

HOPEWELL PANPIPE, MUSIC, ART, AND EXPRESSION:
AN EXPLORATION OF MUSIC IN HOPEWELL CULTURE

By

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Submitted to the Faculty of

The Archaeological Studies Program
Department of Sociology and Archaeology

in partial fulfillment of the requirements for the degree of
Bachelor of Science

University of Wisconsin-La Crosse

2013

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University of Wisconsin-La Crosse, 2013

Abstract

Copper played an important symbolic role in the Hopewell Interaction Sphere, and was used in a number of ritual items, ranging from effigies to panpipes. The role of panpipes in Hopewell is not clear; panpipes have only been recovered from mortuary contexts, and we have little to no knowledge of their living context. I report on my experimental effort to recreate a Hopewell panpipe. My methods include a thorough review of archaeological site reports, and taking a series of measurements on Hopewell panpipes based on archaeological data. These data and measurements resulted in the creation of a series of panpipes in the Hopewellian style, using materials that were readily available to the Hopewell or closely mirror those materials. My reconstruction creates a basic instrument that can be used for comparison with archaeological remains, and to achieve a better understanding of how Hopewell panpipes were made, what materials were used, and the by-products created by their manufacture.

Acknowledgements

Above all I would like to thank my readers, Dr. Joseph A. Tiffany and Dr. Vincent K. Her, for their time, assistance, support and guidance in this endeavor. I would like to thank the members of my reading group, Sarah Sodemann, Seth Taft, and Danielle Krebsbach for their assistance, help and patience. I would also like to thank Dr. Constance Arzigian for first giving me the idea for this project and sharing her knowledge on the subject with me. Last, but not least, I would like to thank my friends and family for their continued support throughout this process.

INTRODUCTION

The Prehistory of North America is a rich and intricate fabric, a fabric comprised of cultures and traditions, spanning thousands of years of human habitation, each one acting as a delicate thread that weaves a tapestry of our shared past. These threads are cultures that ranged in size, scale, and complexity from small bands of the Archaic tradition, to the great cities and chiefdoms of Cahokia and the Natchez. Throughout the long and varied history of people in North America, and the great diversity of tradition that they created, Hopewell stands out amongst the rest, in both temporal and geographical scale, as well as in social complexity Carr 2005: 51-53). Few ancient cultures in the New World achieved the same level of temporal and territorial size of Hopewell. The Hopewell Tradition originating in what is modern day southwestern Ohio, moving west to the Mississippi, south to the Gulf Coast, North to Ontario, and east to the Allegany mountains (Romain 2009:7-6). Within this region, Hopewell represents large and complex groups of people spread across the continent (Figure 1). They were not one monolithic people, but rather a loose grouping of different cultural traditions linked along kinship lines, trade alliances, and cultural belief systems (Caldwell 1964:135). It is this collective group of people that would give rise to some of the earliest forms of complex society in the Americas, mastered craft skills in stonework and metalwork, mound building, and artwork that would not be surpassed for hundreds of years after their culture faded (Trevelyan 2004:35).

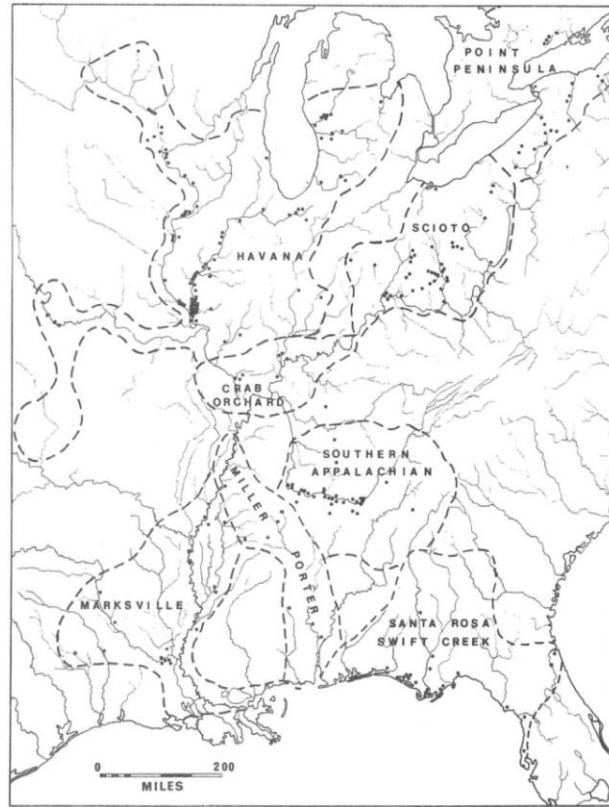


Figure 1. Hopewell Occupation areas (Seaman 1979)

Hopewell

As noted, Hopewell originates in the river valleys of Southern Ohio around 200 B.C. and thrived until A.D. 400 (Willy1966:277). Despite all that has been learned about them over the years, their exact nature is still not fully known. A clear definition of Hopewell has eluded anthropologists for as long as Hopewell has been studied, with a wide variety of views and theories postulated over the years (Turff1997:6-7). This wide ranging set of ideas concerning Hopewell is likely due to the limitations of the archaeological record, only a limited amount of materials survive in the archaeological record and we must try to reconstruct the past based on a limited and incomplete sample. By the very nature of archaeological investigation, we have a limited sample of materials to examine, this coupled with the fact that early research on

Hopewell has focused almost exclusively on burial mounds and earthworks. This has led to the early idea of Hopewell as a burial complex instead of an overarching culture Carr 2005a: 55, Turff 1997:6).

Later researchers emphasizing trade and interaction, show people linked through kinship and trade of exotic goods. From this body of research theories of Zones of Influence appear, looking at broad application of ideology as well as small localized ideologies (Turff 1997:7). In the end, the exact origins of Hopewell remain unknown and the precise nature of their lifeway's continues to be shrouded in mystery, but by looking at these different competing ideas, we can see unifying themes that help us understand and better define these fascinating people.

What we do know about Hopewell is that during this timeframe the Hopewell Culture rose in Southern Ohio, quickly establishing themselves along fertile river valleys, they become the dominant group in the region. Their society and culture were based on a hierarchy of ascribed statuses, which would have allowed for greater stability and economic variability (Cadwell1964:136-137). This high level of stratification encouraged cultural stability and sedentism. This fostered a greater use of natural resources, specialization of agriculture, and population growth, leading to the complex social developments seen in their culture (Carr 2006: 8).

As Hopewell evolved the level of sophistication and technological advancement increased and changed with it. Horticulture became increasingly prevalent, decreasing dependence on wild game and wild plants. The burial and mortuary practices became increasingly complex and sophisticated (Turff 1997:10). Though Hopewellian peoples may have inherited mound building from Adena, the resident cultural tradition preceding them in the region, they greatly expanded mound building and elite burial practices (Figure 2).



Figure 2. Example of a Hopewell Mound from Marietta Conus Mound, mapped by Squier and Davis in 1848. (Romin 2009:110)

The level of craft work developed by Hopewell dwarfed the level of artwork and craft seen in contemporary and earlier cultures. Stone carved pipes and effigies expressed a complex ideology and reached a high level of detail and complexity (Trevelyan 2004:31). Mica sheets were carved into thin sheet effigies for ideological ideas and representations. Using cold forging the Hopewell produced a number of copper implants (Figure3). This ranged from ear spools, animal effigies, and Panpipes (Trevelyan 2004:120, Bernadini and Carr 2005:626-627). It is these panpipes that hold a particular fascination, as Hopewell is the only culture in North America to produce Panpipes, and these Panpipes will be the focus of this paper.

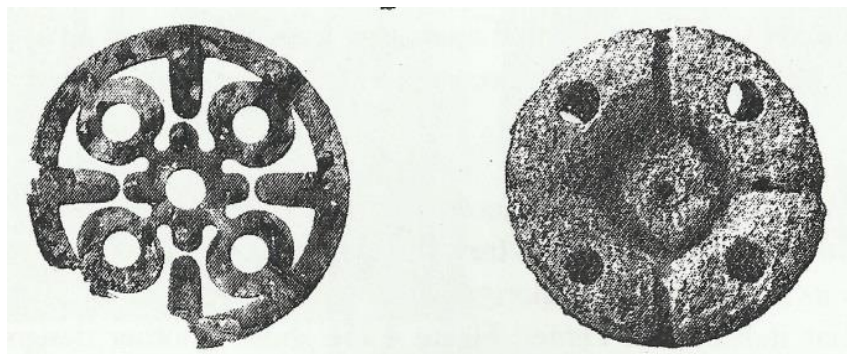


Figure 3. Hopewell Copper disk and ear spool excavated near Mound City at Hopewell Mounds in 1922. (Romain 2009:110)

Panpipes and Hopewell

Panpipes are one of the oldest musical instruments, and have been recorded in a variety of cultures throughout the world. They have been produced in a wide range of styles and varying complexity. These instruments range from the simplest form of two hollow reeds of differing lengths, with each producing a different note; to the more complex configuration, containing up to thirty reeds with each possessing its own unique sound, and placed in multiple rows (Puscoiu 1997:4). The reeds are placed side by side in an ascending or descending order. They can be in a single straight or curved line, or staggered in smaller rows of two or three. These styles of instruments are found throughout the Old World and it has been theorized that they all are derived from an early form called a fifa (Puscoiu 1997:6).

Hopewell is the only North American culture to possess panpipes. Thus, they are likely to be an independent invention, and not co-opted from another culture. The style of the Hopewellian Panpipes is very simple, comprising of 3 or 4 hollow reeds bound to gather and held in place with a sheet of copper (Figure 4) (Turff 1997:29). In some cases the copper is embellished with silver or iron. The panpipe styles are divided into three groups based on length and design: Banded, Short Corrugated, and Long Corrugated. (Turff 1997:29, Turff and Carr 2006:650-651)



Figure 4. Archaeological remains of a Hopewell panpipe. Front and back view approximately 8 cm in length from Donaldson II site, Ontario. (Turff and Carr 2005: Appendix 18.4)

The archaeological record shows a bias concerning these instruments; the remains are nearly always the metal fittings, seldom do the organic components survive. Furthermore we only find them in funeral and mortuary contexts (Young 1976:2-3, Cree 1992:6). Since we know that Hopewell cremated many of their dead, and that burial is presumably only for elite individuals, the discovery of panpipes in these contexts can lead us to believe that they are only elite items, due in part to the fact that they are made of exotic trade goods (Carr 2005b:471, Turff 1997:67) . However, we are only seeing the deposition of these instruments, and do not know what role they played in the lives of the people who possessed them before they entered into the archaeological record. It is this question and this role that I will explore and hope to achieve a better understanding of.

Intersecting ideas

This investigation is based in two parts that are further outlined below, these two intersecting parts focus on Ethnoarchaeology, Ethnomusicology and Experimental Archaeology. Each of these areas of study looks at a different piece of the puzzle, and each can in its own way help answer the questions that we have about the panpipe, but each alone offers an incomplete answer, based within the limitations of data available and the scope of the question asked. By exploring this topic through the prism of each of these approaches and then combining the data from each approach, I can gain a more holistic view of panpipes and their cultural role (Bell 1994:267). Throughout this paper I will explore panpipes from the Hopewell Tradition and make attempts to reproduce them with the hopes that I can come to a better understanding of the cultural context in which they existed.

Experiment

The first section of the paper deals with the experimental archaeology aspect of the research, with the goal to create a set of six panpipes of varying style and dimensions based on the Hopewellian method and style. This has been done by examining site reports and previous analyses, to gather information on the dimensions of Panpipes. From there I have made averages of the length of the copper components of the panpipes. I then used these averages to create my own panpipes.

Cross cultural examination

The second phase of my research deals with understanding what people were doing with the panpipes. I have chosen to conduct a cross cultural comparison, looking at flute music in Native American cultures. This has been done by creating a model of flute related activities and flushing out what activities are most frequently associated with flute music. By creating this model it will be possible to infer activities for which Hopewell may have been using their panpipes (Gibbon 1984:108-110).

THEORETICAL PERSPECTIVE AND LIMITED ASSUMPTIONS

It is difficult due to the very nature of the questions I wish to explore in this paper to concisely establish a theoretical approach or perspective. My question involves several different disciplines within Anthropology; I view them as complementary disciplines, though some may view them as oppositional. For my research I wish to blend an approach that is well grounded in archaeology, ethnomusicology, and cultural anthropology. These three different fields all share the same root goal and the same root origin, but are seldom explored in tandem. Often, we

neglect to examine an anthropological question from a holistic viewpoint, seeing it only through the narrow lens of our distinct sub disciplines (Bell 1994:19-20).

It is my belief that data acquired from these sources can be used to create analog models of human behavior (Gibbon 1984:108). I will be able to look at the different roles that music, shamanism, and panpipes play across cultural and temporal spans. By looking at where these ideas intersect, I can build a model of behavior from Hopewell encompassing these different ideas. Using statistical analysis I can quantify the probability of occurrence and create a best inference model into the nature of panpipes in the Hopewell world (Ascher 1971:263, Spaulding 1971:45). There are three different Anthropological approaches that will be employed in this paper. These three sub-disciplines of anthropology, at first glance rely on very different set of methodologies, but taken together they allow for a more comprehensive approach to this question. These three intersecting approaches are archaeology, ethnomusicology, and ethnoarchaeology, each of which is briefly explored below.

Archaeology

Archaeology is most broadly defined as the study of past human cultures through examining the material remains (Jennings 1989:4). Since Hopewell existed from 200 B.C. to 400 A.D., prior to written records in the Americas, our knowledge of the people and their culture is based solely on what we can glean from the archaeological records. Over the last 200 years, professional and amateur archaeologists have excavated Hopewellian sites, and this work has created a basic understanding of their cultural systems. Beliefs, trade, kinship, and ideology have all been explored through the archaeological record. There are however limitations on what we can know about a culture strictly through material cultural remains. The Archaeological record exists as an

incomplete record; certain items preserve better than others and this leaves us with a partial picture of the past(Jennings 1989:23-24). Within the context of this study, our understanding of Hopewell beliefs and music is limited to what can be gleaned from what has been recovered from archaeological sites. In this case, we only know of panpipes from their final deposition into the archaeological record, which is exclusively in mortuary contexts. Consequently, we do not yet fully understand the living usages of panpipes.

Ethnoarchaeology

Ethnoarchaeology is a subfield of archaeology that combines the cultural anthropology sub-discipline of ethnography with archaeology. Ethnoarchaeology as a whole is the study of modern cultures for the purpose of comparison to archaeological cultures. When looking at the archaeological record, there are often artifacts that were out of place and time. They have no context either due to site disturbance or a lack of understating of what the artifact was used for. By looking at a modern culture that is in similar environments, technological level of innovation, and cultural systems, it is possible to take the past artifact and compare it with a modern one. By doing this we can see what the role of the artifact was, how it was made, and what debris is left from its use and production.

For this analysis, Ethnoarchaeology become an important way of looking at the past. We have panpipes from Hopewell, but they are artifacts, whose function and meaning remain ambiguous. We see them only in one context and do not as of yet know the role that they played in the life of the people who made them.

Ethnomusicology

Ethnomusicology is one of the wider academic fields that look at music. It encompasses a broad range of disciplines and sub disciplines including Folklore, cultural anthropology, psychology, sociology, biology, and musicology. The focus of Ethnomusicology is to explore music within its cultural, social, material, cognitive, and biological role within the society that created it.

Through a greater understanding of the music produced by a culture, we can begin to understand the different ways that music impacted the lives of the people involved and see how it influenced them in their daily lives and overarching traditions. By employing the concepts of ethnomusicology it may be possible to understand the deep emotional and spiritual significance that people place in music in the past as well as the normal daily activities associated with it.

Tying it together

Each one of these three approaches illuminates one element of the past. We can see different acts of how a panpipe would be used by a past culture by looking at the archaeological record, the ethnographic record, and applying ethnomusicology. Each one of these approaches will shed light on one aspect, illuminating a tiny piece of the puzzle. When these approaches are applied to understanding a musical instrument from the past each tells a slightly different story. By using the three approaches in tandem, we can create a holistic view of panpipes, and achieve a better grasp of the role that they played during the time of Hopewell.

METHODOLOGY

The main focus of this study is to gain a better understanding of the Hopewell variant of panpipes, their cultural usage, and more broadly define the role that this type of music played within their culture.

The method employed in my research is broken down into four sections, the first being a background and exposition of Hopewell, beliefs, trade, and society. Next is an exploration of panpipes, their history in this continent, and their uses. These two segments will comprise the background and exposition. This will be followed by an experimental reconstruction of a panpipe based on archaeological examples. Next is a cross-cultural comparison to explore the possible role and use of panpipes within Hopewell.

What We Hope to Learn

There are three things that I hope this analysis will help to clarify, contributing to research on Hopewell culture. First, how were panpipes made? We know the basic materials that they were made from and what their basic functions were, but their true nature has never been clearly determined. This analysis will produce playable panpipes that are constructed in the Hopewellian style and these should be able to act as a proxy to use for comparisons. Second, what different craft specialization were needed to make panpipes and what material remains would be left behind by their production? Third, what did they use panpipes for? Were they strictly ceremonial object or did they also have daily and secular roles.

Understanding Hopewell

Hopewell cannot truly be seen as a single culture since it consisted of a number of loosely connected groups ((Caldwell1964:136-137). Hopewell Culture has traditionally been referred to by archaeologist as the Hopewell Tradition; the lines of connection between groups are often referred to as the Hopewell Interaction Sphere (HIS). The groups within this sphere share ideology, kinship and trade. Although this concept mostly refers to the disparate groups within the boundaries of Hopewell, it also can include people outside of their culture that they traded and interacted with. The Hopewell Interaction Sphere dates from 100 BC to A.D. 400 (Caldwell 1964: 135, Kocik 2012:1). Hopewell is loosely defined as a cultural complex that encompasses a vast geographic area. They ranged from the Mississippi River Valley in the West, to Central Ohio in the east and south to Florida and Louisiana. More importantly what links these groups together, into a thriving social, political and economic entity is a complex system of exchange and a trade network, which is known today as the Hopewell Exchange System (Carr and Troy 2006:189-190). Through the Hopewell exchange system, rapid movement of ordinary and exotic goods from across the continent were able to move between groups and localities, bringing these items together from all corners of the continent (Bernadini and Carr 2005:624-625). This intricate exchange system allowed for the exchange of ideas central to cultural development and change across much of Central and Eastern North America (Willey 1966:277).

There is no ethnographic history of the Hopewell. What we know today is based on a careful examination of the evidence they left behind. They left a great deal of evidence in the archaeological record, which has been explored for over 150 years by archaeologists. Through careful excavations and detailed analysis, archaeologists, ethnohistorians and cultural

anthropologist have been able to model much of the belief systems, and daily lifeway of the Hopewell. The artifacts that they left behind are wide ranging and varied, from everyday utilitarian tools, to detailed artistic expressions (Romian 2009:75). The artworks uncovered to date range from effigy pipes, to carved thin sheets of mica, to fully worked and formed copper pieces, all displayed detailed and complex levels of craftsmanship (Willey 1966:275, Kocik 2012:25-26). It is likely that each of these items had multiple uses; they revealed deep levels of aesthetic and personal meaning. They reflected and displayed kinship, showed off personal aesthetic sentiments, and served as religious and ceremonial objects (Figure 5 (Trevelyan 2004:116, Romian: 2009:11).



Figure 5. Intricate Copper Large openwork composite bird-bear figure, from the Middle Woodland period, Hopewell Mounds Ohio. (Trevelyan2004: plate 6)

It is with this in mind that we will explore panpipes. Panpipes were created from reeds of cane or wood warped in bands of copper or silver. The reed was then plugged by wood wrapped in down and twisted grasses (Cree 1992:4). These plugs were used to create the desired notes on a musical scale. Panpipes represent the simplest form of woodwind instrument, the pipes varied in form, consisting of 3 or 4 pipes. Some are constructed with a flat sheet of metal that covered the entirety of the reeds. Others consisted of a single band connecting the pipes, and only covering a portion of the reeds (Young 1976:7). The panpipes are found across the Hopewell

interaction sphere, there does not appear to be a center that they radiate out from (Figure 6). Rather they tend to have a varied distribution across eastern North America. In North America they are unique to Hopewell. No archaeological remains of these pipes or similar variants have been recovered from prior to or after Hopewell (Turff 1997:30).

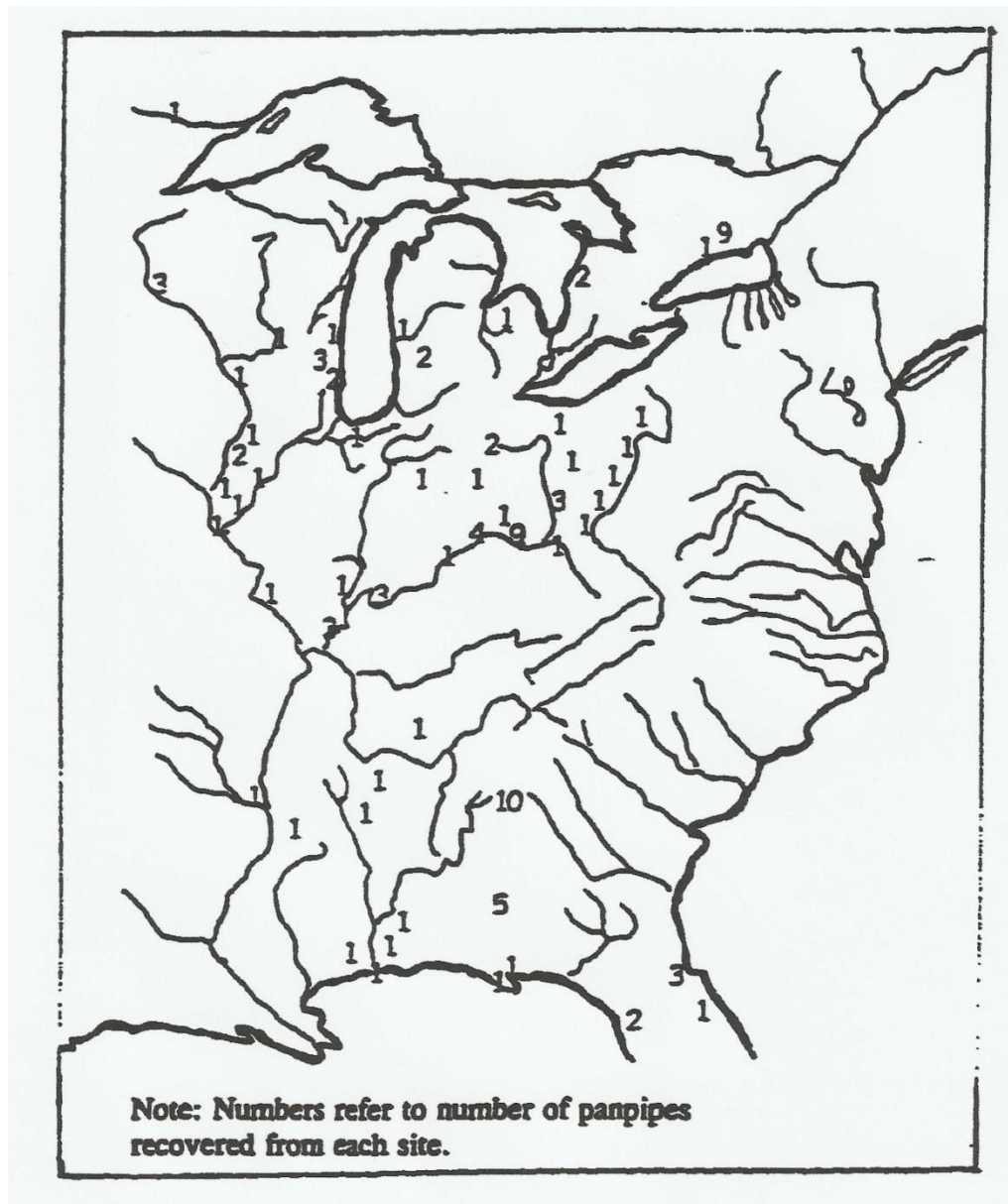


Figure 6. Distribution of 55 Woodland sites where panpipes were recovered from archaeological contexts. (Turff 1997)

Archaeologists have been able to piece together many of the beliefs, traditions, and burial practices associated with the Hopewell (Romian 2009:22). However, due to the small number of panpipes available from this period; little research has focused on them. Thus we have yet to understand the role of music, especially the use of this particular instrument in Hopewell society. Across cultures, music plays a visible role in social, political, and ceremonial life. Given the level of artistic creativity and expression, that the Hopewell tradition achieved, it is likely, that music held an important place in the hearts and lives of its people. The focus of this investigation is to understand how panpipes filled these roles in Hopewell society.

EXPERIMENTAL RECONSTRUCTION

Over the years 105 examples of panpipe remains have been recovered from a variety of settings (Truff 1997:29). The vast majority of panpipes were recovered from burial mounds and ceremonial contexts, burial mounds making up the majority of known examples. These pipes likely represent a small portion of the true number of pipes that would have existed in the past, due to the preservation properties of the archaeological record.

Several researchers have endeavored to understand the role of panpipes, their context and construction. In 1970, Gloria Young experimented in reconstructing a panpipe excavated in Arkansas (Figure 7) (Young 1970:6). Her reproduction was based largely in part on the incredible level of preservation in the pipe. She was able to recreate the interior parts of the panpipe, the reeds and the organic plugs and packing. Her reconstruction did not include the exterior copper elements, and only tuned 2 of the 3 reeds. This is largely due to the incomplete preservation of the third reed so its exact dimensions were not known (Young 1970:7-8).

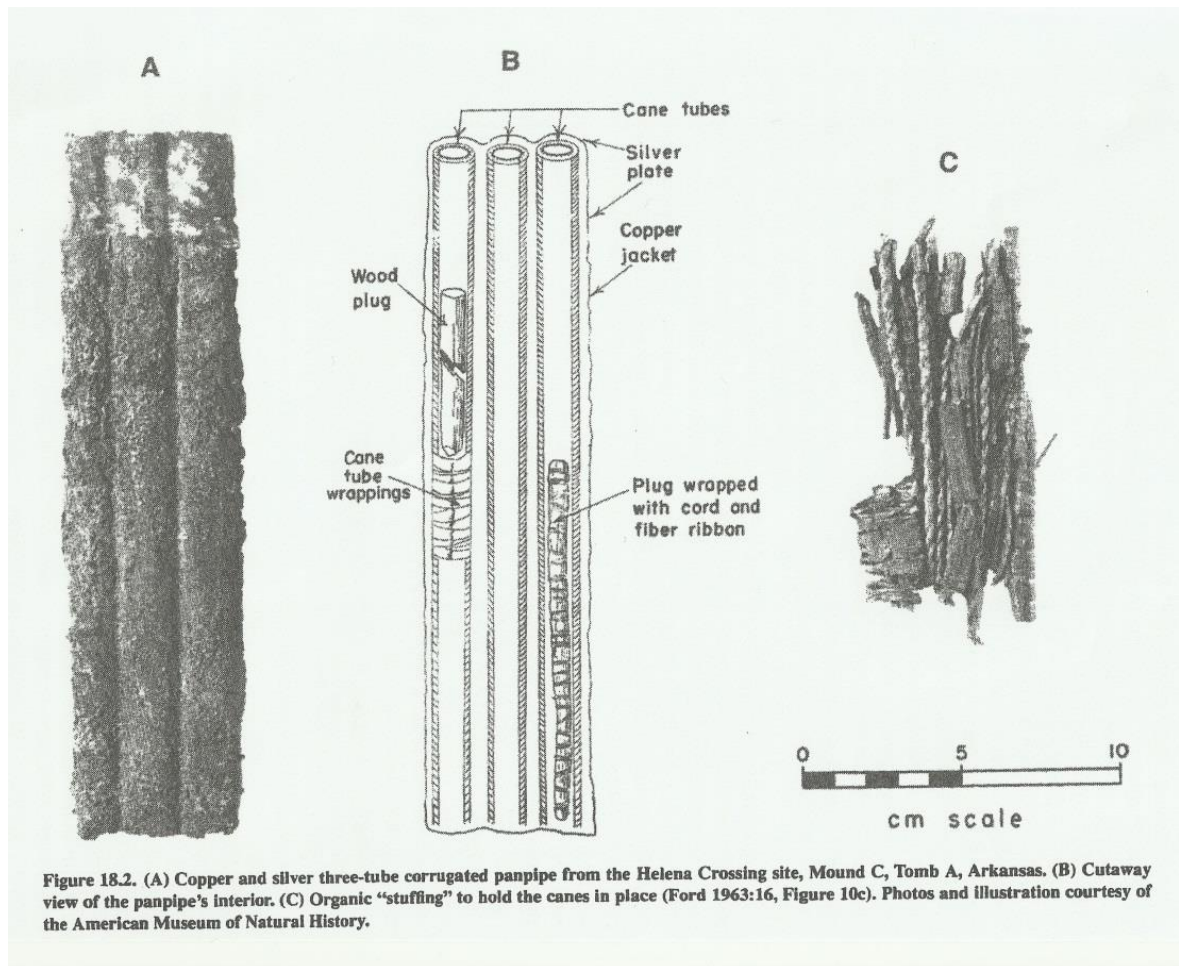
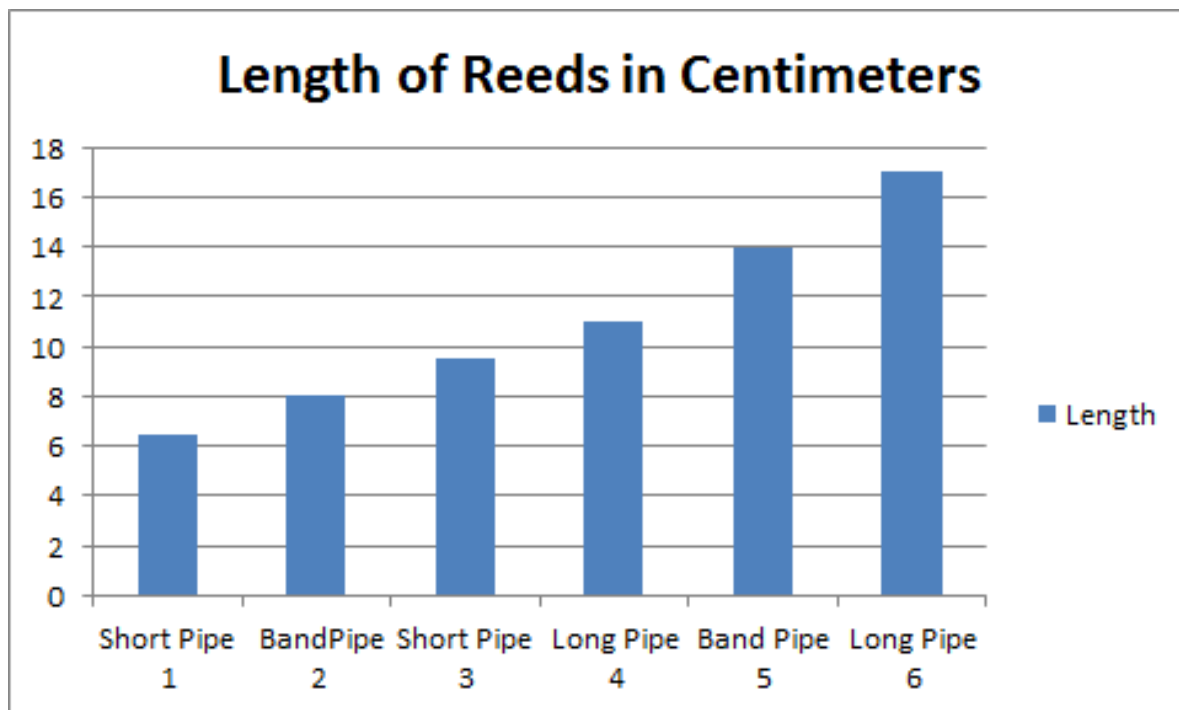


Figure 7. Gloria Young's 1970 reconstruction. (Young 1970)

What I am proposing to do for my experiment is attempt to construct a series of six different panpipes based on remains collected from the archaeological record. In 1997, Gina Turff compiled a survey of all known Panpipes and the contexts that they were recovered from. Her work includes a listing of measurements, height and width, as well as number of pipes. I used this table of measurements along with others that I have found in various site reports to create a set of averages for each type of panpipe. Since there are three classifications of panpipes, Long Corrugated, Short Corrugated and Banded, I have endeavored to create 2 of each type (Turff 1997:29-31).

I have divided the measurements into two groups, based on Long Corrugated and Short Corrugated. I arrived at the average for each of these types, and established a range of measurements. For the Long Corrugated pipes and the Short Corrugated Panpipes I chose to use the 1st quintile, and the 3rd quintile (Table1). Since there is no known data for the banded panpipes, I chose to use the average of the Long Corrugated, and Short Corrugated for the two banded panpipes (Drennan 2012:133). These lengths would allow the reed to protrude approximately one cm above and below the copper cover. The elected lengths are outlined in table 1 (See Appendix A1, A2, and A3).

Table 1. Length of reeds in cm for the 6 reconstructed panpipes.



The aim is to recreate a Hopewell panpipe. It is not to recreate a specific panpipe from the archaeological remains, but instead to create a panpipe in Hopewellian style. This is why I have created six different panpipes; to show a range of their styles and variation. Overall the working of copper and precious metals is reasonably well understood for Hopewell, but the process that was used to form the copper around the panpipe is not fully understood. I have

several different ideas concerning the methods employed in making the panpipes. By making several pipes of different sizes, I am afforded the opportunity to explore these methods.

Experiment

The purpose of my experiment is to explore the methods of panpipe construction based on the archaeological remains from a variety of Hopewell sites. By looking at the archaeological remains from across Hopewell, it is possible to develop a general idea, or impression of the stylistic and functional components of their panpipes. There are approximately 105 panpipes spanning the 600 year window of use by the Hopewell. Thus, by examining the measurements of these pipes it is possible to determine their size, dimension, and the materials used in their construction.

Hypothesis

My generalized hypothesis is that there is enough data from the existing number of panpipes, many of which have been sufficiently described in the archaeological record, to recreate a panpipe in the Hopewellian style. Such an instrument will not only be playable, but will also produce musical notes representative of Hopewell panpipes

Materials

The materials used for this experiment are copper, sinew, cane, wood, and grasses. The organic materials in the archaeological record are too badly degraded or non-existent; hence, it is very difficult to establish what materials were used. The organic elements used in this study have been selected based on the assumption that they were widely available during the Hopewell period, and that they were suitable for use in panpipes.

Copper

Copper will be the sole metal material used in this reproduction. Even though there are several other metals recorded as having been used in panpipes they are in the minority. The vast majority of the panpipes, over 80 %, the only material used were copper; the remaining 20% are either a combination of copper and silver or copper and iron (Turff and Carr 2005:651). Since copper is the common thread between the panpipes, I have determined that using copper alone, and leaving out any silver or iron will be acceptable. For the materiel selected, I have chosen to use commercially available sheet copper. There are several factors that influenced this decision. This first and I felt the most significant is a matter of practicality. It is the desire of this experiment to recreate a Hopewell panpipe and to use materials consistent with artifacts recovered. It is not, however, an attempt to recreate every facet of their production. I feel that there is little to be gained by working raw copper into sheets. The copper selected is 99.9 percent copper, which is of higher grade than native unrefined copper. However, since the natural copper used in these panpipes ranges from 95% to 98% copper, I do not believe that this variation will impact the quality of the instruments produced. The copper used as a sheath or band on the Hopewell pipes ranged from .05 cm to .2 cm in thickness, or .02 inches and .08 inches (Truff 1997:72). As such, I have selected two sheets of copper that are .0625 inches, or approximately 1.5 cm an .024 inches or approximately .5 mm (Figure 8).



Figure 8. Modern copper sheets, sheets used were .5 mm and 1.5 mm in thickness.

River cane

The North American species of cane used in this experiment is called *Arundinaria gigantea* (Figure 9). This species is commonly known as river cane or giant cane. It is found extensively in the southeastern United States. Its range extends as far west as Texas. In the northern states, it is found as far north as New York. This species of cane is found covering the vast majority of areas inhabited by Hopewell people, and would have been one of the most readily available types of cane.



Figure 9. Dried River Cane, *Arundinaria gigantea*

Sinew

The pipes are held together during construction and to maintain the integrity of the panpipe by a binding material. This is either a sticky resin, which hardens when dry, or a sinew binding.

Little evidence remains of which method was used to hold the pipes together before the copper sheet or band was added. I am working with the assumption that sinew was as likely to be used as resin. I have chosen to use a high quality artificial sinew. This is solely for practical reasons. Similar to the copper plate, the use and processing of sinew in the Americas is well understood and documented. I feel that there is little to be added to the overall experiment by going through the process of producing the sinew myself.

Wood

Inside each pipe there is a closed plug at the base. The length of the plug is based on the desired tone of the pipe. The plug width and length is determined by the desired sound. The plug can be moved up or down the pipe to change pitch and note. This plug would have been made from a local wood. For the purpose of this experiment I have chosen poplar wood dowels. Poplar trees, *Populus deltoides*, are found throughout Hopewell territory and are a likely soft wood that may have been used.

Grasses and Hemp

In order to properly tune the panpipe, it is important to ensure that the wood plug cannot move up or down in the cane. In order to make sure that the plug stayed in place it was wrapped with a twine made from twisting dried grasses or inner bark around the plug. In addition, to prevent the reeds from moving inside the copper plate, they were wrapped with twine made of grasses and thin strips of inner bark. For the purposes of this experiment, I attempted to make a grass twine

to use, however this attempt was not successful. Looking at the examples shown in Young's illustrations, I determined that rough hemp would be a suitable substitute for wrapping the plugs.

Stages of the Experiment

Below is the step by step production of each component and assembly of the panpipe with illustration and instruction.

Stages 1

The first step in creating a Panpipe in the past would be to gather the materials. What can be gathered locally would have been the simplest pieces to get. It is doubtful that they were gathering each item individually with the sole purpose of creating a panpipe. Some materials may have been gathered at certain times of the year when they are most available, or suitable. The cane would have been allowed to dry before it was cut to length. In some of the remains the reeds were wrapped in a twine made from dried grasses, while in other the grasses were matted and wrapped around the reed (Cree 1992:4). In some samples, materials such as feathers and clay were also used. These likely would have also been taken from local stock. The sinew must be processed prior to use, however the wood shoots would be gathered right before use in order to keep them supple and malleable for construction.

Stage 2

The second stage involves preparing and cutting the cane to turn it into a reed. The river cane ranges in size from 1 to 3 meters. However, it is naturally divided into jointed segments, which range from 5 cm to 30 cm. I have chosen to cut the cane just above and below the segments. I feel that this is a logical cutting point because cutting in the middle of the reed risks cracking and

making it unusable. It is possible that the reeds were cut when still green before they dried. In this case the reed would have been stronger and less prone to breaking, but then it would need to be dried before completing the process. I have chosen to cut the reed after it has been dried. In selecting the length to cut the reeds, I have looked at the averages of the overall panpipe length, and selected lengths that surround the mean, some slightly longer and other shorter (Figure 10). Interestingly, I have found that within my sample of cane, and the averages of the pipe length, the length of the reeds is very close to the length of the cane segments. This could indicate that that the reed length was influenced by the chance length of the segments.

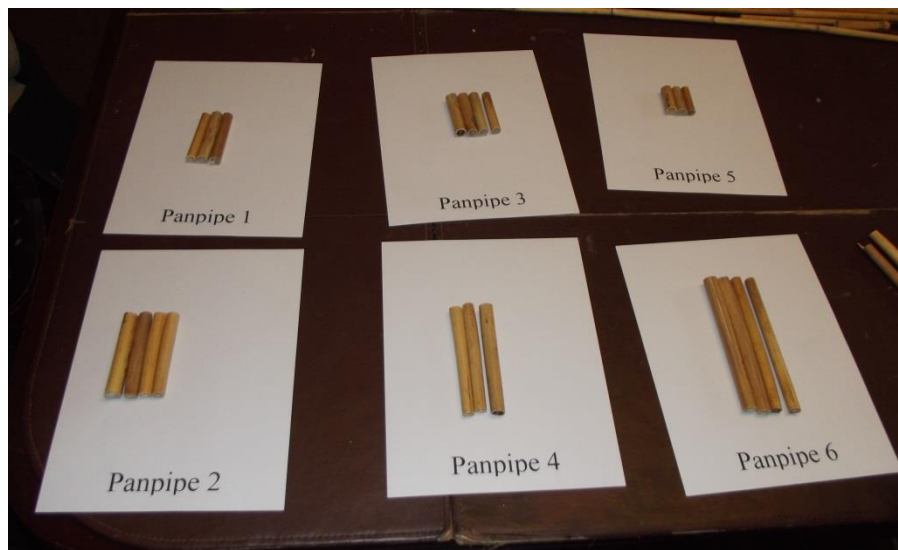


Figure 10. Prepared reeds for the 6 experimental reconstructions.

The overall sizes of the different reeds are:

- Pipe 1: 6.5 cm
- Pipe 2: 8 cm
- Pipe 3 : 9.5 cm
- Pipe 4: 11 cm
- Pipe 5: 14 cm
- Pipe 6: 17 cm

Information also shown in Table 1.

Data in Appendixes A1, A2, and A3.

Stage 3

Stage three focused on the organic wrapping around each cane. I attempted two different approaches with mixed results. The first attempt was to take the long grasses, which had been dried, and attempt to twist them into a cord to wind around the reed. This proved to be futile, as the grasses were too dry and easily crumbled when I twisted them. My solution to this problem was to soak the grasses in water for about 15 minutes. This added enough moisture to the grasses so that they could be worked. After this, I attempted once again to twist the grasses into a cord. After several hours of attempts, I determined that this skill was beyond my ability, and looked at several different possible methods of adding the packing materials. Since the grasses were twisted across the reeds, I took grasses and lightly bundling them into a long, loose sheet and placed them on the table and rolled the grasses along the reed (Figure 11). This method proved to be quite useful, and created a thin layer of grasses parallel to the reed.



Figure 11. Cut reeds being wrapped with moist grass.

Stage 4

Once the reeds were wrapped in grasses, I took sinew and tied a small amount of sinew along the top of the reed. This secured the edges of the grasses approximately one centimeter below the top of the reed. Next I slowly wrapped the sinew at an interval of about one cm along the length of the reed (Figure 12). This secured the wrapped grasses to the reeds, and then tied off the sinew at the base of the reed about 1 cm above the bottom of the reed. This method securely fastened the grass to the exterior of the reed.

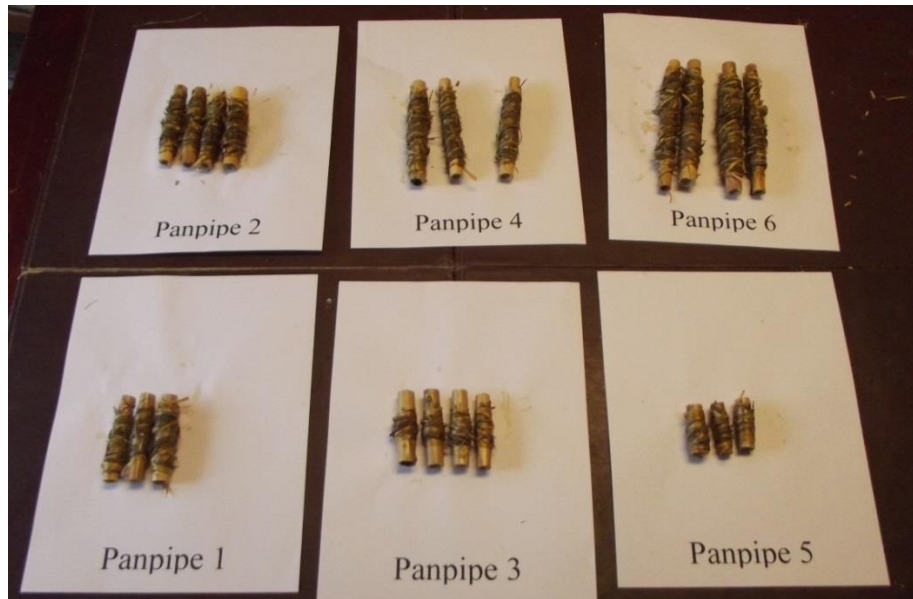


Figure 12. All cut reeds wrapped with grasses.

Step 5

Linking the reeds together is one of the more interesting questions in this experiment. It is unknown how exactly Hopewell panpipes kept the reeds together. It is possible that in the panpipes completely encased in copper this step was not needed. The copper case would have been pressed together and would have held them in place. Looking at the banded panpipe it is likely that some method of holding the reeds together and in place would have been needed since the copper sheath did not cover the whole reeds. If panpipes without copper existed they would have needed to be bound to maintain their shape. In this case I have used sinew along the upper and lower region of the reeds. Taking a single strand of sinew I weaved it between the pipes at the top and the bottom to maintain the shape of the pipe. On the Short Corrugated pipes I used one single strand through the center, and on the Long Corrugated Pipes, I used two strands, one at the top and one at the bottom (Figure 13).

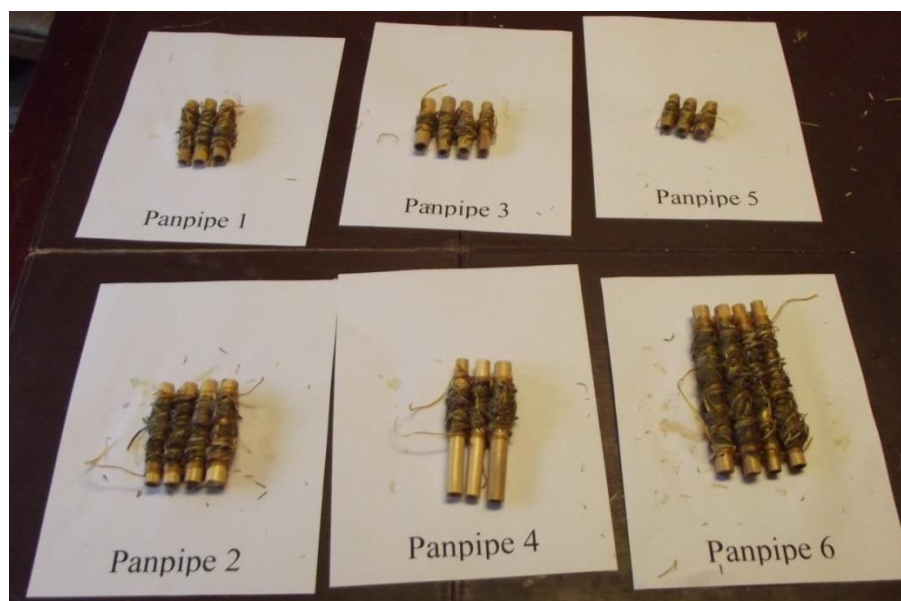


Figure 13. Wrapped reeds tied together with sinew.

Step 6

When the Panpipes were created the copper component was likely cold forged to the desired size and shape for construction. It does not seem probable that they would have hammered out large sheet and then cut them to shape. However, since I am starting with sheet copper, I have measured out the size of the desired sheet of copper, based on the length and width of the panpipe, and then doubling the width plus 2 cm to account for the wrapping of the copper and the overlapping of the copper sheets (Figure 14 and Table 2). In this case I used a metal saw to cut the sheets to my desired size. I suspect that Hopewellian craftsmen would have forged the copper pieces to shape, and would not have cut the pieces. If they were, the copper could have been scored with a knife, and then flexed back and forth to remove excess length.

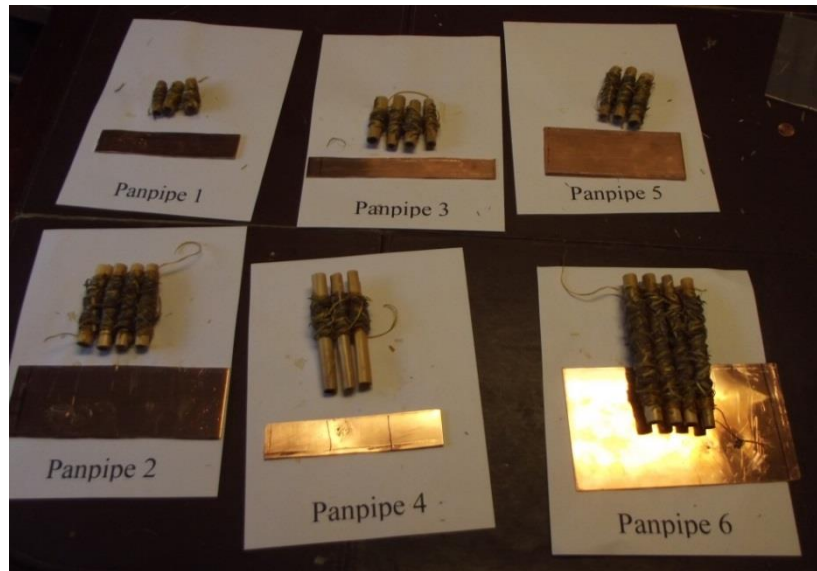


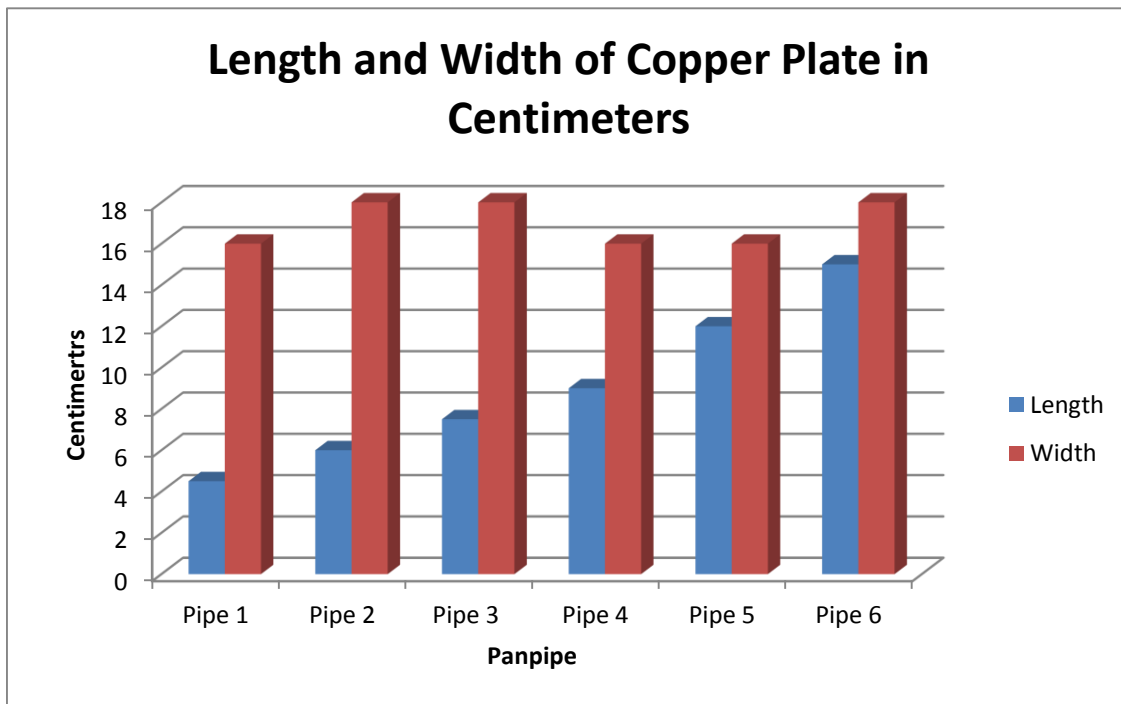
Figure 14. Copper plates with the wrapped reeds before folding

The dimensions of the copper are as follows:

- Pipe 1: 4.5 cm
- Pipe 2: 6 cm
- Pipe 3: 7.5 cm
- Pipe 4: 9 cm
- Pipe 5: 12 cm
- Pipe 6: 15 cm

Data in Appendix A1, A2, and A3.

Table 2. Length and width of the Copper Sheets used in reconstruction.



Stage 7

Once the copper pieces were cut, the next step involved forming and shaping the copper into two bands, two Short Corrugated, and two Long Corrugated covers. This phase took a long time to work out. I had three different approaches to how the copper covers were formed. The first was that the copper was simply bent by hand into shape to form the desired contours. Having two different thicknesses of copper to test, I found that the 1.5 mm copper was too thick to readily bend by hand. However the .5 mm copper could be easily bend and formed by hand. The next approach was to take small piece of metal that had a very close diameter to the reeds, and wrapping the copper around the metal to form the desired shape. This worked well for the two banded panpipes, but did not completely solve the problem of how to corrugate the copper for the long and short panpipes. I tried two different approaches to solve this problem. The first was to place the copper over three metal pieces and then take another piece of metal and place it over

the top. The idea was to use a hammer to pound the metal downward into the copper between the two rods. This would create a depression that would cause the corrugation. This method eventually proved to be unsuccessful for both thicknesses of copper. The next option, which proved to me much more successful, was to bend the metal around the center reed, and then bend back the wings, causing them to double over themselves. The overlap was hammered down, and then the wings were folded forward around the next reed. This resulted in a rippled corrugation, which looks very similar to the corrugation seen in the archaeological record (Figure 15). In the end, the copper plates were created by a combination of hand bending, using an anvil-like structure, possibly a rounded rock, and a light hammer to pound the metal piece into shape.

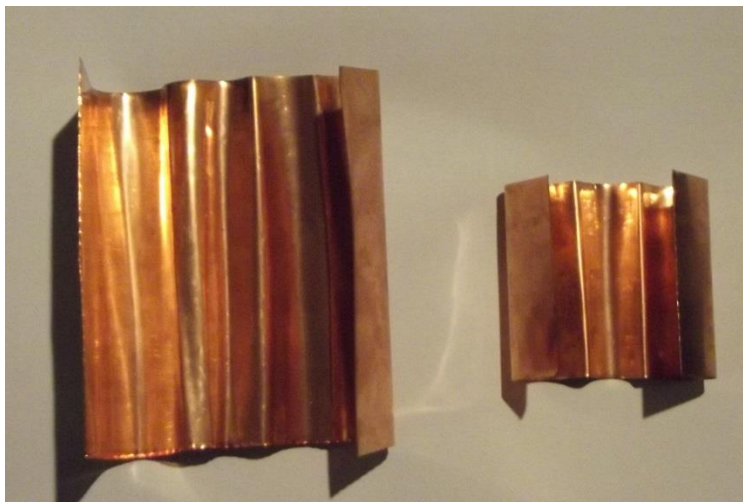


Figure 15. Molded copper cover

Once these sheets were completed the reeds were set in the center, lining up one reed per corrugation, and the wings were folded over and pinched tight sealing the reeds inside the copper cover. The grass matting around the reeds seems to grip well to the inside of the copper cover and secure the reeds in place (Figure 16).

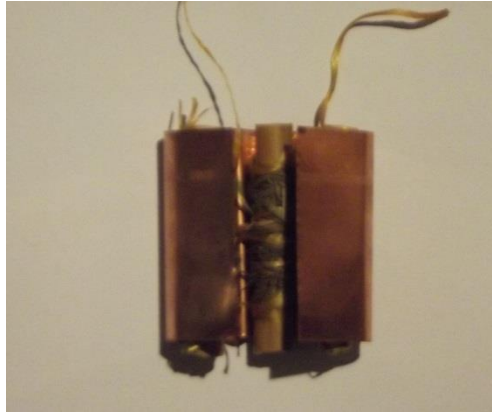


Figure 16. Folded corrugated copper with reeds

Stage 8

Once the finished copper folds are put into place, the exterior and interior reeds are completed. The remaining step is to put the tuning plugs into place. There were two methods that I attempted. The first was to twist grasses around the plug. I found that this approach made a bulky plug that would not easily fit into the pipe and when inserted would not seal the bottom of the reed. The second approach was to wrap the plug in rough hemp twine that I covered in beeswax. This created a nice layer of twine on the plug that easily inserted into the reed and fully plugged the bottom (Figure 17).



Figure 17. Wrapped wooden plug, wrapped with hemp coated in bees wax

Stage 9

Once the Shoots are prepped, they were inserted into the reeds. The placement of the shoot is based on the desired note. They were cut to get to the bottom of the reed tube, and rest where they will make the required note. Once they are prepared, they are placed at the desired depth in the reed (Figure 18). Additionally the soft poplar wood will swell from moisture and firmly plug the reed.

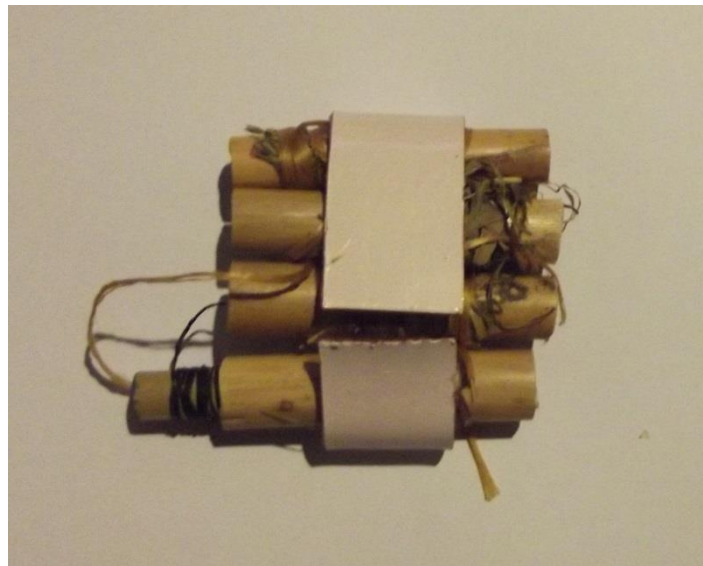


Figure 18. Plugs inserted to desired depth through the base of the reed

Tuning

The notes created by the panpipe are due to panpipes being an end-blown flute, which means that the note is created by vibrations caused by air blowing over the open end of the pipe and resonating in the closed tube. The length of the tube is fundamentally important to the tuning. The longer, and in some cases larger diameter, pipes produce a lower note, and the short a higher note. Typically, a panpipe is flat in tone, so the tube is shortened to negate this. In the case of a Hopewell panpipe, the length of reeds is likely the same, but with plugs of different lengths

affecting tube length and the note produced. This is seen in the Arkansas Crossing pipe, where the remaining organic reeds appear to fit within the copper sheath.

The musical note selected for this experiment is based in part on Gloria Young's reconstruction as well as notes proposed by Gina Turff. This established an A flat one and one half octaves above middle C and an A Flat two and one half octaves above middle C or A⁴ and A⁵, as two likely notes in a three pipe panpipe (Figure 19). Young's reconstruction produced the two high A's and proposed that the third note would be between them. In Turff's research she proposed that the remaining note could be a D four notes higher and B six notes higher than middle C. I have used these four notes as a baseline to try to tune the panpipes to match this scale. The tuning was done by placing a plug in each reed and moving it up or down until the desired note was reached.

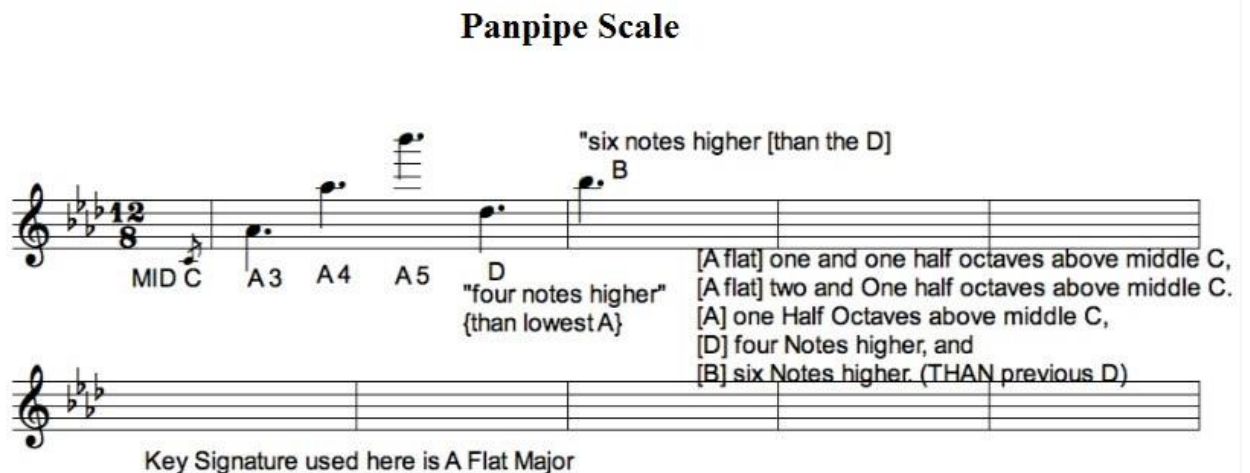


Figure 19. Proposed Musical Scale for Hopewell Panpipes. Courtesy of Lloyd Bogart

Results

By following the steps I have laid out it was possible to create a set of Hopewell Panpipes. I was able to make a set of six different panpipes with several variations that are consistent with

Hopewell. I was able to tune the panpipes very closely to the musical scale proposed by past researchers.

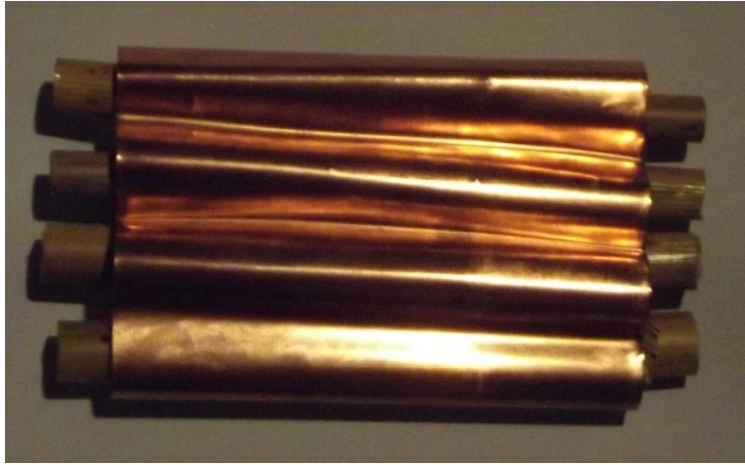


Figure 20. Completed Long Corrugated panpipe 17 cm in length.



Figure 21. Completed Banded panpipe 14 cm in length.

Discussion

This experiment showed that there is broad range of variation in the design of a Hopewellian panpipe. However, each style draws from the same basic model and idea. Of the six created flutes, three could be tuned to some degree, showing a difference in pitch between the Long and Short Corrugated. The Two long corrugated and one of the banded panpipes was tunable to a scale of notes close to the scale seen in Figure 19. I was not able to tune the short corrugated

panpipes to any discernible variation in notes or scale. The notes they produced were too similar to be tuned. It is possible that these short corrugated panpipes represent a separate small panpipe. However, I think it is most likely that the short corrugates only covered a small portion of the reed. The reeds themselves were probably much closer in length to the long corrugated panpipes. The first two panpipes were untunable, and I believe this is due to the reeds being too short. The third could be tuned to a high range of close notes, but could not achieve enough variation to be considered a scale (Puscoiu 1997:8). . All the notes being between high D just below A⁵ and A⁵ (Figure 19). I was operating under an assumption that the reeds were similar in length to the length of the copper cover. I created the reeds so the length of the reed protruded 1 cm above and below the copper sheath. At 4.5 cm 6 cm, the panpipe seems to be too short to create a usable flute. At 7.5 some variation in the scale can be achieved however the notes are very high and close to one another. Therefore, I submit that the thin and short panpipe covers may represent pipes that are similar in length to the Long Corrugated panpipes. The two different types of panpipe likely represent a similar family of panpipes, and a similar musical range used in a variety of settings with comparable instruments.

This reconstruction gives us several areas of inquiry that can be pursued by archaeology. Looking at production of the panpipes, it is possible that the material remains would include hammer stones, which would have been used for shaping the copper. It is not likely that there would be significant copper remains that could be tied to panpipe manufacture, unless they were cutting the copper, as I discussed above, I do not believe they were. I think it is far more likely that they were cold forging and hammering the copper to shape. As such, hearth features would be noticeable in an area that production was taking place. Some kind of rock, likely shaped long and thin like the reeds, may have been used to help shape the corrugates of the copper cover.

Small abrading stones would have likely been used to smooth the edges and finish the copper. Archaeological remains that we might expect to find in a production area would include small fragments of copper, small hammer stones, abraders, and rounded stones, as well as hearth features.

CROSS – CULTURAL COMPARISION

This project explores material remains in the New World, between 1500 and 1000 years before contact with European chroniclers, and at least 1600 years before anyone began to take a systematic look at cultural practices outside their own. Much of this information was collected 1500 years after the end of Hopewell; however, since there is no closer ethnographic data, the information I have from these site reports will suffice.

Since panpipes exist only in Hopewell, I must look at the next closest thing; I will examine the role of flutes in ethnographically recorded societies. What I hope to do in this part of my study is create a model of flutes in North America and in similar levels of society. By looking at a set of activities (religious, mortuary, ceremonial, leisure, and interpersonal), I may be able to determine when, where, and how flutes have been used and apply that to Hopewell (Drennan 2010: 63-64, Spaulding 1971:45-48). This will allow me to create a best possible inference within the realm of statistical probability to extrapolate the role of the panpipe in the deep past (Ascher 1971: 265). To this end, I have conducted an extensive review of flutes in the archaeological record, ethnographic record, and in the Human Area Relationship Files. This has allowed the creation of the data set needed for the analysis (Data in Appendix B).

Cross Cultural Comparisons

The brief florescence of the panpipe in North America occurred between 200 BC and AD 400, this predates any written chronicles of North America by 1100 years. This leaves us only the archaeological evidence associated with the panpipe and Hopewell to examine. As such we only see panpipes in their final depositions into the archaeological record. Looking at the archaeology panpipes are recovered nearly exclusively form mortuary contexts. At first glance, this would lead one to believe that the only use of the panpipe was part of mortuary practice. In order to understand the role of the panpipe, we must step further afield into Ethnography and Ethnomusicology.

The goal of this analysis is to create an analogue model of behavior based on a broad sample size and look at what activities similar music is used, and draw inferences to activities that Hopewell would have employed the panpipe (Gibbon 1984:109). This will be done by looking for Native American cultures that have traditionally used flutes in their cultural practices. Since there is considerable variability in Native American flutes I have had to create inclusion and exclusion criteria to determine which cultures and their flutes will be acceptable for this model.

Data Selection Methods

The selection method for the cross cultural comparison was to first identify the extent of Hopewell Interaction Sphere, then identify and map where panpipes have been recovered. By taking these two maps, one showing Hopewell territory and another showing panpipe location and then taking this information to compare with ethnographic information to see what cultural groups lived in these regions for comparison. The first step was identifying the tribes living in

these regions. The strength of the model is in trying to find cultures that are as closely related to Hopewell in cultural, environmental, and environmental factors. The stronger correlations that can be identified between the groups the better the model (Gibbon 1984:108, Drennan 2010:85).

Inclusion Criteria

I have chosen to include Native Cultures from North America, since I am focusing on ethnographic comparison. The cultures date from contact period forward for inclusion. The ethnographic comparison pulls information from cultures that go back before contact. Our understanding begins where we can make inference based on tradition and oral history to see how long they were using these practices. I have identified 34 cultural traditions from areas similar to Hopewell, that have flutes as part of their cultural expression. The ethnographic history and uses of flutes within these cultural groups will form the basis of my comparison.

Exclusion Criteria

When picking the cultures for comparison I have excluded cultures for three reasons. The first is that there is little or no ethnographic information concerning the rituals, beliefs, and activities about the culture. Without detailed ethnographic accounts the culture cannot be used in the comparison. The second exclusion criterion is if they are too culturally dissimilar to Hopewell. It will be difficult to create a model of behavior if people lived very different lives. The last exclusion criteria are if the flute used is too dissimilar. In Hopewell there are 3, or 4 pipe panpipes, most Native flutes are 5 or 6 notes; however there are several that exceed 8 or more notes. I feel that 6 notes is close enough to the range seen in the panpipes, however anything over it has been excluded from the data set. By using these exclusion criteria it will help strengthen my analog model for comparison (Gibbon 1984:108-110).

Hypothesis

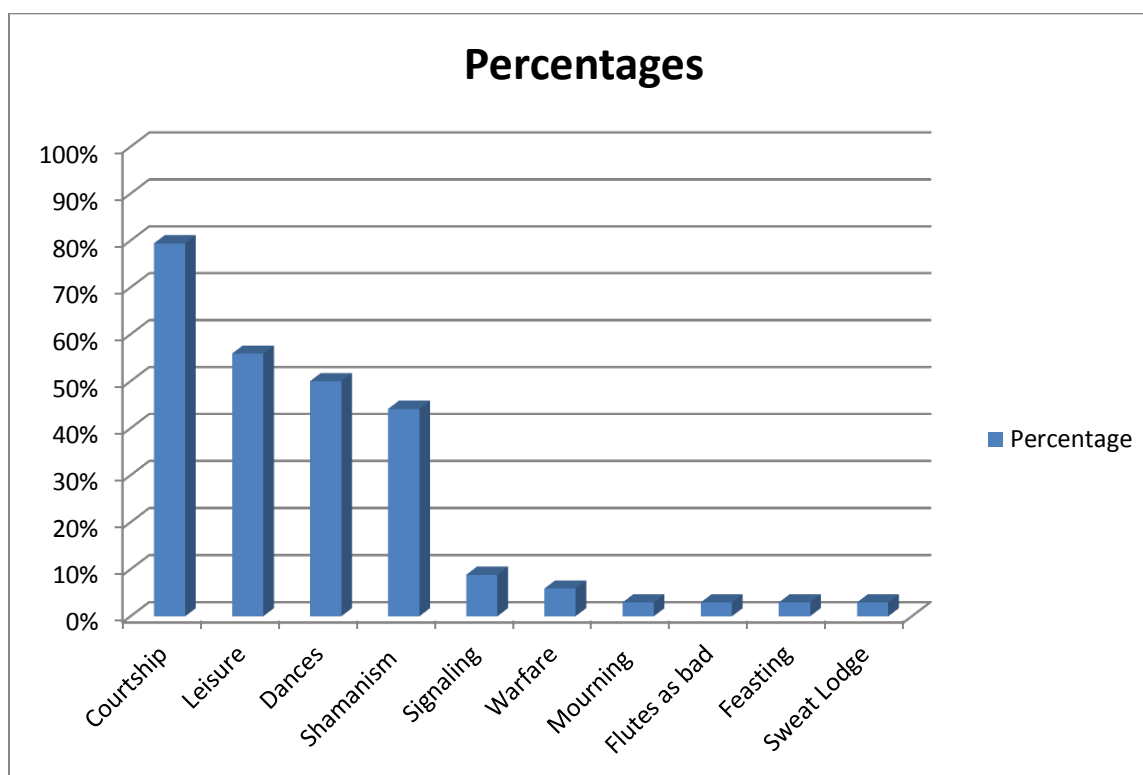
The null hypothesis is there is no relationship between historic Native American flute using cultures and Hopewell panpipe use. I believe that given enough data and a strong enough model; it will be possible to infer behavior about the past. However due to the incomplete nature of the data set and the archaeological record, my belief is the null hypothesis can be rejected on quantitative grounds and that I will be able to show that we will be able to see some correlation in activities across cultures and time applicable to Hopewell.

Analysis

Though it can never be said with complete certainty what activities people were doing in the past, it is possible to pull back the veil of time, and see a brief snippet of their lives. In the case of the Panpipe most supposition is based on analogy with one or two other cultures (Drennan 2010:85). In this case through a systematic survey of flute music it is possible to qualify the different activities. This approach moves us beyond basic suspension, since it is grounded in frequency of activity through time, to see how they may have used the Panpipe.

There are 34 cultures that fit the criteria for analysis. These cultures were broken down into three groups based on geography, Woodland, Western Coast, and Prairie-Plains (for detailed breakdown of each region see Appendix B). Within these 34 cultures there are ten activities reported in the ethnographic record. Most activities reported appear in a minority of cultures, often less the 9% across the ethnographic record. Four activities are seen in high percentages and likely do not represent an anomaly in data, but instead point towards a culturally accepted activity (Table 3).

Table 3. Percentage of each cultural activity out of a total of 34 cultures.

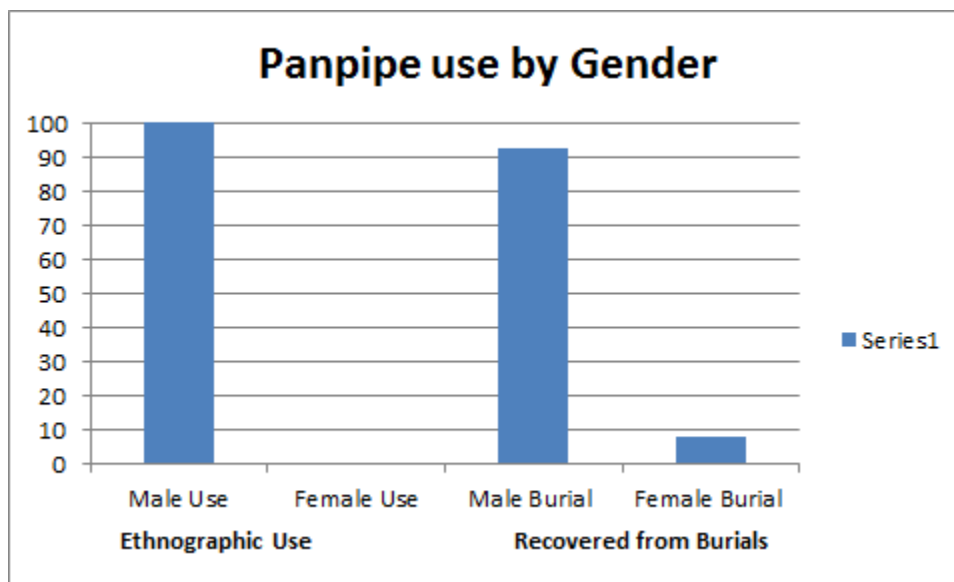


Gender

The only constant in all the ethnographic data is that the lute is being used solely by men. In 34 cultures surveyed none report female use of flutes. There do not appear to be any ethnographic contexts where women are using flutes in any of the cultures that I could find ethnographic data for. Within Hopewell, most of the panpipes 92% are recovered from mortuary contexts where the individual is identified as the likely sole owner was identified as male. There is a very small minority of panpipes found in female graves (Table 4). Based on the ethnographic comparisons and the high frequency of panpipes in male graves and contexts, I believe that the panpipes were used primarily by men, if not solely by them. A few examples of panpipes in female burials may represent panpipes that were in the position of an important male relative that as placed as a

grave offering in the female grave. It is most likely that panpipes in their living contexts were used exclusively by men.

Table 4. Ratio of Male to Female Ethnographic use and Ratio to Male to Female panpipe burials



Courtship

The most frequently seen activity was court ship. This was seen in 79% of cultures overall, and the number maintained when looking at region to region. The general manner of the flute in courtship is associated with wooing the bride. In nearly all of the ethnographic contexts, the male sits outside of the females dwelling and plays a simple song. If she determines that she is interested she emerges if not she ignores them. This seems to be the standard across the different cultures of courtship and the role of the flute.

This cannot easily be qualified archaeologically, as there are not durable remains that would enter the archaeological record to represent this activity. I feel that it is highly likely that this activity was happening with the Panpipe in Hopewell, but there are no archaeological

remains that we will be able to recover to verify this. It is possible that the few female Hopewell burials that contained a panpipe, may have received it from a male in a courtship ritual.

Leisure

Ethnographically leisure activities seem to have the next highest level at 56% of cultures.

Unfortunately this activity is a broad category, in much of the ethnographic records; the flute is referenced as being used in storytelling and leisure, or feasts and leisure. Exactly what entails leisure is left vague in many of the ethnographies. For this category, I include storytelling, small non-ceremonial feast and meals, and small informal gatherings. Simply put this is the type of activities that people engage in when gathering informally at the end of the day.

It is likely that during Hopewell times people were acting in similar manner. People likely still gathered in groups and participated in these activities where the Panpipe was included in their stories, songs, and feast. Similarly this is an activity that would be very difficult to search for archaeologically, but by reviewing site reports for areas that could represent gatherings; we may find copper or fragments that are related with panpipes.

Dances

Many of the larger communal gatherings involved dances; these could be both secular and religious in nature. These range from celebrating a religious ceremony to a successful hunt or move from one place to the next. Within most Native American Cultures it is difficult to separate the secular and religious activities. In much of the ethnographic data the use of flute music is listed as religious and secular. When reviewing the activities I felt that combining the two activities is warranted and it does not greatly change the overall average of activities. This activity appears in 50% of cultures.

Like many other groups, Hopewell probably had large secular and ceremonial gathering that included song and dance. Based on the high level of cultures using flutes in their dances it is possible that Hopewell was using it in a similar ways. Looking at the results, dance activities are seen in 50% of cultures, I feel that this level is high enough to indicate a likely activity for Hopewell.

Shamans and Healing

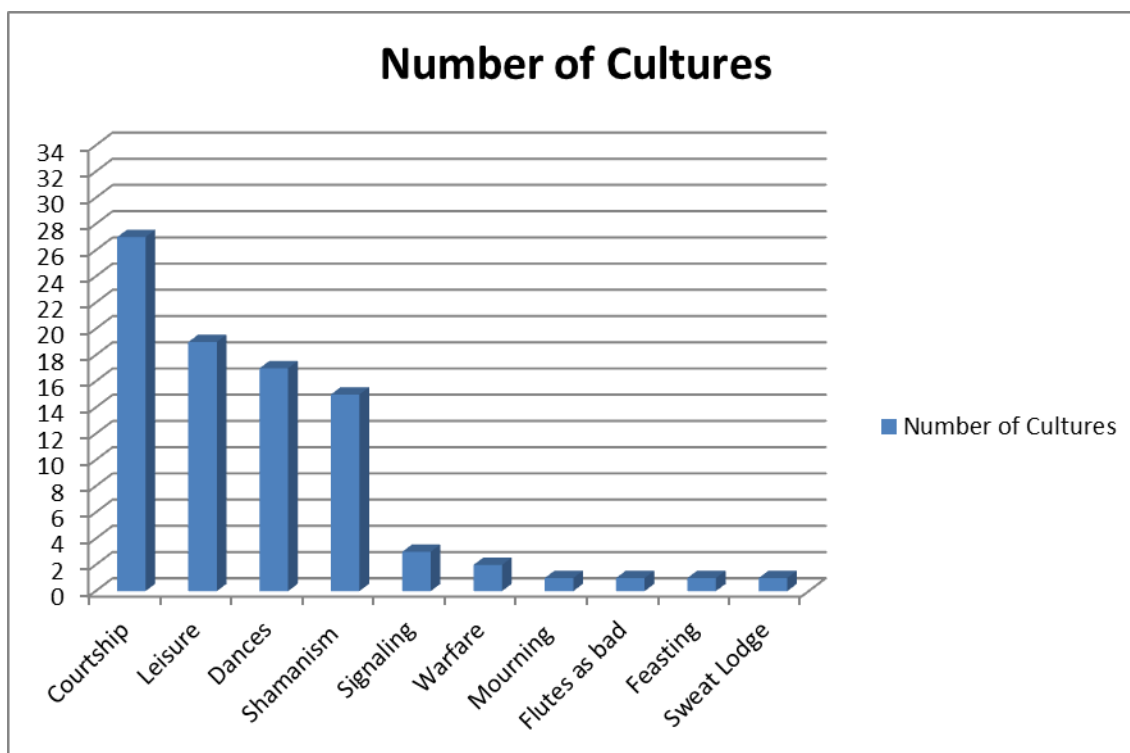
One of the interesting things is the level of flute music associated with Shamans and healing. This appears in 44% of cultures, in Hopewell, the majority of the panpipes are recovered from burials that are associated with Shamanism. This shows a correlation between activities that we see ethnographically and archeologically. We only see the panpipes in mortuary contexts and not use, but based on this model, we can infer what the shamans used it for a variety of activities, and based on archaeology we know that there was a wide range of Shamanism related activities in Hopewell (Carr and Troy 2005:187)

Conclusion

Though there are limitations on the Ethnographic Model, I have endeavored to present a systematic and extensive survey of flute music and its role in North American Cultures. By taking this approach, I have created a model based on activities, and the frequency of these activities in cultures that bear a striking similarity to Hopewell. Through this model it is possible to achieve a greater understanding of human activities related to the Panpipes. In my review, there are three activities that happened frequently enough across cultures that I can conclude that they were likely happening in Hopewell. Panpipes in courtship rituals, leisure, dancing, and shamanism were likely a part of their daily lives. These four activities are seen in the majority of

cultures, courtship in 29, leisure in 20, dancing in 17, and shamanistic activates in 15 cultures out of 34 (Table 5). These activities are observed with a frequency high enough that it is likely not due to sampling error or bias.

Table 5. Number of total cultures for each activity move to top



Final Summation

Throughout this project I hope to come to a better understanding of their role that Panpipes played in Hopewell culture, to see what symbolic, religious, and cultural meaning they may have. By exploring Hopewell culture by using a well-grounded and holistic approach, I believe I have gained a better understanding of their beliefs and how music was integrated into them. This investigation has added one more piece of information to our basic understanding of Hopewell and our pursuit of knowledge about the distant past..

Conclusion

In conclusion, I have found that both parts of my research are possible. I was able, based on a thorough examination of the archaeological record, to achieve a basic idea of what a Hopewell panpipe was like. The results were mixed, but overall positive, and it has created a baseline for further attempts at reconstruction. I was able to create an instrument similar in style to Hopewellian Panpipes. This experimental activity helped to identify areas that can be examined archaeologically to further our understanding of their construction and what materials were used and what materials remains we may find in the archaeological record. It is likely that the production included small hammer stones, abraders, copper, and stone materials to assist in the formation of the copper, as well as the organic materials including sinew, river cane, and grasses.

The Cross-cultural comparison identified several activities, courtship, leisure, and dancing that are likely associated with panpipes and role they played in society. Through this approach it is possible to infer the kinds of activities that Hopewell was using their panpipes for.

Looking at both of these approaches, it is possible to identify areas for future inquiry on this topic. Though none of the findings are definitive, each shows a potential path in the next step of scholarly exploration. In order to identify the materials used in panpipe production, we now know what to look for in future excavations, or in review of site reports.

The ethnographic work points towards activities that could be associated with Hopewell panpipes, and suggests several areas of research to flush out the data sets. Further ethnographic work with modern tribes and a more extensive examination of ethnographic sources may shed more light on the role of panpipes in the Hopewell Culture.

Appendix A

Panpipe Raw Data

Table A1. Banded Panpipes Dimensions and Locations.

Site Name	No. of Panpipes	Form	Number of Tubes	Length (cm)	Width (cm)	Metal
Banded Panpipes						
Dane Co. WI	3	band		6.88		Cu
		band		5.47		Cu
		band		5.94		Cu
Elkhart Lake	1	band		4.68		Cu
McKinstry, OH	1	band		9	2.80	Cu
Turner, OH	2	band		5.90	3.50	Cu
		band		4.95	3.00	Cu
Connett, OH	1	band		2.80	2.50	Cu
TunaCunneen	1	band		5.75	3.75	Cu
Total	9			51.37		
Average				5.71		

Source: Turff 1997, Turff and Carr 2005

Table A2. Long Corrugated Panpipes Dimensions and Locations.

Site Name	No. of Panpipes No.	Form	Length (cm)	Width (cm)	Metal
Long Panpipes					
<i>Trempealeau, WI & Laurel, MN</i>					
Cassville, WI	1	LC	11.25	5.50+	Cu
Schwert, WI	1	LC	11.25	3.75*	Cu
LaPeer Co., MI	1	LC	13.2	5.10*	Cu
Mallon, MI	1	LC	12.70	4.00	Cu
Cincinnati, OH	1	LC	9.38	4.68	Cu
North Benton, OH	1	LC	15	5.00	Cu
Yant, OH	1	LC	13.75	7.50	Cu
LeVesconte, ON	4	LC	7.5		Cu
		LC	14	4.50*	Cu
		LC	12.50	4.50	Cu
		LC	12.60	4.30	Cu
Donaldson II, ON	2	LC	13.40	4.50	Cu
		LC	19.70	5.80	Cu
Albany, IL	1	LC	12	5.00	Cu
Jersey Co., IL	1	LC	13.5	5.50*	Cu
Pete Klunk, IL	1	LC	10.9	5.00*	Cu
Putney Landing, IL	1	LC	10.50	5.00	Cu
Rutherford, IL	3	LC	9.50	4.80	Cu
		LC	9.50	4.80	Cu
		LC	9.38	4.68*	Cu
Stoner, IL	1	LC	10.4	3.20*	Cu
Mount Vernon, IN	3	LC	13.13	5.00	Cu-Ag
		LC	11.56	4.68	Cu-Ag
		LC	10.63	4.68	Cu
Turner, OH	3	LC	8.75	3.75*	Fe
		LC	8.75	3.75*	Fe
		LC	7.5	5.00*	Cu

Table A2. Long Corrugated Panpipes Dimensions and Locations continued

Hopewell, OH	5	LC	9.1	5.40*	Cu
		LC?	12.50	3.40	Cu
		LC	13.12		Cu
		LC	13.13		Cu
		LC?	10.98	4.06*	Cu
Robinson, OH	2	LC	8.2	4.30*	Cu-Ag
		LC	8.2	4.30*	Cu-Ag
Marietta, OH	1	LC	15.00	5.00	Ag
Franklin, TN	1	LC	11.25	3.75	Cu
TunaCunnhee, GA	8	LC	13.75	3.75	Cu-Ag
		LC	10	4.25*	Cu-Ag
		LC	12.25	4.00	Cu
		LC	13.75	6.25*	Cu
		LC	15.50	7.50	Cu-Ag
		LC	11.25	4.50	Cu
		LC	10.25	4.25	Cu
		LC	12.75	4.25	Cu
		LC	13.13	4.06*	Cu
Crystal River, FL	1	LC	13.13	4.06*	Cu
Murphy Island, FL	3	LC	17.50	5.01	Cu
		LC	10.93	5.50	Cu
		LC	10	5.50*	Cu
Pierce, FL	1	LC	7.5	2.50*	Cu
Mandeville, GA	4	LC	15.30	6.25	Cu
		LC	9.38	6.70*	Cu
		LC	13	6.00*	Cu-Ag
		LC	12	4.75*	Cu
Helena, AR	1	LC	20.70	5.50	Cu-Ag
McCarter, MS	1	LC	7.5	2.90*	Cu
Converse, MI	1	LC	12.50*	8.75*	Ag
Blakeley, AL	1	LC	7.50	3.80	Cu
Knight, IL	2	LC	7.5		Cu
		LC	7.5		Cu
McRae, MS	1	LC	15.8	5.80*	Cu-Ag
Total	60		688.45		
Average			11.47416667		

Source: Turff 1997, Turff and Carr 2005

Table A3. Short Corrugated Panpipes Dimensions and Locations

Site Name	No. of Panpipes No.	Form	Number of Tubes	Length (cm)	Width (cm)	Metal
Short Panpipes						
Schwert, WI	2	SC	3	4.10	3.80	Cu
		SC	3	6.3	3.60	Cu
Converse, MI	1	SC	3	5.30	3.75	Ag
Cameron's Point, ON	1	SC	3	2.30	3.75	Ag
LeVesconte, ON	1	SC	3?	6.5		Ag
Albany, IL	1	SC	3	3.5	3.40*	Cu-Ag
Baehr, IL	1	SC	3	5.93	1.88	Cu
New Castle, IN	1	SC		6.6	4.10*	Cu
Robinson, OH	1	SC	3	4.5	3.00*	Ag
Kohl, OH	1	SC		6.30	4.00	Cu
Yent, FL	1	SC	3	7.33	5.25*	Cu
Mandeville, GA	1	SC?	4	6.5	3.30*	Cu
Jackson, AL	1	SC	3	5.70	4.20	Cu
Pharr, MS	1	SC	3	6.5	4.50*	Ag
Total	14			77.36		
Average				5.53		

Source: Turff 1997, Turff and Carr 2005

APPENDIX B

Raw Ethnographic Data

Table B1. Ethnographic Activates by Tribe and Region

Culture	Courtship	Leasure	Dances	Shamisim	Signling	Warefare	Mourning	lutes as ba	Feasting	Sweat Lodge	Source
Western											
Yurok	1	1									Hatch 1958
klamath	1	1									Spier 1930
pomo	1	1									Barrett 1952
Yuki		1									Foster 1944
Yokuts		1	1	1						1	Gayton 1948
Paiute	1	1		1							Heizer 1978
Hupa	1	1	1								Heizer 1978
Chilua	1	1	1								Heizer 1978
Whilkut	1	1	1								Heizer 1978
Chimarko	1										Heizer 1978
wintu	1		1	1							Du Bois 1935
Maidu	1	1	1	1							Densmore 1958
Konkow	1	1	1	1							Heizer 1978
tubatulabal	1	1									Heizer 1978
Coasrnoan	1	1	1	1							Broadbent 1972
Total	13	13	8	6	0	0	0	0	0	1	
Precentage	87%	87%	53%	40%	0%	0%	0%	0%	0%	7%	
Woodland											
Ho-Chunk	1	1	1	1		1			1		Radin 1923
Seminale	1										Fogelson 2004,
Ojibwa/chippawa	1	1	1	1	1						Densmore 1929
Iroquois	1	1		1							Fenton 1953
creek		1	1								Swantson 1928
Cherokee	1	1	1	1							Hamel and Chiltoskey 1975,
Chickasaw		1	1	1		1					Fogelson 2004, , Swanton 1946
caddo			1	1							Fogelson 2004, Swanton 1942
Choctaw	1	1		1							DeMille 2001, Densmore 194
Quapaw			1	1							DeMille 2001, Joutel 1714
Sauk	1										Black Hawk 1834
Kickapoo	1										Trigger 1978
Total	8	7	7	8	1	2	0	0	1	0	
Pregetage	67%	58%	58%	67%	8%	17%	0%	0%	8%	0%	
Prairie/ Plains											
Pawnee	1				1				1		Densmore 1929
Omaha	1		1								Fletcher 1911
Blackfoot				1							Houngry Wolf 1977
Assiniboine	1		1		1		1				DeMallie 2001,Dening 1930
Pend d'oreilles	1										Walker 1998
Salish/Kootenai	1										Walker 1998
Shoshone	1										walker 1998
Total	6	0	2	1	2	0	1	1	0	0	
Precentage	86%	0%	29%	14%	29%	0%	14%	14%	0%	0%	
Complete TotL	27	20	17	15	3	2	1	1	1	1	
Precent	0.79	0.59	0.50	0.44	0.09	0.06	0.03	0.03	0.03	0.03	

Table B2. Ethnographic Activates Western Region.

Culture	Courtship	Leasure	Dances	Shamisim	Signling	Mourning	Flutes as bad	Feasting	Sweat Lodge	Warefare
Western										
Yurok	1	1								
klamath	1	1								
pomo	1	1								
Yuki		1								
Yokuts		1	1	1					1	
Paiute	1	1		1						
Hupa	1	1	1							
Chilua	1	1	1							
Whilkut	1	1	1							
Chimarko	1									
wintu	1		1	1						
Maidu	1	1	1	1						
Konkow	1	1	1	1						
tubatulabal	1	1								
Coasrnoan	1	1	1	1						
Total	13	13	8	6	0	0	0	0	1	0
Precentage	87%	87%	53%	40%	0%	0%	0%	0%	7%	0%

Table B3. Ethnographic Activates Western Region Percentages.

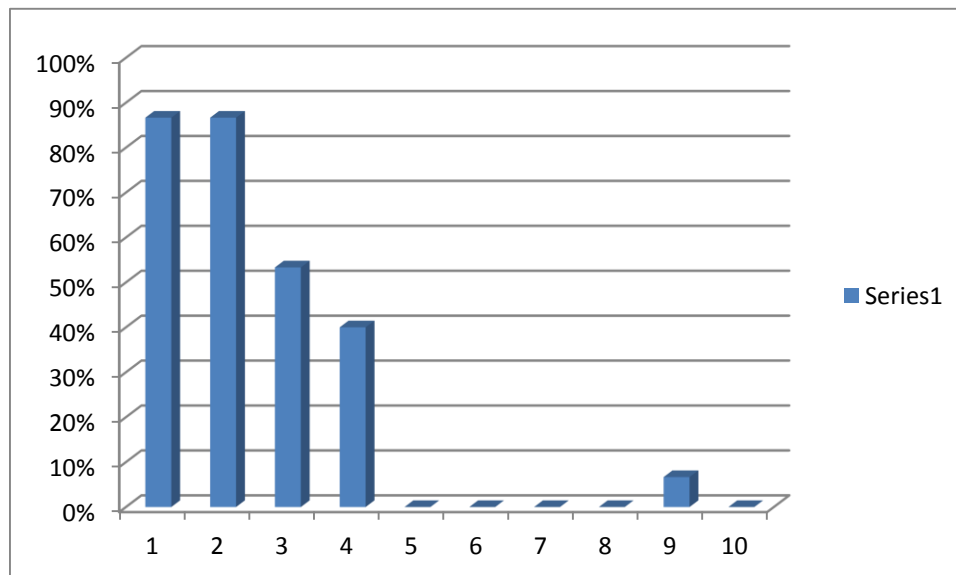


Table B4. Ethnographic Activates Woodland Region.

	Courtship	Leasure	Dances	Shamisim	Signling	Mourning	Flutes as bad	Feasting	Sweat Lodge	Warefare
Woodland										
Ho-Chunk	1	1	1	1				1		
Seminale	1									
Ojibwa	1	1	1	1	1					
Iroquois	1	1		1						
creek		1	1							
Cherrokee	1	1	1	1						
Chickasaw		1	1	1						1
caddo			1	1						
Chawktaw	1			1						
Quapaw			1	1						
Sauk	1									
Kickapoo	1									
Total	8	6	7	8	1	0	0	1	0	1
Pregetage	67%	50%	58%	67%	8%	0%	0%	8%	0%	8%

Table B5. Ethnographic Activates Woodland Region Percentages

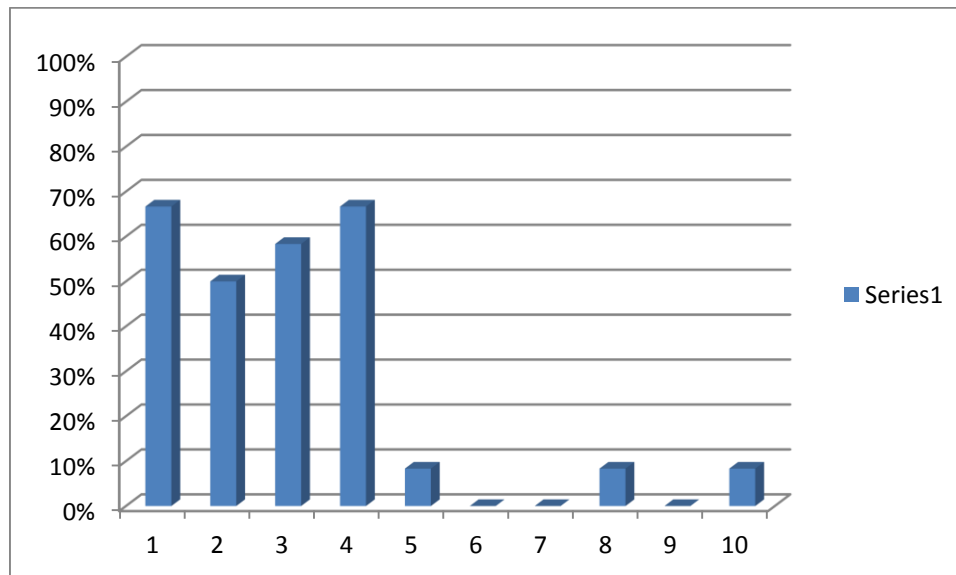
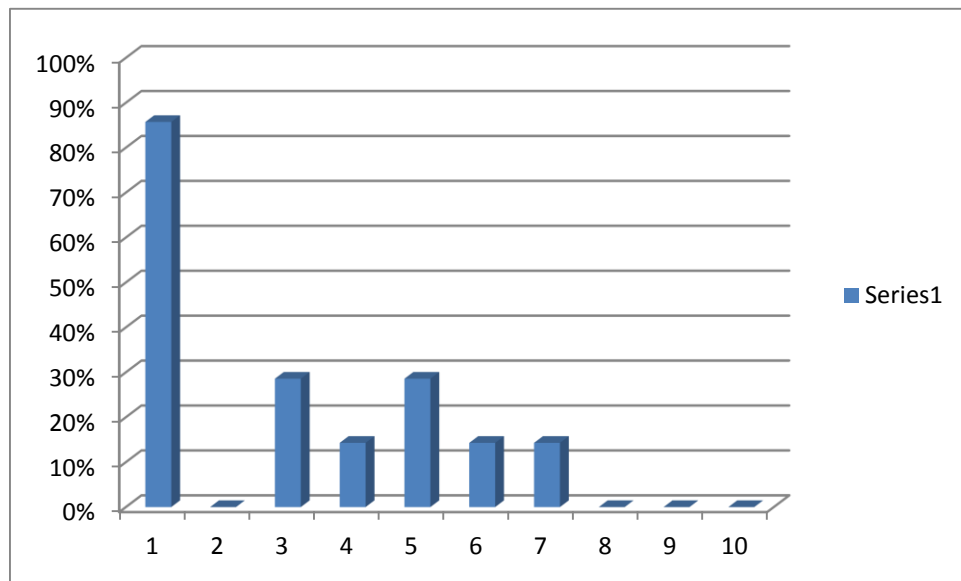


Table B5. Ethnographic Activates Prairie- Plains Region

Prairie/ Plains												
Pawnee	1				1				1			
Omaha	1		1									
Blackfoot				1								
Assiniboine	1		1		1			1				
Pend d'oreilles	1											
Salish/Kootenai	1											
Shoshone	1											
Total	6	0	2	1	2	0		1	1	0	0	
Percentage	86%	0%	29%	14%	29%	0%		14%	14%	0%	0%	

Densmore 1929
 Fletcher 1911
 Houngrly Wolf 1977
 DeMallie 2001, Dening 1930
 Walker 1998
 Walker 1998
 walker 1998

Table B6. Ethnographic Activates Prairie- Plains Region Percentages



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