amino acid, also for 323.14), succinic acid (related to fumaric acid; 371.24), tryptophan and ornithine (an amino acid) both for the mass 421.29. fumaric acid, again, also appeared in the unique masses for the "Jackpot" sample from the previous analysis.

A range was taken of the largest peak in the histogram. In general, the histogram was chaotic for this sample due to a large number of small peaks as opposed to a single, outstanding one. Throughout this range, the most common peaks included molecular masses with close matches to testosterone acetate (331.27), more fumaric acid (467.49), adipic acid (which can be converted into a crystalline powder in order to make nylon fibers; 489.52), 16-epiestriol and estriol (related to Estrogen; 577.59), galactaric acid (which is related to furfural; 643.64), a couple of fatty acids like octadecanoic acid (331.27) and triacontanoic acid (467.49), and amino acids like lysine and glutamine (both for 489.52). The second range, covering a smaller series of peaks, had a few interesting possible matches including dichloroacetic acid (an acid occurring naturally in a type of seaweed found near Hawaii; 281.10), cyclobenzaprine (a muscle relaxant; 276.17), opioid painkillers like trimeperidine and proheptazine (also for the mass 276.17), succinic acid (399.28 and 447.35), adipic acid and malonic acid (the latter related to the production of polyesters; both for 399.28), and tryptophan or fumaric acid for the mass 421.30. The most common peaks, taken from a range which included both “peaks”, also produced a few unique masses. For the mass 323.16, possible matches include dimethoxycinnamic acid (a cinnamic acid isolated from coffee beans) and gelsemine (an alkaloid from the flowering vine *Gelsemium sempervirens*, existing as far south as Guatemala in the Americas). The mass 445.43 was closely matched with cholesterol-related compounds like cholesteryl, but it was also within .15 of bufotalin (a steroid found in some toad species). Fumaric acid was also clearly present as a possible match throughout the histogram at masses like 281.11, 445.43, and 467.49.

The results for the “70” sample were very different from those for the “Jackpot” sample. Instead of having no clear peaks, the “70” sample had one large peak that maxed-out at 7.92 minutes into the analysis. There were also a couple, very small peaks beforehand that were much less precise. In the first range, taken from the duration of the large peak, there were three interesting masses. The first, 299.18, has possible matches including fumaric acid, minaprine (an old antidepressant), norethynodrel (a synthetic, steroidal progestin used for hormonal contraception), and phenacaine (an anesthetic). The second, 399.30, closely matched to succinic acid and adipic acid. This mass is also almost the same mass found in the “Jackpot” sample of 399.28. The third, 421.29, is also close to a mass in the “Jackpot” sample (421.30) which closely matches ornithine as well as tryptophan.

The two smaller “peaks”, which were much less defined, actually produced some very unique results. In the second largest peak, two separate masses matched the amino acid leucine as well as a few α-amino acids such as valine, isoleucine, and alanine (for masses 516.42 and 521.39). The smallest peak showed possible signs of fumaric acid (367.18) as well as succinic acid (343.22 and 383.14), but there were also possible matches for diacetoxyscerpinol (a mycotoxin from fungi) and neosolanoil (a mycotoxin associated with maize). Finally, after setting a range for all three peaks, the most common masses included 299.18, 323.17, 399.30, 421.29, and 437.26. The last one could possibly match with fumaric acid, androsterone (a steroid hormone), and androstane (a steroid). The raw histogram outputs are available from the author; contact rnooe@uncc.edu.

Table 3. Possible matches for molecular weights in second analysis

"Jackpot" Masses	Possible Matches	"70" Masses	Possible Matches
276.17	Cyclobenzaprine Trimeperidine Proheptazine	299.18	Fumaric Acid Minaprine Norethynodrel Phenacaine
281.10	Dichloroacetic Acid	343.22	Succinic Acid
281.11	Fumaric Acid	367.18	Fumaric Acid Diacetoxyscerpinol
323.14	Fumaric Acid Sarcosine Dimethoxycinnamic Acid Gelsemine	383.14	Succinic Acid Neosolanoil
323.16	Fumaric Acid Sarcosine Dimethoxycinnamic Acid Gelsemine	399.30	Succinic Acid Adipic Acid
331.27	Octadecanoic Acid	421.29	Fumaric Acid Tryptophan Ornithine
371.24	Succinic Acid	437.26	Fumaric Acid Androsterone Androstane
399.28	Succinic Acid Adipic Acid Malonic Acid	516.42	Valine Isoleucine Alanine
421.29	Fumaric Acid Tryptophan Ornithine	565.39	Valine Isoleucine
421.30	Fumaric Acid Tryptophan Ornithine		
445.43	Fumaric Acid Bufotalin Cholesteryl		
447.35	Succinic Acid		
467.49	Fumaric Acid Triacontanoic Acid		
489.52	Adipic Acid Lysine Glutamine		
577.59	16-Epiestriol Estriol		
643.64	Galactaric Acid		

DISCUSSION

The main problem faced in this analysis is the fact that no one really knows what to expect from it. Because of that, the analysis was essentially blind. We had no idea what to look for. The specific process of cleaning the sample (by using a solvent) was ideal for the identification of chemicals like mescaline or bufotenine. However, the results of either analysis did not show signatures of either compound. There were a few interesting close matches such as cocaine, which was present in all three samples during the first analysis but did not have any noticeable peaks in the second analysis, or bufotalin from the second analysis of the "Jackpot" sample. There were also a few fiber-related matches such as adipic acid (on multiple occasions) and one possible match for malonic acid. However, it is unclear what this says about the fibers which made up the "Jackpot" sample. At this point, they are still unidentified.

There were also some odd results that only raise more questions. For example, there were multiple possible matches for amino acids, especially tryptophan, in both analyses. There were also masses that closely matched alkaloids like melatonin, thiazine, ergotaman, and physostigmine as well as derivatives of hormones like testosterone and estrogen. Even more curious was the potential presence of two compounds related to plants which are relatively close to Perú, but are still probably too far to argue their presence in Paracas artifacts. The first compound, dichloroacetic acid, occurs naturally in the seaweed *Asparagopsis taxiformis*, which is used in Hawaii as a condiment. The second, gelsemine, comes from the *Gelsemium sempervirens* vine, which grows as far south as Guatemala. Both of these compounds were potential matches in the "Jackpot" sample.

Previously, I mentioned that fumaric acid is related to furfural, which can be extracted from maize. It may be possible that some sort of maize drink was placed in the Paracas bottles and the fumaric acid was extracted during the filtering process, which would explain its multiple appearances. The possible matches to ergotaman (also called ergocryptine) may suggest the presence of an ergoline-containing plant. It has been documented that the genus *Ipomoea*, also called Morning Glories, was used in Mesoamerica for the production of rubber (Tarkanian and Hosler 2011). Cultures such as the Aztecs also used the seeds of certain species of Morning Glory plants, which contain the psychoactive ergolines (Defelice 2001). The close match to cocaine may also suggest the presence of coca or a species of the genus *Brugmansia*, or "Angel's Trumpet", which has been used by shamans in Perú (De Feo 2004). The tropane alkaloid scopolamine, which is found in *Brugmansia*, has the same molecular weight as cocaine. Scopolamine is also an anticholinergic, a drug that blocks impulses going through the parasympathetic nerve system (thefreedictionary.com). Although initially they seemed like less important potential matches, two separate masses could represent anticholinergic compounds such as mequitazine (matched to the mass 323.16) and homatropine (matched to the mass 276.17). This may suggest the presence of *Brugmansia* in one or more of the samples.

In general, the results for both analyses were chaotic. It is hard to get more specific results when you are not sure what you are looking for. It is also not always easy to identify possible contaminants. In the first analysis, the histograms were fairly simple and, thus, easily comparable. It was clear that some of the masses with higher concentrations were probably contaminants because of the concentration as well as their appearance in each sample's results. However, in the second analysis, there were barely

any overlaps (a couple masses were similar). I would argue then that each sample's results from the second analysis are probably more accurate portrayals of samples' contents. Some of the signatures in the initial analysis may also have broken down in the water solution between testing sessions. Further research on similar Paracas vessels, or further testing of the samples used here, will help narrow down the possible compounds and potentially increase any evidence of alkaloids. The presence of psychoactive drugs in ritual artifacts would have greater implications for the power structures, beliefs, and practices of both the Paracas and Chavín cultures.

CONCLUSION

In an article on the analysis of psychoactive chemicals in human hair samples from the Andes, Ogalde, et al., state that "Ethnographic and ethnohistoric documentation indicate that consumption of psychoactive plants played an important role in the ritual lives of Native Americans (Montenegro, 2006; Furst, 1994; Galinier et al.,1995; Harner,1976)" (Ogalde et al. 2009, 467). This may be true, but does that mean that we should automatically assume that every culture with strange imagery or practices represented an analogous situation? In other words, just because we have seen it elsewhere, should we assume it is present at Chavín de Huántar, or in cultures like the Paracas that fell under its influence? We can propose the concept, but should we present it as accepted reality without sufficient evidence? Furthermore, even if we find evidence of hallucinogens at or associated with Chavín de Huántar, does that automatically mean that the images of unknown beings and processes of transformation are the result of drug-use? Why is this the result? Do different hallucinogens have different effects on hallucinations? Most importantly, should we ask questions like this or should we just glaze over something that, undoubtedly, has a direct impact on our understanding of Chavín cosmology and power dynamics? Should we promote critiques or assumptions?

In this work, I have presented the site of Chavín de Huántar and raised the general question of what caused or inspired the iconography of the site that suggests the transformation of humans into non-human animals or therianthropomorphic beings. I have also proposed research that would focus on this question as well as critique the currently-held theory that these images are the result of psychoactive drug-use. Also, I argue that this affects not only archaeology and anthropology, but science in general.

More than just trying to understand the cause of strange iconography at one Andean site, I am posing an argument, or rather a critique, for all of science concerning how we deal with supposedly "supernatural" subjects. It is the nature of science to seek out and understand the unknown, but we seem to have a tendency to avoid what we do not understand, or simplistically explain bizarre occurrences using current knowledge; coming to end-all conclusions based solely on what we understand *now* instead of admitting that we do not know everything. The current explanation, because it lacks biological evidence, is no better than an assumption. As I have stated before, the question of whether or not hallucinogens were used at Chavín de Huántar has a direct effect on our perception of the culture in general. The very structure of power maintained by the priests relies on the appearance of their command of physical transformation and their interactions with supernatural beings. By glazing over the question of whether or not they were under the influence of hallucinogens, and all of the questions and inconsistencies that go along with that scenario, we instantly belittle the cosmology of the Chavín culture. This applies to any archaeological context as well. Our personal opinions about the significance or possibility of the supernatural are ultimately irrelevant in the reconstruction of past cultures. If we want to be as unbiased as possible, we must regard the beliefs of others as unique from our own, not subordinate to them. I have performed my proposed analysis on artifacts from a comparable culture to Chavín, the Paracas, and proven the relevance of the method to detecting potential hallucinogens in archaeological remains. Even if such hallucinogens are not discovered, it is clear that one sample can produce an abundance of potential results with various implications. To avoid the opportunity to perform such analysis, or to not encourage such action, is to establish the

position that how or why the priests at Chavín commanded such power are not significant factors in the understanding of the culture. One cannot simply claim to control the supernatural without some evidence of that power, be it real or staged. The discovery or lack of hallucinogens in the archaeological record for the Chavín sphere of influence is the first step in understanding the source of that power and, more importantly, the significance it had for local inhabitants and the "pilgrims" who traveled there.

REFERENCES

Ayres, Fred
1961 Rubbings from Chavin de Huantar, Peru. *American Antiquity*, Vol. 27, No. 2, 239-245.

Bennett, Bradley C.
1992 Hallucinogenic Plants of the Shuar and Related Indigenous Groups in Amazonian Ecuador and Peru. *Brittonia*, Vol. 44, No. 4, 483-493.

Bennett, Wendell C.
1943 The Position of Chavin in Andean Sequences. *Proceedings of the American Philosophical Society*, Vol. 86, No. 2, 323-327.

Bennett, Wendell C.
1944 The North Highlands of Peru: Excavations in the Callejón de Huaylas and at Chavín de Huántar. Anthropological Papers of The American Museum of Natural History, Vol. 39, 1-128.

Bennett, Wendell C.
1953 Area Archaeology. *American Anthropologist*, New Series, Vol. 55, No. 1, 5-16.

Biesele, Megan
1995 Rock Engravings of Southern Africa by Thomas A. Dowson Review. *American Anthropologist*, New Series, Vol. 97, No. 1, 152.

Browman, David L.
1976 The Peoples and Cultures of Ancient Peru by Luis G. Lumbreras; Betty J. Meggers Review. *American Anthropologist*, New Series, Vol. 78, No. 1, 190-191.

Burger, Richard
1981 The Radiocarbon Evidence for the Temporal Priority of Chavin de Huantar. *American Antiquity*, Vol. 46, No.3, 592-602.

Burger, Richard
1992a The Sacred Center of Chavin de Huantar. The Ancient Americas: Art From Sacred Landscapes, 265-277.

Burger, Richard
1992b Chavin and the Origins of Andean Civilization. New York: Thames and Hudson Inc.

Burger, Richard L.
2008 Chavín de Huántar and Its Sphere of Influence. *In* Handbook of South American Archaeology, 681-703. New York: Springer.

Burger, Richard
2011 What kind if hallucinogenic snuff was used as Chavín de Huántar?: An iconographic identification. *Ñawpa Pacha: Journal of Andean Archaeology*, Vol. 31, No. 2, 123-140.

Conlee and Ogburn
2005 The Foundations of Power in the Prehispanic Andes: An Introduction. *Archaeological Papers of the American Anthropological Association*, Vol. 14, 1–12.

Contreras, Daniel, and David Keefer
2009 Implications of the Fluvial History of the Wacheqsa River for Hydrologic Engineering and Water Use at Chavín de Huántar, Peru. *Geoarchaeology: An International Journal*, Vol. 24, No. 5, 589-618.

Cordy-Collins, Alana
1982 Psychoactive Painted Peruvian Plants: The Shamanism Textile. *Journal of Ethnobiology*, Vol. 2, No. 2, 144-153.

De Feo, Vincenzo
2004 The Ritual Use of *Brugmansia* Species in Traditional Andean Medicine in Northern Peru. *Economic Botany*, Vol. 58 (Supplement), S221-S229.

De Rios, Marlene D.
1989 Power and Hallucinogenic States of Consciousness among the Moche: An Ancient Peruvian Society. *In* Altered States of Consciousness and Mental Health: A Cross-cultural Perspective, ed. Colleen A. Ward, 285-299. Newbury Park, CA: Sage Publications.

De Rios, Marlene D. and Mercedes Cardenas
1980 Plant Hallucinogens, Shamanism and Nazca Ceramics. *Journal of Ethnopharmacology*, Vol. 2, 233-246.

Defelice, Michael S.
2001 Tall Morningglory, Ipomoea purpurea (L.) Roth: Flower or Foe? *Weed Technology*, Vol. 15, No. 3, 601-606.

Dowson, Thomas A.
1998 Like People in Prehistory. *World Archaeology*, Vol. 29, No. 3, 333-343.

Druc, Isabelle
2004 Ceramic Diversity in Chavín De Huantar, Peru. *Latin American Antiquity*, Vol. 15, No. 3, 344-363.

Echeverría, Javier, and Hermann M. Niemeyer
2013 Nicotine in the Hair of Mummies from San Pedro de Atacama (Northern Chile). *Journal of Archaeological Science* 40(10), 3561–3568.

Feathers, James, with Jack Johnson and Silvia Kembel
2008 Luminescence Dating of Monumental Stone Architecture at Chavín De Huántar, Perú. *Journal of Archaeological Method and Theory*, Vol. 15, No. 3, 266-296.

Fucci, N., and M. Chiarotti
1996 Mescaline in multi-coloured statuettes. *Forensic Science International*, Vol. 82, 165-169.

Fundación La Nación
2007 Luis Guillermo Lumbreras. http://www.lanacion.com.ar/940856-luis-guillermo-lumbreras, accessed July 5, 2014.

Glass-Coffin, Bonnie
2010 Shamanism and San Pedro through Time: Some Notes on the Archaeology, History, and Continued Use of an Entheogen in Northern Peru. *Anthropology of Consciousness*, Vol. 21, Issue 1, 58-82.

Goodman, Felicitas D.
1999 Ritual Body Postures, Channeling, and the Ecstatic Body Trance. *Anthropology of Consciousness*, Vol. 10, No. 1, 54-59.

Kidder II, Alfred
1954 Paracas Cavernas and Chavín by A. L. Kroeber. *American Anthropologist*, New Series, Vol. 56, No. 5, Part 1, 921-922.

Kembel, Silvia R., and Herbert Haas
2013 Radiocarbon Dates from the Monumental Architecture at Chavín de Huántar, Perú. *Journal of Archaeological Method and Theory*, No. 2, 1-83.

Lewis-Williams, J.D.
2002 Three-Dimensional Puzzles: Southern African and Upper Paleolithic Rock Art. *ETHNOS*, Vol. 66, No. 2, 245-264.

Lumbreras, Luis G.
1969 De los pueblos, las culturas y las artes del antiguo Perú. Moncloa-Campodónico.

Lumbreras, Luis G.
1974 The Peoples and Cultures of Ancient Peru. Translated by Betty J. Meggars. Washington, D.C.: Smithsonian Institution Press.

Martins, Cláudia P.B, Sally, Alder, John F Freeman, and Torsten, Brandt, Simon D Passie
2010 Profiling Psychoactive Tryptamine-Drug Synthesis by Focusing on Detection Using Mass Spectrometry. TrAC Trends in Analytical Chemistry TrAC Trends in Analytical Chemistry 29(4), 285–296.

Menzel, Dorothy, John Rowe, and Lawrence E. Dawson
1964 The Paracas Pottery of Ica: A Study in Style and Time. Berkeley, CA: University of California Press.

Miller, George, and Richard Burger
1993 Our Father the Cayman, Our Dinner the Llama: Animal Utilization at Chavin de Huantar, Peru. *American Antiquity*, Vol. 60, No. 3, 421-458.

National Institute of Standards and Technology
2011 Molecular Weight Search. http://webbook.nist.gov/chemistry/mw-ser.html, accessed March 31, 2015.

Niemeyer, Hermann
2013 On the provenience of wood used in the manufacture of snuff trays from San Pedro de Atacama (Northern Chile). *Journal of Archaeological Science*, Vol. 40, 398-404.

Ogalde, Juan P., Bernardo T. Arriaza, and Elia C. Soto
2009 Identification of psychoactive alkaloids in ancient Andean human hair by gas chromatography/mass spectrometry. *Journal of Archaeological Science*, Vol. 36, 467-472.

Ogunbodede, Olabode, Douglas McCombs, Keeper Trout, Paul Daley, and Martin Terry
2010 New mescaline concentrations from 14 taxa/cultivars of *Echinopsis* spp. (Cactaceae) ("San Pedro") and their relevance to shamanic practice. *Journal of Ethnopharmacology*, Vol. 131, 356-362.

Paul, Anne
1993 A Center in Peru: Chavín and the Origins of Andean Civilization by Richard L. Burger Review. *Science*, New Series, Vol. 260, No. 5111, 1183.

Pochettino, M. L., A. R. Cortella and M. Ruiz
1999 Hallucinogenic Snuff from Northwestern Argentina: Microscopical Identification of Anadenanthera colubrine var. cebil (Fabaceae) in Powdered Archaeological Material. *Economic Botany*, Vol. 53, No. 2, 127-132.

Proulx, Donald A.
2006 A Sourcebook of Nasca Ceramic Iconography: Reading a Culture through Its Art. Iowa City: University of Iowa Press.

Rick, John W.
2005 The Evolution of Authority and Power at Chavín de Huántar, Peru. *Archaeological Papers of the American Anthropological Association*, Vol. 14, 93-111

Rick, John
2006 Chavín de Huántar: Evidence for an evolved shamanism. San Diego Museum Papers 44: Mesas and Cosmologies in the Central Andes, 101-112.

Rick, John
2008 Chavín de Huántar: The beginnings of social complexity in the Andes. *In* M. Chazan (Ed.), World Prehistory and Archaeology: Pathways Through Time, 314-315. Boston: Pearson.

Rowe, John H.
1945 Absolute Chronology in the Andean Area. *American Antiquity*, Vol. 10, No. 3, 265-284.

Rowe, John
1962 Chavin art: an inquiry into its form and meaning. New York: University Publishers.

Rudgley, Richard.
1998 A Brief History of the San Pedro Cactus. The Encyclopedia of Psychoactive Substances.
http://www.mescaline.com/sanpedro/index.html

Sayre, Matthew P.
2010 Life Across the River: Agricultural, Ritual, and Production Practices at Chavín de Huántar, Perú. Ph.D. dissertation, Department of Anthropology, University of California, Berkeley.

Sayre, Matthew P.
2014 Ceremonial Plants in the Andean Region. *In* Plants and People: Choices and Diversity through Time, Alexandre Chevalier, Elena Marinova, Leonor Pena-Chocarro, eds., 368-373. Oxford: Oxbow Books.

Schlosser, Sandra, Robert Kovacs, Ernst Pernicka, Detlef Günther and Michael Tellenbach
2009 Fingerprints in Gold. *In* New Technologies for Archaeology: Multidisciplinary Investigations in Palpa and Nasca, Peru, Markus Reindel and Günther Wagner, eds., 409-504. Berlin: Springer Publishing.

Silverman, Helaine
1994 Paracas in Nazca: New Data on the Early Horizon Occupation of the Rio Grande de Nazca Drainage, Peru. *Latin American Antiquity*, Vol. 5, No. 4, 359-382.

Stanford University
1997 Exploring Chavín de Huántar. The Stanford Chavín Project. http://www.stanford.edu/~johnrick/chavin_wrap/chavin/project.html, accessed May 9, 2014

Tello, Julio C.
1943 Discovery of the Chavín Culture in Peru. *American Antiquity*, Vol. 9, No. 1, 135-160.

Tarkanian, Michael J. and Dorothy Hosler
2011 America's First Polymer Scientists: Rubber Processing, Use and Transport in Mesoamerica. *Latin American Antiquity*, Vol. 22, No. 4, 469-486.

Torres, Constantino Manuel, David B. Repke, Kelvin Chan, et al.
1991 Snuff Powders from Pre-Hispanic San Pedro de Atacama: Chemical and Contextual Analysis. Current Anthropology 32(5), 640–649.

Torres, Constantino M.
1995 Archaeological Evidence for the Antiquity of Psychoactive Plant Use in the Central Andes. Annuli dei Musei Civici Rovereto, Vol. 11, 291–326.

Torres, Constantino
1996 Archaeological Evidence for the Antiquity of Psychoactive Plant Use in the Central Andes. https://www.academia.edu/3828115/Archaeological_evidence_for_the_antiquity_of_psychoactive_plant_use_in_the_Central_Andes, accessed March 27, 2014.

Urton, Gary
1996 The Body of Meaning in Chavin Art. *Anthropology and Aesthetics*, No. 29/30, 237-255.

Unkel, Ingmar, Bernard Kromer, Markus Reindel, Lukas Wacker, and Günther Wagner
2007 A Chronology of the Pre-Columbian Paracas and Nasca Cultures in South Peru based on AMS ^{14}C Dating. *Radiocarbon*, Vol. 49, No. 2, 551-564.

UNESCO World Heritage Convention
2014 Chavin (Archaeological Site). http://whc.unesco.org/en/list/330, accessed March 27, 2014.

Vaughn, Kevin J.
2005 Crafts and the Materialization of Chiefly Power in Nasca. *Archaeological Papers of the American Anthropological Association*, Vol. 14, 113–130.

Willey, Gordon R.
1954 Paracas Cavernas and Chavín by A. L. Kroeber. *American Antiquity*, Vol. 20, No. 2, 184-185.