Archaeology Lab Manual

PSU Lab Practicum

Fall 2013
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1. INTRODUCTION

1.1 Purpose

This lab manual is an in-progress document created by Shelby Anderson’s Anth 410 Lab Practicum Class in Fall of 2013. The purpose of the lab manual is to outline lab processing and analytical procedures that will ultimately be used to train students new to lab work, and to maintain consistency in procedures between students and across quarters and years. Future classes will continue to modify this manual.

1.2 Archaeological Ethics: Curation and Collections

1.3 Research Design: Connections between Field, Lab, and Research Goals

2. CARE OF OBJECTS IN THE FIELD AND LAB

2.1 Stone

Tiffany Nickerson and Desiree Lukens

Before Going into the Field

Care of archaeological artifacts is equally as important as the process used to recover them in the field. Stone artifacts are a common find in archaeological sites. Some may think that stone is a sturdy material, but it too can be damaged and should be handled carefully. Stone artifacts come in all shapes and sizes from projectile points to hammer stones that make them, and even larger in the form of weights for nets.

For purposes of caring for a stone artifact, both in the field and in the lab, and for deciding how to do lab work on the stone, it is helpful to be able to identify what kind of rock the stone artifact is crafted from. Geologists divide rock into three general categories: igneous, sedimentary, and metamorphic. Understanding which category a stone artifact falls under can help to identify the physical aspects of the stone and dictate methods for its conservation. As Rodgers described in chapter 6 of The Archaeologist’s Manual for Conservation “Igneous rock includes those formed from volcanism both within and on the earth. Sedimentary rocks are layered, formed through gradual deposition of minerals in oceanic or fluvial environments. Metamorphic rock begins as igneous or sedimentary but is changed through heat and pressure in the earth.” (Rodgers 2004:148)

Regardless of what kind of rock is involved, it is imperative that the artifacts be handled with care and preferably one at a time. Another important point is to physically handle them as little as possible as “oils, acids, and salts in human skin will damage most all types of materials over time.” (Texas historical commission, 2013:3). This can, in turn, affect the ability to get results for residue analysis. This is a key consideration in cleaning stone artifacts. Typically, cleaning is done with a brush in
a gentle manner. Sometimes water may be added to remove stubborn materials. If the stone has a build up of salt, it can be soaked in water to remove the salt. This can be necessary in especially porous stone which is prone to salt infestation.

Having a plan in place regarding what kind of analysis will be used in the research is important to have before excavation begins, this will help with knowing how one should care for the objects when they are removed from their provenience. Although this lab manual will discuss some of these cases for special artifact handling and preservation, information about other cases where special cleaning and preservation steps should be taken can be found here: http://www.sha.org/research/conservation_facts/process.cfm

Once recovered from a site, documentation of an artifact's provenience information is key. This information will then be transferred over to the container(s) that the artifact will be stored in. Provenience information is important in knowing exactly where an artifact came from and it's relation to other artifacts gathered. Without this information it limits the knowledge that can be gained from the objects.

**Storage**

When in storage, an artifact should be kept in an environment similar to the one it came out of, though stone can be slowly dried. For example, containers and bags should be acid-free. In addition to selecting a container made of appropriate materials, each artifact should be stored individually. Bagging artifacts together creates potential for damage. Also, it is necessary that stone artifacts be put in containers of the appropriate size. (Texas Historical Commission, 2013) Small or fragile objects can be stored in archive-quality vials, or small bags. Foam or tissue can be added if an object is in need of support.

(http://www.texasbeyonddhistory.net/abouttbh/)
Once in the Lab

Once the artifacts (in their storage containers, of course) are received at the lab, apply the same handling guidelines as were used in the field. One of the main differences between the lab and the field is that, in the lab, we have more capabilities for creating better storage (and thus better research) environments. Stone is generally pretty stable, but should still be kept in good conservation environments. Of stable stone, the National Park Service Guidelines say that “Gradual daily and seasonal fluctuations of temperature and relative humidity can be tolerated”. (National Park Service, 2001: 6) In contrast, unstable stone requires a specific climate. This is usually due to some form of salt contamination. Here the NPS guidelines suggest the relative humidity be kept below 50%. As for temperature, “Choose a point between 60 and 72 degrees and keep the temperature steady. Allow it only to fluctuate enough to keep the RH in check.” (National Park Service, 2001: 6)

(http://www.nps.gov/noca/historyculture/collections.htm)

Of course, many times there might be special cases with stone artifacts that require more care that one can get in the lab. At this point, conservators are a good resource. They can give you advice on further care of artifacts or work with the artifacts themselves.

References Cited

Rodgers, Bradley A.


Texas Historical Commission

2013 Basic Guidelines for the Preservation of Historic Artifacts. Texas Historical Commission, Austin Texas

National Park Service

2.2 Bone

Desirée Lukens and John Esh

Bone artifacts are found in archaeological sites in a variety of forms. This versatile material can be worked into a variety of tools or decorative artifacts, exist as remains detailing the dietary habits of the past inhabitants, or through skeletal remains of our ancestors, tell us how they lived, worked, and died. As the environment, other creatures, and the years can be particularly unkind to faunal material, special care must be taken when excavating, storing, and examining such artifacts.

Excavation

Because recovered bones may be very fragile and have deteriorated over time, there are specific processes for testing the condition of any bone artifacts. The most basic of techniques involves testing the hardness of the surface to assess the artifact’s condition by pressing gently on the surface to test for compression. Little to no deterioration is indicated by a hard surface with no give. A soft surface shows slight to moderate deterioration, and if it is extremely soft or spongy, then significant deterioration has occurred and removal of the bone may require additional step for maximum preservation.
When uncovering a bone it is important to use the proper equipment to reduce the risk of damaging an already fragile material. The use of soft brushes and wooden picks will allow for gentle removal of the surrounding matrix and help to reduce the possibility of damage (Grant 2007). Figure 1 shows a bone in the process of being excavated, and in figure 2 we see it fully excavated, but even with the proper tools having been utilized, significant degradation at the narrowest section has caused the bone to snap in two.

Figure 1 (Bone in the process of excavation)
Cleaning
As in excavation, the archaeologist in the lab removes most sediment with a soft brush and a wooden pick to gently work stubborn dirt away. Do not wet or soak bone that is dry in an attempt to loosen or remove dirt, as due to its porous nature it will retain the moisture for long periods of time, which can cause the bone to expand and cause or exacerbate already existing damage, with the exception being dry bones in perfect condition. These may be soaked for a short period of time, but proper drying procedures should be followed afterwards. If the bone was damp or wet upon excavation the bone can be rinsed in water or immersed for a short amount of time to aid the removal of foreign materials. Rootlets that have grown into the bone over time can be taken out with tweezers, but if there is any doubt as to the extent of damage that will be caused by their removal, an expert should be consulted, as leaving them in place will cause no damage to the bone. Finally, all cleaning should be done gently, as the interior of bone is porous and it is easy to break the thin bone inside. Of particular concern in arctic endeavors are bones recovered from midden piles. Artifacts found in these sites and their associated features may contain a layer of preserved animal fat preserved by permafrost that can present a health concern upon defrosting. The cleaning of such artifacts should not be attempted until a conservator has been consulted (Grant 2007).

Damp or wet bone should be dried slowly and kept out of direct sunlight. Before the drying process begins, all cracks and fractures should be measured. If these damages to the bone increase, it is a sign...
that the drying process is occurring to quickly, and the relative humidity in the vicinity should be increased. This can be accomplished by placing the bone in a cool refrigerator, by draping damp cloths near the artifact, or by introducing humidifiers to the environment. A light brushing of alcohol can also be used to clean bone and can kill any mold (characterized by white fluffy strands, see Figure 3) that may grow while drying in addition to expediting the drying process. By measuring the weight of the bone daily, it is possible to determine when the drying process has concluded. As the weight of the bone stabilizes, the artifact can be said to be dry (Grant 2007).

![Figure 3 (Mold growth on artifact)](image)

It is possible for bone recovered from damp environments rich in salt (such as the ocean) to have absorbed salts. As the bone dries this salt crystalizes on the surface of the artifact and causes flaking, causing irreparable damage to the bone. To alleviate this, the bone must be soaked in a sequence of water baths (with varying concentrations of salt and tap water) until the soluble salt level of the bath reaches that of tap water (Hamilton 2000).

**Storage and Transportation**

Avoid rapid changes in both temperature and humidity. Also avoid storing bone in direct sunlight, under bright lights, near windows, exterior walls, or heating/air-conditioning units. A stable environment is ideal to prevent damage, discoloration, and mold growth. When transporting or storing objects wrapping them in acid-free tissue can help with padding. Once properly padded bone can be stored in
cardboard or plastic boxes. If bone is damp or wet do not store in a plastic bag (See Figure 4), this will trap condensation and heat, while encouraging mold and mildew growth (CCI 2002) (Singley 1981). Bones that are completely waterlogged in the field need to remain as such (in either a salt or freshwater bath depending on their original environment) until they can be properly dried in a controlled setting. Keeping them wet with the inclusion of a fungicide can help prevent mold and mildew growth.

Figure 4 (Bone waiting to be sorted for analysis and storage)

References Cited
Canadian Conservation Institute


Grant, Tara


Hamilton, Donny
Identification

To identify antler in the field, look for heavy dense objects with a hard exterior and a spongy center (Stone 2010). This spongy interior can be observed in Image 1. The exterior will often have a dark brown color although it is also common to find burnt antler and antler that has been culturally modified (Sease 1994).

Image 1. Modified Antler, Courtesy: Nuluk Archaeology Project, Portland State University

It is easy to misidentify antler as either bone or wood they have similar appearances in both color and texture, especially in a deteriorated sample. To avoid misidentification, examine the specimen under a microscope or magnifying glass to get a closer look at the interior pore structure and surface composition (Brady 2007, Sease 1994). On a piece of antler one should be able to see a thin hard exterior surrounding a softer more porous interior neither bone or wood will have those two distinct
layers (Minnesota Historical Society 2009). Refer to Image 2 for an example of the cross section of
antler. Antler also differs from bone in that it has no central marrow cavity so there will not be large
pores visible like there is in a sample of bone. Instead one will see an area made up of smaller more
irregular pores (Sease 1994).

If the exterior of the antler is intact there will be a rougher surface than there would be on the
surface of a bone, which is generally smooth. The base of an antler will also have a distinctive rough burr
where the antler was connected to the skull (Minnesota Historical Society 2009, Sease 1994). It is easy
to mistake poorly preserved or charred antler as wood. The same process of looking at the antler under
a microscope and identifying the distinct outer surface and the non-uniform porous interior will help to
determine the difference (Minnesota Historical Society 2009).

Image 2. Cross section of an antler, Courtesy: wildlifeonline.me.uk.

Initial Cleaning

After antler has been excavated in the field one must decide if it is appropriate to do a field
cleaning of the artifact. This is decided based on the condition of the artifact and if any residue analysis
or dating will be done which would be adversely affected by cleaning (Brady 2007). If the antler is in
poor condition or has cultural modifications such as added color or carvings do not clean it in the field.
However if the antler is in good condition it can be cleaned by gently brushing it with a soft dry
toothbrush (Brady 2007).

Image 3. Courtesy: cjonline.com
Packing and transportation from field to lab

If the antler is from a dry environment it can be stored and transported similar to wood or bone by wrapping it in acid free tissue paper and then placing them in plastic bags which are clearly marked with provenience information. To further protect the antler during transport pack the bags into polycarbonate boxes, see Image 4, to help prevent crushing and overcrowding (National Museum of Iceland 2012).

Image 4. Courtesy: sha.org

If the antler is wet it is recommended to keep it as close to the condition it is found in as possible. A good way to do this is to pack it for transport with the material it was found with such as moss, soil, or water (Brady 2007). Once these waterlogged items get to the lab they should be handled by a conservator as soon as possible to avoid any degradation that might be caused by the destabilization of their environment (National Museum of Iceland 2012).

Cleaning in the lab

In the lab the antler can be more thoroughly cleaned. If the sample is in good condition, yet has a large amount of dirt or mud crusted on it, immerse the antler in water and gently remove the dirt using your hands or a soft brush (Brady 2007). However when using water to clean antler it is important to ensure that you are working with a well-preserved piece. Putting a small or poorly preserved piece of antler into water for cleaning can cause the specimen to rapidly deteriorate making it unusable for study (Stone 2010).

Long-term storage

Antler is sensitive to changes in temperature and humidity. This is important to consider when deciding where and how to store your samples (Minnesota Historical Society 2009). Do not store samples near heat or cooling sources, such as radiators or vents, or windows. Also avoid storage around direct sunlight or bright lights (Minnesota Historical Society 2009, National Museum of Iceland 2012). Exposure to bright lights and temperature fluctuations can cause surface damage and cracking to the antler (Stone 2010).
It is also important to maintain a stable humidity level. A humidity level over 55% causes mold growth and a humidity level that is low or constantly fluctuating causes cracking or other damage to the samples (Minnesota Historical Society 2009, Stone 2010). Careful care of the storage and treatment of antler will help ensure that it will be useful for archaeological research in the future.

Image 5. Courtesy: www.spacesaver.com

Types of Antler Artifacts Found in the Field

As mentioned in the above discussion, antler can be hard to distinguish from bone and wood. Antler in archaeological sites is usually found carved into an object, or as debitage left over from carving. A technique for breaking antler apart is to break it off. A person would carve the antler, and then twist it apart to separate off the piece they wanted to use for toolmaking. This leaves a distinctive square mark, as can be seen on the bottom on Image 6.


Tools made out of antler range based on where one is excavating. Images 7 and 8 below show the variety.
Image 7, Oblong Pegs. Image 8, Possible Haft Element.

Both photos courtesy of Nuluk Archaeology, Portland State University.

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Minnesota Historical Society

2009 Bone, Antler, Ivory, and Teeth. Electronic Document,

National Museum of Iceland

2012 Guidelines On the Care of Archaeological Artefacts. Electronic Document,

Sease, Catherine


Stone, Tom

2010 Canadian Conservation Institute: Care of Ivory, Bone, Horn, and Antler. Electronic Document,
Further Resources
History Colorado

http://www.historycolorado.org/oahp/archaeology-palaeontology

This link will bring you to a list of articles on both archaeology and paleontology. It includes articles on the preservation of artifacts during excavation, conservation afterward, and public archaeology among many others.

Muros, Vanessa

Caring for Artifacts From the Field to the Lab: Packing and Storage of Archaeological Collections.

http://www.academia.edu/1684972/Caring_for_Artifacts_From_the_Field_to_the_Lab_Packing_and_Storage_of_Archaeological_Collections

This next link is a power point presentation, which goes over how to pack freshly excavated items in the field in order to transport them safely to a lab.

Minnesota Historical Society

http://www.mnhs.org/collections/archaeology/archcons.htm

The Minnesota Historical Society has a variety of links for information on archaeological curation, collections, and guidelines for fieldwork on their site in addition to the article referenced above.

2.4 Shell

Nate Jereb and Craig Bridenbeck

Description and Properties
Shell is the hard exterior covering of mollusks. Mollusks are invertebrate animals in the phylum Mollusca, and the two classes of primary significance to archaeology are Gastropods (snails) and Bivalvia (clams, oysters, and mussels). Shell is comprised of calcium carbonate (CaCO3) and conchiolin, which is similar to collagen. This shell is often created in layers, which can be useful for seasonal studies (Storch 1997).

Both marine and freshwater mollusks are seen in the archaeological record, but marine are more common. This is because shell from salt-water animals is typically thicker, more robust, and easier to manufacture than freshwater shell. Shell is commonly used to make decorative items, or as a sort of currency in some regions (Northern California is one example). Trade networks are responsible for bringing marine shell artifacts into noncoastal parts of North America. Objects made from mollusks found on the California coast were traded as far inland as the Great Basin. Some shell artifacts have a utilitarian purpose, fishhooks and bowls being the most common. Most shell artifacts serve a decorative
role (Sutton et al. 2009). Whole shells are often found in middens, which can provide important data on past human diet. Radiocarbon dates can be acquired from shell (Storch 1997). Environmental conditions as well can be surmised by looking at shell artifacts, their oxygen values being compared to modern shells to determine the difference in rainfall from paleo-environments (Davis, 2000).

http://oceanexplorer.noaa.gov/explorations/11maya/logs/oct7/media/archaeology7.html

Care in the Field
Shell survives well in most environments, but high acidity can cause them to degrade. Acidity dissolves calcium carbonate, the main material in shell. If the object is stable, excavate around it using wooden tools or brushes. Metal tools can damage the find. In cases where shell fragments may be exceedingly fragile, it may be helpful to remove “a chunk of deposit that will fit in a 5 gal bucket and immersing it in a 5 percent gelatin solution (dissolve 50 g gelatin in 950 ml hot tap water) for 24 hours, freshened with another 5 percent bath. After a second 24 hours, drain and cover the mass with a 10 percent formalin bath (commercially available). After 24 hours drain off liquid and air dry the shell in the bucket for two weeks or more.” (Claasen 1998: 89) Store the artifact in acid-free paper bags or open polyethylene bag until it is time to transport it. Degraded shell should be treated with a 3%-5% solution of Acryloid B72 in either acetone or toluene before it can be excavated. If the find is damp, a PVA emulsion mixed 1 part to 4 with water should be used (Sease 1994). In the case of wet shell, the water-based consolidant Rhoplex
AC-33 is recommended, which can be used as is or diluted with water. For best results use distilled or deionized water (Storch 1997).

Exercise caution when applying chemicals. Remove as much dirt as possible before application, as clumps may end up sticking to the artifact. Use soft brushes and do not allow the consolidants to build up on the surface. Let the artifact dry completely before attempting to remove it (Sease 1994).

Care in the Lab
Shell that is in good condition, and is free from any paint or pigment, can be washed in water with a soft brush. Be sure to allow the specimens to dry before continuing cataloguing and analysis procedures. Shell with pigment should be cleaned gently with a soft, dry brush, with special care taken to not remove any. Stop cleaning immediately if the paint or pigment comes off easily. Starting the cleaning process with a wooden toothpick is recommended, as a hard exterior may be covering a brittle, friable interior. Exercise caution when removing dirt attached to the surface of the shell, as the dirt may pull off parts of the surface. Soften attached dirt with a brush filled with water by gently touching the brush to the clumps (Sease 1994). Broken objects that are in otherwise good condition can be mended with Acryloid B-72, mixed 1:1 with acetone (Storch 1997).

Storage
Shell that is not stored in proper containers runs the risk of deterioration as a result of Byne’s disease. This is the result of acidic vapor reacts with the calcium carbonate contained in the shell to produce salts. A microscope may be necessary to identify Byne’s disease, because it can look like mold or fungus to the unaided eye. Older literature recommends tasting the salts to identify the condition, NEVER actually do this, however. The salts that form are different from common table salt, and may be harmful. Wood and wood storage products can produce the acids (especially acetic and formic acids) that cause the disease. Shell artifacts should be stored in acid free boxes (steel is recommended), polycarbonate plastic boxes, or polyethylene bags. Archival materials are usually acid-free or alkaline buffered. They should also be stored in areas with low humidity, as the vapors that cause this deterioration are carried through water in the atmosphere. Byne’s disease is preventable, but, unfortunately, irreversible (Shelton 2008). Additional protection by adding a coating of linseed oil varnish to the shell may prevent Byne’s disease from forming. As well, it has been found that soaking/boiling samples before entering the collection have been less prone to Byne’s disease. If it is appropriate in that it would not affect later testing, this may help to stave off the deterioration of a collection, if proper storage is not readily available (Tenner and Baird, 1985).

In Text and Additional Citations:
Claassen, Cheryl

Davis, Loren G.
2000 A Late Pleistocene to Holocene Record of Precipitation Reflected in Margaritifera Falcata Shell From Three Archaeological Sites in the Lower Salmon River Canyon, Idaho.

Brady, Colleen, Molly Gleeson, Melba Myers, Claire Peachy, Betty Seifert, Howard Wellman, Emily Williams, Lisa Young
2006 Conservation Treatments. Electronic Document,
Kelsi McDaniel and Jonathan Duelks

In the Field

Archaeological wood is a very fragile material. When handling it, it must be fully supported or there is chance that it will break (conserve-o-gram). Waterlogged wood is especially prone to degradation and must be handled with extreme caution. Most importantly, the wood must be kept wet. Drying will cause any number of problems including shrinkage and collapse, which will make it impossible to record the original shape, size, form and possibly use (SHA). The wood can be kept wet by spraying it with water or wrapping it in a wet rag (conserve-o-gram). It can also be kept in a tank of water, but if the material is exceptionally weak this may cause further damage (SHA). There is no definitive answer on how to care for wood in the field, as it is dependent on the stability of the recovered material, so the best solution should be decided upon when it is recovered. However, it is important to bring the necessary material to be able to perform all three tasks. It is also critical to remember that wood recovered from fresh water should be treated with fresh water, and wood recovered from salt water should be treated with salt water (SHA). If you are going to be in the field for
an extended period of time, the National Parks Service recommends coating it with a solution of boric acid and borax. To make the solution you mix one percent of each in water, separately. Then, you mix the solutions together in a seven to three ratio (conserve-o-gram).

**Waterlogged Wood – From Field to Lab**

The waterlogged wood will of course, need to remain wet while being transported from the field to the lab. For smaller wood artifacts you will need plastic containers with lids and sealable plastic bags (Ziploc brand bags will do, see Archival Supplies, Digging with Storage in Mind by Emily Rocha, section of this manual for more. Place the wood artifact in the plastic bag with water then fill the plastic container with water and pack the bagged artifact in the container (Singley 1981:45). For short-term packaging, larger pieces of waterlogged wood can be wrapped in three layers of polyethylene bags or sheeting that are sealed (Singley 1981:45). “If the waterlogged wood cannot support its own weight, a board should be used as a secondary support (Leigh 1972 in Singley 1981:45).

Waterlogged wood is being stored between field and lab should also be treated to prevent the growth of fungus. For short-term storage, Lysol spray will be sufficient, but for longer storage use a proper fungicide in solution form (Singley 1981:45). When selecting a fungicide to use Katherine Singley recommends that you be aware of cost, effectiveness, toxicity, pH value, compatibility with wood & future conservation techniques and carbon content (1981:45). Always prepare and plan ahead. Be aware of the material types you may encounter and bring the necessary preservation and storage supplies into the field with you. When choosing methods and supplies for preservation keep in mind what types of analysis will be performed in the lab. Choose preservation supplies and methods that will not interfere with radiocarbon dating, dendrochronology, residue analysis, etc. or obscure any other information you may need when analyzing the artifacts.

**Dry Wood- In the field**

Wood artifacts that are dry are significantly more stable than waterlogged wood artifacts, but should still be treated with care. Use a paintbrush to remove excess dirt from dry wood artifacts (detailed cleaning can be done in the lab,) and wrap them in plastic or store them in archival quality zip-lock bags and carefully store them in boxes (Rodgers 2004:42)

**Waterlogged Wood – In the Lab**

Once in the lab it is important to record the object to the best of your ability before attempting to do anything else. Next, you can either choose to prep the wood for treatment or for long term storage. The steps involved in treating waterlogged wood include introducing a supporting agent and then commencing the drying process. A number of different materials can be added to wood recovered from wet sites to provide support including sugar, acetone-robin, alcohol-ether and camphor-alcohol (CRL). The first step in this process is to remove any remaining dirt. The wooden object, if stable enough, is then submersed in a container of water that has one to five percent polyethylene glycol in it. The water acts as a solvent in this case, and as time progresses it will evaporate. The container must be kept at a constant temperature around 50 degrees Celsius. The next step is to periodically begin adding PEG to the container. The amount that needs to be added each time depends on the size of the object being treated. This process can take several weeks or even months, again depending on the size of the object.
Polyethylene glycol continues to be added until it amounts to 70 percent of the total solution. As PEG is added, it causes the object to solidify by replacing any excess water. The wood can then be removed and any excess polyethylene glycol, which will leave a waxy residue, delicately wiped off (C

After a bulking agent is added, drying can commence. It is possible to dehydrate an object without adding supporting material, but it is not recommended (SHA). If the polyethylene glycol method is used no drying is necessary. There are two drying techniques: air and freeze. The first method is not recommended as it only works in very limited cases where the objects are larger (SHA). This process can take several months, and if it is rushed it will be detrimental to the structure of the wood. Freeze-drying is a safer method and can be done under a vacuum, in a freezer or in arctic environments (SHA). The problem with this, however, is that it will eventually have to be thawed or kept in a freezer indefinitely.

If you wish to store the wooden object, you should not use any fungicides or biocides to try and prevent growth. To prevent any sort of fungus or bacteria from growing in the tank the water needs to be kept cooled and preferably stored in a cool place (but not freezing), and the water should be changed often (SHA). The object should be stored in the smallest container possible, which will help control evaporation. A solution of 10% ethanol or alcohol can be added to a smaller container to prevent growth (SHA).

Cleaning Wood- In The Lab
Whether the wood artifact you are cleaning is dry or waterlogged, be extremely careful and treat it, as you would with any artifact, very delicately.

Dry Wood can be run under gently flowing water or wet with a spray bottle if necessary, waterlogged wood needs to stay wet to remain stable and so should be constantly wetted during cleaning (Rodgers 2004:43). To remove loose mud or silt use a soft nylon bristle brush to lightly scrub or brush away caked on sediments (Rodgers 2001:43). Be aware that the outer surface that you are cleaning may already be in poor condition (Rodgers 2004:43). We are always careful not to damage artifacts, but keep in mind that the dirt you are removing by scrubbing, however gently, could potentially scratch the surface as it is brushed away, further damaging the artifact and obscuring the original surface (Rodgers 2004:43). You may encounter concretions of iron corrosion or sand on wood artifacts which will be more difficult to remove. In these cases dental picks, scalpels or an air scribe may be needed (Rodgers 2004:44).
Be careful! Sediments and concretions stuck to wood may pull off parts of the wood when removed, and the tools you are using could damage the artifact as well. If a concretion cannot be removed without damaging the artifact talk your lab instructor before continuing with cleaning.

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Journal of Archaeological Science 37:2277-2283

Additional Resources
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2.7 Ceramics

Jordyn Heimbigner and Steve Gandee

Conservation
When Handling Ceramics, always handle with care, knowing they are breakable. The main damaging factor in caring for ceramics is careless handling (Deck 2013:1). Ceramics vessels and objects have weak points and strong points. Never lift and object by its weak points such as their handles or spout (Deck 2013:1). Handle all objects with two hands on their strongest points (Deck 2013:1). See the below picture:
Proper way to hold ceramics (taken by myself). Not the proper way to hold/ pick up ceramics

Special care must be taken with low-fired ceramic objects. These objects “are composed of clays and additives that begin to fuse or melt at temperatures between 900 degrees-1200 degrees C” it is “no longer water soluble but remains porous to water” (National 2003:1). These ceramic objects typically have glazes to reduce their liquid permeability. During the firing process both the clay and the glaze expand and contract at different rates and have a different level of hardness (Society 2007:1). The level of hardness is determined by the temperature that the clay is fired at and it has to do with the impurities that are within the clay. This leaves the two materials susceptible to separation and can lead to the glaze chipping since it is not “chemically bound to the body” (National 2003:1). Furthermore, on top of the glass some ceramics may have an extra slip “clay layer over the body and below the glaze” which may cause more chipping of the glaze (National 2003:2). In caring for these ceramics, do not clean the attached soil off of them until you are in the lab with proper equipment to care for the potential flaking (Society 2007:1). If you are reassembling a ceramic with glaze, never use tape that can peel it off (National 2003:1). If the chipping is fairly bad, you may want to consider consolidation, introducing a “dilute adhesive into a body, slip layer, or under the glaze;” however you must use a consolidant that will “age well, not change color, remains soluble, [and] not alter the appearance of the object” (National 2003:2). See below the difference between an earthenware (low-fired) ceramic and high fired ceramic. You can see that the low fired ceramic is chipping.
Earthenware milk pan with a lead glaze interior (Plymouth 2011:1)

Chamber pot-Ceramic white glazed, high fired, circa 1805- circa mid (Museum Victoria 1).

Low-fired ceramics are also susceptible to crumbling in moist soil “as the ceramic body begins to re-hydrate back to clay” (Society 2007:1). When ceramics are excavated they are in need of lifting supports in the field so they will have support when brought to the lab (Society 2007:1). If these ceramics are wet, they should be kept in a wet context until it has been assessed if the water has salts in it (Society 207:1). These very porous materials are highly affected by soluble salts; if contaminated the salt with crystalize in the artifact’s pours as it dries out and can expand with fluctuating humidity exerting pressure and causing damage (Society 2007:1). If you discover that this is the case, consult a conservator to remove the salt soluble water.

These porous ceramics are also more likely to be stained from materials in association with them (like iron) so be aware of its storage because though it will not necessarily damage the artifact, it will obscure its decoration and original aesthetic intent (Society 2007:1). If any ceramics become stained (including
high-fired ceramics) avoid removing the stain as it is often unpredictable how it will react and affect the artifact long term, if you must do so, you should have “conservator should remove stains [but] only if the staining prevents display or treatment (National 2003:3). These stains “cannot be removed without chemical cleaning, and often this will result in further damage” (Society 2007:1). See the image of stained ceramic below

![Stained Ceramic](Museum of Indian 2013:1)

“Small lid showing salts formation on the surface” (Society 2011:1).

When excavating on site and you are digging through the sediment ceramics can usually be identified. There are times that the ceramic can be hard to identify because the ceramic will be masked by “soil, soluble and insoluble salt encrustations and staining from minerals in the soil or from nearby metals” (Society 2006:3). The best way to know if you have a ceramic is by having it cleaned and analyzed, so pack up what you think the ceramic is and take it back to the lab. Ceramics can handle a large variety of conditions and survive but one thing that you need to look out for is the humidity, it can have harsh effects on the ceramic piece. When packaging up the ceramics it is very important that you try to keep the ceramics with the ceramics and not with any heavy artifacts that you might have found. We want to keep things in the same condition that we found them that means the ceramics in one piece or at least the piece that you found it in. We want to keep ceramics in the same environment that we found them in, like stated above. With ceramics it wouldn’t be a bad idea to have acid free foam with you to pack into the bag or container that will hold all of the ceramics.
Most ceramics are able to be cleaned with deionized water and soft brushes, but if the ceramics are made of soft material, are crumbling, or have flaking paint glaze or gilding do not use brushes (Society 2007:1). If the ceramic artifact is sturdy enough they should be cleaned with “mild detergents in water” such as “Triton X-100 [see it pictured below], Vulpex and Orvus” (Deck 2013:1). Obviously take special care in handling these objects even when cleaning. Consider if you want to do residue analysis prior to cleaning as well because that data may be lost if you clean the materials off the ceramics.

(SPI 2013:1)

If a ceramic vessel is complete “it must be lifted with the contents intact. Once lifted, the contents can be excavated separately” (Society 2007:1). The inner contents of the vessel could be supporting it. If it is broken into pieces and a candidate to be reassembled, use an adhesive with long term stability that do not “discolor, become brittle, fall apart, or cannot easily be reversed [or re-dissolve],” and it must not be “stronger that the ceramic fabric” to prevent it from breaking in a new spot rather than the original breakages when there is mechanical failure (Society 2007:1). One adhesive suggested by conservators is Acryloid B-72 (pictured below) (Society 2007:1).
Acryloid B-72 (Society 2011:1).

When you store your ceramics, stacked items should be cushioned using felt, soft cloth, or polyester padding to avoid abrasion of decorative surface elements. (Deck 2013:1). You should not use acid-free tissue when storing wet ceramics because it can stick to the ceramics, but rather use Ethafoam (see examples below) (Society 2007:1). Ceramics should be stored at 65-70 degrees Fahrenheit at 45% relative humidity (Deck 2013:1).

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**2.8 Glass**

**2.9 Metal**

*John Esh and Tiffany Nickerson*

**Care of Metal Artifacts in the Field**

In the field, the modern archaeologist will at some point encounter one of several types of metallic artifact, and while all share common characteristics in the methods needed to properly handle and preserve them before they are sent to the lab for analysis, many have their own particular quirks which must be recognized in order to halt or slow the process of deterioration. The main enemy of the metal artifact is corrosion, and from the moment it is formed, this force begins to have a deleterious effect upon it.

**Terrestrial Recovery**

As the majority of archaeology is performed on terra firma, most of the metallic artifacts recovered by archaeologists will come from the soil. The degree of damage to each artifact will be
dependent on a combination of factors including the age of the artifact, how long it has been buried, the type of matrix the artifact is found in, and the amount of moisture, gases, or other chemicals it has been exposed to, amongst others. But, these facts notwithstanding, the most important step to be taken upon the retrieval of any metal-based artifact is to remove as much moisture as possible from the artifact and place it in a stable and controlled environment. Before this is done it is permissible to clean the object in the field, but only to the point of removing excess dirt and debris. A soft brush may be used, but under no circumstance should any sort of corrosive damage mitigation or removal be performed in the field. Scrubbing, picking, or hammering away at the invasive damage will only serve to contribute to the already advanced degradation. In many cases, the layer of corrosion serves as a protective barrier, and removal in a non-controlled environment can and will cause even further trauma (Singley 1981). As well, like the impressions left in the thick casing around sea-salt environed artifacts, the outer layer of corrosion on the exhumed artifacts may contain impressions of other artifacts associated with the metal object.

Figure 1. An iron cross before and after cleaning in the lab.

After the artifact has been cleared of any loose sediment and all moisture has been removed, it can be stored in one of several ways. Smaller artifacts such as nails, jewelry, buttons, can be stored in small, plastic, airtight bags, but the inclusion of a silica packet with each bagged artifact is absolutely necessary.
Figure 2. Indicator Silica Packet

Functioning much like the bag of rice you place your iPhone into after dropping it in the toilet, the silica packet acts as a desiccant, absorbing any moisture remaining within the plastic bag and within the artifact itself. Indicating silica (which changes from a blue to a pink color with moisture absorption) should be used so that maintenance can be performed as needed. Larger objects should be kept in airtight plastic containers, properly padded to protect the artifacts contained within from physical damage, and an appropriate amount of silica placed within. If no airtight containers are available, any container will do, but it must be contained within a sealed plastic bag of sorts, and of course, it must contain an indicating silica packet to keep the moisture under control (Singley 1981). Lastly, remember, do not eat the silica.

Marine Recovery

The recovery and care of metal artifacts that have been submerged in marine environments presents a whole new set of obstacles for curators and archaeologist’s to tackle. Unlike those artifacts recovered from a terrestrial environment that, might have been exposed to moisture, were not saturated, artifacts located in an aqueous matrix must not be allowed to dry out before being taken to a lab for controlled recovery and identification. The second they are exposed to air, rapid degradation of the artifact will begin to occur. The preservation of artifacts found within freshwater environs is a simple matter; these items can be kept in a container containing tap water with an added inhibitor solution to retard the process of corrosion. If no inhibitor is available, then any non-salt containing water is suitable (Hamilton 2011).

Artifacts found submerged in salt water are often encrusted in thick layers of shell, coral, sand, clay, rust, and other artifacts attached and part in part to thick matrix that the “main” artifact lays within. These layers can in fact be beneficial to the archaeologist as they both serve to protect the interior artifact from environmental damage as well as provide a collection of associated artifacts for study.
Because of this, significantly more attention must be paid to the detail of the casing that the artifact finds itself inside. Casts should be made of any impressions left by artifacts for the necessity of recording their provenience and association. Even the ghostly remains of the most seemingly insignificant items may hold a clue to the story of the site from where the artifact was found. When the artifact is recovered, it is preferable to keep it in a tap water and inhibitor solution, just as with artifacts recovered from fresh water, but if that solution is not readily available, the artifacts may be kept in salt water until they can be transferred to a more suitable bath (Hamilton 2000).

Aside from keeping the artifacts in stable solution as in figure 3, there are more steps that can be taken to preserve the artifacts in the lab. Once artifacts are rendered stable enough for more regular storage, there are many things to consider. Metal objects, as with most types, should be stored on archive quality shelving so that outgassing does not damage the artifacts. (Texas historical commission, 2013:8) Temperature and humidity are important considerations as well. Because metal archaeological artifacts are often damaged and unstable, it is key to keep the humidity and temperature at
recommended levels. The National Park Service considers stable metal to be a level 2 climate sensitive material, and based upon that and the object’s environmental history and local climate, the humidity should be anywhere between 30%-55%. (National Park Service, 2001: 6) The temperature should be above 50 degrees but below 75, and should not be changed by more than 5 degrees in any day. (National Park Service, 2001: 6) For more unstable metals, the recommended humidity level is under 30%, and for iron, specifically, it should be less than 15%. Temperature of unstable metals should be kept between 60 and 72 degrees. (National Park Service, 2001: 6)

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The purpose of this lab manual is to review the basic care of bulk materials extracted from a site and taken from the field to the laboratory. Specifically, instruction on storage in the field, cataloging of information, correct packaging for transit to the lab, and care of analyzing bulk materials in the lab are considered.

Field to Lab Storage

When storing bulk or soil samples for transportation from one location to another, the following should be taken into consideration:

- Sterilized mason jars, or polyethylene bags (double bagged) are a good choice for storage. It is necessary to make sure these storage devices are not overfilled and are securely sealed. When preparing for transportation, they need to be put in a place where the storage devices will neither puncture nor break. Sturdy boxes of either cardboard (acid free) or wood (for short term use only) are recommended. Like samples should be consolidated so that their information can be retrieved quickly and in an organized manner. They should be packed separately from unrelated artifacts or unrelated samples (National Museum of Iceland 2012).
If the sample is found either wet or dry, it is necessary to keep it in the environment in which was originally found until further processing. Samples should be kept out of areas where temperature change may occur quickly, such as in the sunlight. For soil samples, change in temperature could alter its chemical composition, biasing later analysis. Drying of organic composite material should be accomplished in the lab, and kept wet until it reaches the lab (Vanessa Muros 2011).

Labeling is one of the most important things to consider in the field. Recording the provenience of the sample, or anything recovered with it is essential. All the necessary in situ information must be recorded, as well as the necessary project information. Acid free paper label facing out (Junge/Anderson 2013) should be put inside of the bag with same information, if the writing on the storage device is compromised.

Legibility cannot be overemphasized when writing pertinent information. Each sample should be put into a separate bag. If there is more than one bag to a sample, it is necessary to put at the bottom of the bag “1 of #”, and the same information should be put onto however many corresponding bags are being used for a single sample.

Although different projects may require different layouts of information to be recorded on the sample bags and other storage devices, the following is common and their meanings should be understood.

- Accession Number- This may contain information about the site location, the year of excavation, the place of storage, or a reference to a particular report

- Catalog Number- This may contain the accession number and other information in its entirety, including serial numbers which designate the bag as a particular number in the field catalogue (Sutton 1996: 26)
- Temporary Number- A temporary number may be assigned as part of the field catalog
- Object Description- Whether it be a bulk sample or a soil sample, and any other descriptive features that may help when analyzing
- Provenience Information- This will include any information about the exact location of the sample. It may include the Level at which it was recovered, Quadrant designation, Northing and Easting of the sample taken, if it has been sifted, what screen size it has been processed through and any other pertinent information which a project supervisor may assign to this section.

Other information, such as dates, names of excavators and project designations should also be taken into account. Documentation outside of the storage bags should also include field notes, maps of the site and maps of the collection units (Sutton 1996:20).

- Transportation from field to lab - If there is danger of changing temperatures and heat variation, cooling may be necessary to maintain the chemistry of a soil sample. A temperature of “4 +/- 2 Celsius has been found suitable for many applications,” (A. Paetz, B-M. Wilke 2005:42) when moving samples from the field to the lab to maintain stability within the sample.
In the Lab Bulk Sample Procedure - Sifting

When processing bulk samples in the lab, the following steps should be taken to sift through the samples properly:

1) All material should be screened through sifters 1/4", 1/8", and 2mm screens, with the remaining >2mm soil being bagged and information being copied from the master bag, along with the screen size it came from, on a non-acidic paper form, facing out be placed with it.
2) The remaining material in each sifter should then be sorted through independently- the 1/4”, 1/8”, and 2mm screened material following the uniform process:

a. Sort out different materials such as wood, bone, modified lithics, charcoal, ivory, soil clumps and unmodified rocks. Have a lab supervisor double check work before moving on.
b. Soil clumps will be gently crushed with a mortar and pestle, and sifted through the 2mm screen once more, with any remaining diagnostic material to be kept for later steps. The remaining sifted soil may be discarded.
c. Once the materials have been sorted, the unmodified rocks should be weighed and recorded on the appropriate lab sheet. They can then be discarded.
d. Next, each independent diagnostic material (bone, wood, ivory etc.) should be weighed and recorded in the appropriate lab sheet.
Each piece of material should then be bagged separately, with information from the master bag, along with the screen size it came from, placed on a non-acidic paper form and put in the bag facing out along with it.

e. These independently bagged diagnostic material (bone, wood, ivory etc.) may be placed together in a larger bag with the information from the master bag and the screen size which they originated from on it. It is important to keep all diagnostic material from each sized sifter together.

3) Once all of the materials from each screen size have been processed, they can be placed back in the master bag. It is important to make sure that everything has been accounted for and everything is properly labeled and grouped together. (Anderson 2013)

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Other special sample types?

3.0 Artifact Analysis

3.1 Archeology Lab Work for Dummies

Michelle Reed and Nate Jered

As noted in the laboratory manual created for the Fort Vancouver site, “Artifact analysis is the key to archaeological interpretation and an understanding of the behavior of those from the past that we are studying,” (Archaeology Lab Work, 2003). It is the treatment of the artifacts once they leave the field that becomes the responsibility of those working in the lab. There are strict rules that must be followed in order to ensure each piece of the history being examined is being treated in the manner of a physician: “first do no harm.” However, in order to do the work with integrity, one must know HOW to do the work.

When working in an archaeology lab situation for perhaps the first time, there are some basic tenets that must be followed and understood. Some of you may have done a considerable amount of lab work, some maybe a little and some, none at all. In order to facilitate an introduction to sifting through samples, classifying, categorizing and cataloging, there are certain steps that need to be learned. The following instructions should enable a neophyte to undertake and become competent in basic lab practices.

Basics

The first step is to become familiar with the physical layout of the lab itself. Do a walk through, preferably with your professor or one of the Teaching Assistants who can help you. Look at cabinets to see where things are stored; hopefully they will contain labels that indicate their contents. Learn what specific supplies you will be using for your first project and where they are stored. Check out the equipment that will be used, such as scales, microscopes, computers, calipers etc., and know how to use them (see below).

Before you start working with your project bags wash and dry your hands. This will remove any remnants of food or oily substances that may be on your hands that may harm the artifacts.

When you are given your bags to examine, follow the correct procedure for filling out the tags that will accompany each of your sorted items. Always write clearly, legibly, and in pencil.
Next, learn how to handle specimens correctly. Use tweezers on small objects, brushes when removing excess material, trays used to place items in while waiting to be confirmed or transported to another part of the lab. (For example, if you want to look at a specimen under the microscope, carry it to that location in a tray.) Never use a brush that is stiffer or harder than the material being cleaned. Metal brushes will clean rust off of ferrous objects, but will irreparably damage organics (bone, wood, shell, etc.). For organics and softer materials, use a standard toothbrush. Always cease cleaning immediately if the object is unstable enough to be damaged in this process. Be sure to know all the steps necessary to sort material into correct categories. If you are not sure...ASK! Once you have sorted through your bags and have your samples, have them checked by your professor or a TA.

EQUIPMENT

Microscope – if you don’t know how to use the model that is in the classroom, ask the TA to show you. This tool is invaluable in looking at small specimens to determine their material type (bone, antler, ivory, wood, lithics, teeth, etc.). Sometimes wood, antler and even ivory are difficult to differentiate, especially when they are very small samples. In Room 41 there are more sophisticated microscopes that can be used but be sure you know how to use them.

Scales – the small weight scale used in this class will only weigh up to 400 grams so be sure your rock samples are under this amount or you will get an error message. If necessary, put them into two separate trays. When preparing to weigh a sample, be sure to weigh the type of container you will be using and zero out the scale before placing your container and sample on the platform.

Calipers – the calipers are equipped with digital readout displays and a couple have USB ports to connect to a computer, which will make transferring readings much quicker and easier. Just be sure to have someone instruct you in their use if you are not familiar with them. Also, be sure to measure your samples no less than three times to ensure accuracy.

Labeling supplies – materials used to label museum objects must meet the following criteria: be chemically stable, have excellent aging characteristics, prevent absorption, and be removable, (National Park Services, Conserve 0 Gram, July 1993, Number 1/4).

SCREENING AND SORTING

Your professor will determine the size of the screening that will be done on the samples. Screening is usually done through 1/4, 1/8” and less than 2 mm sizes. Each level will need to be sorted individually into the various material types and placed into bags with the appropriate identification tag
containing all the information that is presented. While sorting the materials, use the small plastic trays to separate and identify materials that are found (ex. Bone, antler, wood, teeth). (Nuluk Project Lab Processing Guidelines). DO NOT MOVE TO THE NEXT SIZE WITHOUT COMPLETING THE PREVIOUS ONE.

CATALOGING

In order to be proficient with cataloging you need to be familiar with the program that is being used to store the information, which will most likely be Excel in the case of this lab. Learn how to move around in the program and when NOT to use the auto-fill. Various people may be working on the same project so the name, the date and perhaps the condition of the material will change from one time to the next. The person in charge of this stage of data collection (usually the TA who will be using the information) will lead you through the steps necessary to do the cataloging, show you where and how to store the finished bags.

It is imperative that you become familiar with the method of assigning accession numbers, (Sutton, The Archaeology Catalog, 2013) how to know what information is required in each of the fields and what terminology is being used to describe each sample. It’s a good idea to look back over what other people have entered in the fields and compare it with what you are seeing on the written tags and how you interpret those notes so there is consistency.

PRESERVATION

Different artifacts require different means of preservation. Several articles are provided by your professor to outline those steps that should be taken for preserving wood, bones, metal, ceramics, etc. (Chicago Historical Society, Artifact Handling and Transport Procedures, 2007).

Some of these can be found in the National Park Service bulletin, Conserve 0 Gram 6/1, July 1993. This will be an important lesson that will be used when working in the field. The resources provided in the rest of this manual, however, are the most relevant, as they pertain specifically to material and artifact types being analyzed in the lab.

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3.2 Stone

Jonathan Duelks and Jordyn Heimbigner
Lithic debitage analysis focuses on the non-utilized flake debris created during flint knapping, or the production of stone tools. Approaches and methods to debitage analysis can vary based on the types of questions being asked. Debitage analysis can tell us about what types of tools were being made or what phases of tool production were happening at a site. This helps with the overall interpretation of a site. For instance, using technological typology analysis one can conclude that notched points were made at a site based on the presence of a notching flake (Andrefsky 1998: 115). In Lithics, Macroscopic Approaches to Analysis William Andrefsky Jr. describes two categories of analysis of debitage, typological analysis and aggregate analysis (1998). In these categories of analysis various attributes of flakes are used to measure and categorize in different ways depending on the assemblages examined and the research questions to be addressed. But before we get into categories of analysis we should discuss basic terms and characteristics.

Attributes and Descriptors for Characterization of Debitage

Debitage consists of flakes, shatter, and other debris from the manufacture or maintenance of flaked stone tools (Yohe II 2013: 63). Debitage flakes differ from flaked tools and utilized flakes in that they are unused, and show no recognizable use-wear or retouch (Adrefsky 1998: 82).

Flakes, as seen in figure 1 and 2, have distinct characteristics. The dorsal surface is the side of a flake or detached piece that shows evidence of previous flake removals or the original unmodified surface of the rock. On a dorsal surface that has had removal of detached pieces, a line or ridge formed by this removal can be seen. This is a dorsal ridge. On the side opposite of the dorsal surface one would find the ventral surface, the smooth surface of a detached piece that contains no previous flake removals except for the occasional erraillure scar (a small chip detached from the bulb of percussion). The bulb of percussion is the bulbar location on the ventral surface formed as a result of the Hertzian cone (a cone of force) turning toward the outside of the objective piece. The surface area that receives the force to detach the material is the striking platform; it is often removed with the detached piece so that the detached piece will contain a striking platform at the point of applied force. The end that contains the striking platform is known as the proximal end, while distal end is the location that shows the type of termination, the condition or character of the distal end. There are four types of termination as seen in figure 3: feathered terminations, step fractures, hinge fractures and overshot terminations.

(Andrefsky 1998: glossary)

Shatter is the angular waste resulting from stone tool making activities that is not otherwise diagnostic (Yohe II 2013: 64). They have no clear dorsal or ventral side, platform, or other flake characteristics (Wilmerding and Kay 2012:58).

Cortex is a chemical or mechanical weathered surface on rocks (as opposed to modified by humans). Attributes of cortex are generally described in three stages: primary, secondary, and tertiary decortication. Primary decortication, or cortical flakes, have a dorsal surface entirely covered by cortex. Secondary decortication, or partially cortical flakes, possess some cortex on their dorsal surface. Tertiary decortication, or interior or non-cortical flakes, have little or no cortex (Yohe II 2013: 63).
Figure 1: Flake Characteristic Illustration. (Note that Flakes should not be drawn upside down, the proximal end should always be up.) (José-Manuel)

Figure 2: Flake Characteristic Illustration (right side up) (Mississippi)
Figure 3. Schematic Illustration of flake termination types (Andrefsky Jr. 1998: 21).

Debitage Categories, As Suggested in Fort Vancouver’s Lab Manual
Debitage can be categorized into six categories: bipolar debris, debris, shatter, flake fragments, broken flakes, and complete flakes. In bipolar debris, attributes of bipolar manufacture are present. There is no evidence of bipolar reduction, and no single ventral surface present among debris. Shatter, as previously discussed, has no flake characteristics. Flake Fragments have a single ventral surface, but do not have a platform. A broken flake and a complete flake have the platform, a single ventral surface, and margins intact (Willson 2003).

**Recording Debitage Characteristics**

When sorting quantities of debitage size class can be measured based on screening or sieve size (2mm, 1/8 inch, ¼ inch, ½ inch, or 1 inch). Determine the material type of the debitage (for example, basalt, obsidian, chert, quartzite, ect). Use calipers to take measurements when describing individual pieces of debitage. Flake length should be recorded from proximal to distal end. Remember that debitage will sometimes be broken and proximal or distal end may not always be present. Flake width should be recorded from edge to edge. Also record the flake weight and thickness. The type of termination (feathered terminations, step fractures, hinge fractures and overshot terminations) should be identified. Cortex can be recorded in different ways depending on preference or experience, (discuss and decide on uniform method for our class). Some descriptions of the cortex that should be addressed are its presence or absence, the measured presence (0%, <50%, >50%), and whether it is primary, secondary or tertiary decortication.

**Analysis of Debitage: Aggregate and Typological**

Aggregate debitage analysis is conducted by stratifying the entire assemblage of debitage by a uniform criterion then comparing relative frequencies of debitage in each stratum (Adrefsky Jr 1998: 131). Aggregate analysis of debitage records fewer technological attributes of a larger sample of debitage. The main advantage of this approach is that larger samples can be analyzed and still provide technological interpretation. Further, once the parameters have been established, this type of analysis does not require specialized skills or knowledge (Yohe II 2013: 67).

Aggregate debitage analysis can group together different classes of debitage by length (linear size debitage analysis), weight (Weight increment analysis of debitage) or screened size grade debitage analysis (Yohe II 2013: 67 and Adrefsky Jr. 1998:135-137). Andrefsky Jr. suggests that if length alone does not seem suitable to characterize size variability of the debitage assemblage, to produce a better overall perception of the shape and size one could divide length by thickness or width (Andrefsky 1998:132). Use and accurate and sensitive scale to record weight of flakes. Screened size graded debitage analysis groups flakes based on size using nested screens of various mesh size (2mm, 1/8 inch, ¼ inch, ½ inch, or other nesting screen/sieve mesh sizes). Combinations of aggregate analysis can be used as well. Measurements of thickness and weight can be helpful in categorizing flakes with screen size graded debitage analysis (Andrefsky Jr. 1998:134).

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Figure 3:
William Andrefsky Jr. Schematic Illustration of Flake Termination Types Lithics: Macroscopic Approaches to Analysis Pg. 21

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3.3 Bone

*Steve Gandee and Kristin Leonard*

Basic Lab Analysis of Bone

Mandible of a bearded seal (O’Harra 2007)

All of the bone assemblages for the following steps of basic analysis come from archaeological sites of hunter gatherers in Northwest Alaska, collected by Dr. Shelby Anderson and her team. When entering Dr. Anderson’s lab, you will notice numerous large bones lining the counters, too large to be stored in cabinets. These large bones come from whales, and represent only one type of species that you will work with during faunal analysis. Marine mammals, such as whales, were greatly utilized by hunter gatherers of the Arctic for meat, blubber, and bones (McCartney and Savelle 1985: 37). We also see remains of dogs (Canis familiaris), in certain Arctic sites as well, which constitutes a small portion of the terrestrial mammal bones that you may see in Dr. Anderson’s collections (Mohl 1986: 81). It is often difficult to distinguish the species that a bone specimen belongs to if it is in fragments (Morrison 1983: 62). However, based on the faunal assemblages from the Clachan site in the Western Arctic, the species of fauna that you may encounter in lab analysis are: ring seal, bearded seal, arctic fox, caribou, canid, various fish, various birds, bowhead whale, bear, walrus, muskox, wolverine, moose, and rodents (Morrison 1983: 62).
The first step in working with bone in the lab is to prepare your workstation. Before handling any lab materials, it is necessary to wash your hands. Next, you will gather all of the materials necessary for basic analysis of faunal remains. The materials you will need are as follows:

- A large plastic or metal tray for laying out faunal materials
- Several plastic sorting trays, both large and small
- A small paintbrush or toothbrush
- A wooden pick
- Several clear plastic Ziploc bags in various sizes
- Paper tags to label the faunal remains being analyzed

Once your workstation is set up and your hands are washed, take a bag full of faunal remains that you will be working on to your workstation. Each bag will contain remains from several different species of fauna. Each bag is from a specific collection unit, so it is important to not mix materials from these different bags. Take one piece of bone fragment out of the bag at a time, and gently clean the fragment with the paintbrush or toothbrush. *Do not scrub the pieces of bone harshly. The goal for cleaning these faunal remains is to gently brush off as much excessive sediment as necessary to be able to identify the type of bone and which species it belongs to. If pieces of bone are breaking off while brushing, or you are creating scrape marks in the bone, you are brushing too hard or in excess. Do not brush off all of the sediment from these bones, as that sediment may be necessary for running tests on the artifact in the future. While cleaning the bones, you may find deep crevasses, such as on vertebra, where sediment is deeply imbedded. To get this sediment out you will likely need to use a wooden pick for gentle removal of the sediment. It is important to use wooden implements versus metal implements because metal could damage the bone, whereas wood is soft and is less likely to damage the bone.
While cleaning the bones, it is good for maintaining good organization to sort the bones into different types (i.e. vertebrae, teeth, mandibles, crania, etc.). You will repeat this process until all of the bones in the bag that you have picked up are cleaned and sorted. Once all of the bones are sorted by type, you will then sort them by species, while still keeping the bones sorted by type. For example, you will keep the ribs together but you will sort the ribs into their species type, i.e. marine ribs, terrestrial ribs, bird ribs, fish ribs, etc.. To separate bone types and species types, you will use the plastic sorting trays. The classes of species that you will sort these bones into are: terrestrial mammals, marine mammals, fish, and birds. *Remember that some of these specimens will have tests run on them in the future so it is important not to handle them too much, as this could contaminate the test sample.

After you have cleaned and sorted all of the faunal remains from one large bag, you will bag these individual specimens in Ziploc bags of an appropriate size. It is extremely important to give each specimen in its individual bag a tag that tells what site the bone is from, who collected the remains in the field, the date it was collected, the catalogue number, the excavation level it was found in, and what the artifact is. You will get all this information either from a previous tag that was made out in the field by the excavator or it could all be written on the bag that you took the faunal remains out of in the first place. Once you have made the tags for each of the bags that you sorted through and placed the tags into the individual bags, you will put these smaller bags into an appropriately labeled artifact box, where they will await further analysis. Then you will start the cleaning and sorting process all over again.

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3.4 Antler

3.5 Shell

3.6 Ivory

3.7 Wood
3.8 Ceramics

Kristin Leonard and Kelsi McDaniel

Northwest Alaskan Ceramics of Hunter Gatherers

The ceramics being analyzed for Dr. Anderson’s lab all come from hunter-gatherers of Northwest Alaska. The people of Alaska did not start manufacturing and using pottery until about 3000-3500 BP, when Siberian pottery technology spread rapidly through Alaska, Canada, and islands off the coast of Southwest Alaska (Anderson et al. 2011). Because of this technology’s rapid spread, it is a fair assumption that ceramics became an integral part of life for people living in the North American Arctic (Anderson et al. 2011). These ceramic vessels and sherds tend to be very thick, coarsely textured, and tend to crumble and exfoliate easily (Charest et al. 2009). Because these ceramic sherds and vessels appear unrefined and rough, people have mistakenly labeled these ceramics as poorly crafted (Frink 2008). However, the production quality of these ceramics reflects a harsh environment and limited resources, rather than poor craftsmanship (Anderson et al. 2011).

Basic Ceramic Analysis:
The First step for basic ceramic analysis is to lay out all of the bags of artifacts, which contain ceramics, from a specific collection. Note that some of these bags will be completely made up of ceramics, and some will contain other artifacts along with the ceramics. The bags of surface collections will need to be sorted the non-ceramic materials will be individually bagged and given an artifact tag. When left with only ceramic artifacts, the analysis process can begin.

All ceramics should be handled with care, as they are extremely fragile. This includes washing hands before handling the ceramic sherds and vessels, and if a ceramic piece needs to be picked up, it should be held over a try covered with foam padding. This way, if piece of ceramic is dropped, it will land on a soft surface and likely retain its shape. If a ceramic piece is dropped on the floor or on the hard surface of a table from high up, it will likely break into many pieces.

All of the information gathered from ceramic analysis will be recorded (legibly) on a spreadsheet, in pen.

Take a single bag that has many ceramic sherds and one at a time, in no particular order, take a single sherd from the bag and assign it a layer and place in its own smaller appropriately sized bag, and write the letter corresponding to the ceramic sherd on it. When going to record this, put the letter after the catalogue number of the original artifact bag. Note: if there are more than 26 sherds in one bag, begin labeling the other sherds AA, BB, etc. until all of the sherds are labeled.

Measure the maximum length of the sherd and record under the column “Max Length.”

Take a second measurement of the length, perpendicular to the Max Length, and label under “Min Length.”

Use a digital Mitutoyo Metric Caliper to measure these lengths. This caliper is extremely accurate but be sure to zero out the caliper at zero before beginning the measuring process.
If both lengths taken from the sherd are <20mm, you will not record its dimensions but instead, you will place all <20mm sherds in a small artifact bag labeled “<20mm”

After recording the dimensions of a sherd, you will weigh it using a scale that measures hundredths of grams, and will record this in the “weight” column.

For each sherd, record its corresponding catalogue number, its accession number, the name of the site, site number from the bag, and the provenience information from the bag which includes: feature, unit, level, and quad.

The next step is to measure the thickness of the individual sherds. Take three thickness measurements using a Mitutoyo Digital Micrometer. *If there are a variety of thicknesses, try to get a representative sample. When measuring the thickness of a rim sherd, always measure >1cm away from the rim. Calculate and record the average thickness of the sherd based on the three measurements taken.

The next step is to record the condition of the sherds. If over half of the external surface is exfoliated, write a 1 meaning yes, exfoliated. If not, write a 2 meaning not exfoliated.

Record the interior surface exfoliation in the same way with the same 1 and 2 labels.

If sherd is fractured (if cracked but not falling apart) write 1. If not then write 2.

If sherd is broken (post deposition, e.g. during handling in the lab) write 1. If not, write 2.

Record the part of the vessel that each sherd belongs to: for body sherds write 1 for rim sherds write 2 for base sherds write 3 for other (e.g. handle) write 4
Measuring Ceramic Sherds

http://interactive.archaeology.org/sagalassos/fieldnotes/wp-content/uploads/2009/07/20090614-20090723-Suburban_Survey_Pottery_Study-Figure_1.jpg

Many of the sherds will be too small to differentiate, but will most likely be from the body if no rim is visible.

Base sherds tend to be very thick, but again it will likely be difficult to tell if it is really a base sherd because there is such a wide variation in overall thickness of ceramic vessels.

Record exterior and interior surface treatment: mark 0 if surface treatment is undetectable due to exfoliation or obscuring residue, mark 1 if there has been surface treatment such as decoration or smoothing, write a two if there is no surface decoration or smoothing.

Identify exterior and interior smoothing of surfaces: 0 if smoothing is undetectable from exfoliation or obscuring reside, write 1 if the surface has not been smoothed, write 2 if the surface has been smoothed but shows no visible brush marks, and write 3 if the surface has been smoothed and brush marks are visible.

Record color of interior and exterior of the sherd using the Munsell Chart

Record internal and external residue: mark 1 if there is residue, mark 2 if there is not.

Record the temper of the sherd: if primary temper is organic, write 2. Note: organic temper is burned up in the ceramic firing process, creating holes in sherd core. If the majority of the temper is mineral, then write 1. Most of these ceramic sherds will contain both types of temper so you will also record a secondary temper type: marking 1 for mineral, and 2 for organic.
Ceramic analysis involves looking at a number of attributes including the kind of clay and temper used to make the vessel, the ware type, the technique used to decorate the object and its color, any trademarks and, if possible the shape, size and type of the vessel (Burke 2009; MVA). A thorough and correctly done analysis can indicate where the object came from, who made it and where the clay to make the vessel was extracted.

Determining the type of clay used to make an object can be very informative. By examining minerals and other inclusions, it is possible to determine where the clay came from (SHA 2007). However, knowledge of local and nonlocal clays, or further field investigations is needed order to determine plausible clay sources. Vessel decoration is also important. There are many different decorative techniques including glazing, embossing, hand painting and stamping, transfer printing, lithographic decals, edge banding, gilding, hair lining, and luster. Certain groups of people tended to have a preferred technique and styles (Burke 2009). Most of these are distinguishable to the naked eye. The area of Alaska where the ceramics are being collected is known to have at least ten different nations by the time it peaked (Anderson et al. 2011). These groups of people are also known to have had trade relationships (Anderson et al. 2011). That means evaluation of the clay used to make a vessel as well as decoration can possibly indicate which groups were trading with each other.
A Rare Whole Vessel

http://interactive.archaeology.org/zominthos/glossary-of-ceramics/

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Mississippi Valley Archaeology


Society for Historical Archaeology


University of Alaska, Museum of the North
3.9 Glass

3.10 Metal

3.11 Other Material Types

4. CATALOGING AND LABELING

4.1 Photography

Emily Rocha

The goal of archaeological photography is to document an artifact for notes and future reference. An artifact may be sent off to a museum, misplaced, or disintegrate over time. A photo will be all that is left to study. A photo helps to preserve the item and document it as part of the archaeological record. This guide will focus on steps and tips for accurate object photography in a lab setting.

The author used a Canon Rebel EOS T31. All references to settings refer to this camera model. All photographs used are from the Nuluk Collection. Dr. Shelby Anderson, of Portland State University, has conducted these excavations in partnership with the National Park Service along the Seward Peninsula in Alaska as part of a study on Climate Change and Archaeology in the Arctic.

Basic terms
Aperture (Av) - Iris of the camera’s eye. Adjust the Av setting on the camera to allow more or less light into the shot.

Depth of Field - Controlled by the aperture, the depth of field is the area of the shot that will be in focus.

Shutter Speed (Tv) - Amount of time the shutter remains open to allow light into the shot. Adjust the Tv setting on the camera to alter the length of time the shutter will be open between clicking the shutter button and the photo being taken.
Setting up the camera
The settings will vary by artifact type and lighting, but it is good to try to get them set to a general setting, like the ones I recommend here, before hanging the camera on the pedestal.

Selecting the aperture: Turn the mode dial to Av. Turn the main dial, located behind the shutter button, to adjust Av settings. You will notice the number changing in the aperture frame of the display screen. Turning to the right increases the F number. The higher the F number, the wider the depth of field, with sharper focus of both foreground and background. Turning the button to the left decreases the number, creating a larger aperture opening. The higher the setting, the slower the shutter speed and visa versa. I recommend setting the Av to 5.6 for smaller items, 11-16 for medium size, and around 22 for larger objects.

Correct depth of field. Av set at 32. Entire photo is in focus. Manuport is shown in clear detail.

Incorrect depth of field. Av set at 4. Only the center of the photo (middle of manuport) is in focus. Notice the sides, and even the scale, are blurry.

Setting the shutter speed: Turn the mode dial to Tv. Turn the main dial to adjust the Tv settings, shown in the image below as 1/125. Turning to the right increases the number, and correspondingly, the shutter speed. This lets less light into the camera and makes the resulting photo darker. Turning the dial to the left decreases the number, brightening the image. The goal of a perfect Tv setting is getting the color to be as true as possible. I recommend setting the Tv to 1/100 - 1/200 depending on the object. The Tv will readjust itself automatically as you focus the camera.
**Hanging the camera**
The camera is hung upside down on the adjustable camera stand. Adjust the LCD screen to face you before attaching the camera to the pedestal. Turn the screw clockwise to tighten the camera, counterclockwise to loosen. Make sure the camera is tightly screwed in. Note that the camera will be taking pictures upside down. Move the camera up and down on the stand by using the knob on the left, tightening the position by turning the knob on the right. Be careful, the stand is spring-loaded.

![Camera setup](image)

**Set the lighting**
Use external lighting to adjust how shadows appear in your frame. The best images use two lights. Place the lights facing each other to minimize shadows on the artifacts. The light on the left side should be in the upper right hand corner; this is where light needs to be coming from in the shot. It is okay for a slight bit of shadowing to appear, so long as it is not overpowering or distorting the artifact.

Set the camera for the type of lighting you will be using. Using the stand lights is called tungsten lighting. Press the WB button and select tungsten lighting. Attaching the reflectors (white umbrellas shown in photo below) reduces shadows cast on the object from the lights. Refer to Box 1 for sample images using various lighting and shadows.

![Lighting setting](image)
BOX 1

What is the big deal about lighting? While digital photographs can easily be edited to appear how one wants them, it is important in archaeological photography to take the best natural picture possible. To achieve this without needing to adjust colors in a photo program later we use a system of lights. This box contains an example of lighting coming from different corners of the shot. Remember, light should be coming from the upper left hand corner. The light stand should be slightly higher than the camera, looking down onto the artifact.

**Photo 1:** Light in the **upper left**, at correct height. Shadows enhance the image, background is equally white, and the artifact looks proportioned properly.

**Photo 2:** Light in the **upper right**, at correct height. Glare on right end of point creating a disproportional appearance.

**Photo 3:** Light in the **lower left**. Right half of the photo is shaded. Shadow at top detracts from showing the top of the point.

**Photo 4:** Light in the **lower right**. Left half of the photo is shaded. Note the shadow at the top.

**Photo 5:** Light in the upper left, yet positioned too low. Shadow cast at end of artifact, making it appear longer than it actually is. Shadows are also in-between the barbs, making

**Photo 6:** Using **two lights**. Having a light on each side of the artifact at correct height minimizes shadows and creates a clear background.
Record the catalog number for the artifact to be photographed into the photo log for the project (See Box 2). Only work with one artifact or bag of artifacts at a time. Photographing each artifact individually will avoid confusion, misplacement, or mixing up of the artifacts.

**Arrange the artifact on the background**

Common backgrounds include black, gray, and white. A white background makes for a nice transition of the photo to a document. Based on the artifact color, choose a background accordingly.

Arrange the artifact so that it is in the center of the view on the camera. If you are photographing multiple images in one shot, arrange them in a row, grouping items of similar sizes. It is sometimes recommended to place the artifact slightly ‘above’ the background. Do this by placing a piece of clay under the object.

Use standard archaeological conventions to arrange the artifact. A few common examples:

Pottery sherds – Take two shots. In the first, arrange with rims to the top. Then prop the sherds up so the rims are straight when viewed from above. Bases are aligned down and body sherds are placed up with wheel marks horizontal (Dorrell 1989: 213).

Points – Arrange points with the tip up. Never have the tip facing down towards the scale.

![Example images: Pottery, Point, Multiple items, Antler Squares](image)

**Placing the scale**

There are different sizes of scales. Use a scale relevant in size to the artifact. You would not use a 10cm scale for an artifact that is only 1cm. Center the scale at the bottom on the artifact, or along the left or right side. Never place the scale so that it is at the top of the final image. This detracts from the main point of the photo: the artifact. The standard scale for object photography is a 10 cm or 5 cm scale. Make sure the unit of measurement shows in the picture.
Taking the picture
After the camera, background, and artifact have been properly set up, it is time to take the shot. It is standard practice to get a picture of the front and back of the artifact. As each artifact is different in size and color, settings may have to be adjusted while shooting, do not forget to record these in the log. Make sure the artifact is centered in the box on the display screen. The camera uses the color it detects in this box to adjust for lighting.

The object needs to appear ‘sharp’ with all details in focus. Use the magnifying buttons on the back of the camera to zoom in on the display screen and see the object in closer detail. Depress the shutter halfway to sharpen the image. You will notice the camera focusing. Continue holding the shutter until the image looks clear and focused. If autofocusing (af) is not working, switch the button on the lens the manual focus (mf). Press the shutter all the way to take the picture. Note that the camera will still shoot the artifact in the original frame of view, even if you are zoomed in on the display screen. Zooming in and depressing the shutter ensures the maximum focus and clarity.

Keeping a photo log as you work
As photos are being taken, a record will be kept of all settings on a photo log. Refer to Box 2 for an example. We recommend setting up a spreadsheet in Google Drive that all members will be able to contribute to. Also print out a hard copy for writing on during the session.

Record the catalog number of the artifact, and include shots taken associated with it. The number used will be the number in the upper right hand corner, i.e. 100-0224. This number will transfer to the computer and appear as: IMG_0224. Also record the Av/Tv settings used on each shot.
Photos should be stored in a folder labeled with the project name that all members can contribute to. When done photographing for the day, plug the camera into the computer and transfer your photos to the folder. This will ensure that photos are not accidentally deleted off the camera.

Transfer the information from the manual log onto the digital log. Note in this log which photos are the final images for an artifact.
Box 2 provides a sample of what a photo log should look like. The log is a description of what each photo is. This is used in correspondence to the digital photo file kept. In the notes section record what type of lighting is used, the view of the shot, and if any editing has been done. Also mark if a photo has been deleted or chosen as the final image. Fill in a hard copy while working, and then fill in the digital record when you are done shooting for the day.

**EXAMPLE: NULUK PHOTOGRAPHY LOG**

<table>
<thead>
<tr>
<th>Photo #</th>
<th>Catalog #</th>
<th>Description</th>
<th>Photographer</th>
<th>Av Settings</th>
<th>Tv Settings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use # auto-generated by camera</td>
<td>BELA XXXXX</td>
<td>Use content description on label</td>
<td>Initial using First Middle Last</td>
<td>Record Av number here</td>
<td>Record Tv number here</td>
<td>Position, edits, lighting, etc.</td>
</tr>
<tr>
<td>100-0263</td>
<td>BELA 55705</td>
<td>Slate Fragment</td>
<td>EMR</td>
<td>10</td>
<td>1/100</td>
<td>Side with catalog number *final</td>
</tr>
<tr>
<td>100-0265</td>
<td>BELA 55705</td>
<td>Slate Fragment</td>
<td>EMR</td>
<td>8</td>
<td>1/100</td>
<td>Unlabeled side *final</td>
</tr>
<tr>
<td>100-0445</td>
<td>BELA 55714</td>
<td>Groundstone Fragment</td>
<td>EMR</td>
<td>5.6</td>
<td>1/60</td>
<td>Side with catalog number -Slightly blurry on left end, retake?</td>
</tr>
<tr>
<td>100-0447</td>
<td>BELA 55714</td>
<td>Groundstone Fragment</td>
<td>EMR</td>
<td>5.6</td>
<td>1/60</td>
<td>Unlabeled *final</td>
</tr>
<tr>
<td>100-0450</td>
<td>BELA 55714</td>
<td>Groundstone Fragment</td>
<td>EMR</td>
<td>5.6</td>
<td>1/80</td>
<td>Side with catalog number</td>
</tr>
<tr>
<td>100-0451</td>
<td>BELA 55714</td>
<td>Groundstone Fragment</td>
<td>EMR</td>
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<td>1/125</td>
<td>Side with catalog number *final</td>
</tr>
<tr>
<td>100-0442</td>
<td>BELA 55727</td>
<td>Ivory Handle</td>
<td>EMR</td>
<td>5.6</td>
<td>1/100</td>
<td>Side with catalog number *final</td>
</tr>
<tr>
<td>100-0438</td>
<td>BELA 55727</td>
<td>Ivory Handle</td>
<td>EMR</td>
<td>13</td>
<td>1/80</td>
<td>Unlabeled -Too much shine on right end?</td>
</tr>
<tr>
<td>100-0439</td>
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<td>Ivory Handle</td>
<td>EMR</td>
<td>5.6</td>
<td>1/100</td>
<td>Unlabeled -Less shine?</td>
</tr>
</tbody>
</table>
Suggested Resources
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Connolly, David


Dorrell, Peter


Florida Museum of Natural History

<http://www.flmnh.ufl.edu/sflarch/archaeological_collections.htm>

Schlitz, Matt


Photographs used in guide
On cover, left to right: Groundstone fragment, modified antler, carved ivory

Page 2: Manuport

Page 5, Box 1: Barbed ivory point

Page 6: Pottery sherd (Cape Krusenstern Collection), biface tip, antler squares

Page 7: Modified antler

Page 8, featured in display screen: Modified seal bone
Managing Digital Photographs

4.2 Illustration

Dealing with Archives and Other “Artifacts”

Hi, if any one is interested in writing about this topic, I (Emily Rocha) have come across a few websites in my research on archival supplies:

Digital - See section 22 on Conserve O Grams:  
http://www.nps.gov/museum/publications/conserveogram/cons_toc.html


4.3 Digital

4.4 Paper

4.5 Preparing for Transport and Curation

4.6 Archival Supplies: Excavating with Storage in Mind

Emily Rocha and Alyssa Kudray

Archival materials may be the last thing on your mind as you set out into the field to spend your summer excavating new and interesting materials. However, thinking about how discoveries will be archived and curated are an important part of the research design. The archaeological record is a nonrenewable resource. Once an object has been disturbed and removed from its original context there is no going back. As an archaeologist, it is your responsibility to ensure objects will be properly cared for and stored so that they will be in good condition for future researchers as well as for public display. The following essay will discuss archival supplies and their uses.

First let us cover materials which were commonly used in the past. The Society for Historical Archaeology has a chart on their website that compares non-archival materials previously used to store archaeological objects and what should be used instead. Some of these may sound familiar, especially if you have worked or spent time in a lab dealing with older collections.

Rubber bands – Remember that time you pulled out an old photo collection and noticed the rubber band had snapped? These degrade easily and leave residue on objects, making them not ideal to secure anything for a long period of time. They can also cut into or bend flat materials, such as paper.

Newspaper – If you look at your fingers after reading a newspaper they will most likely look grey or black. This is because newsprint easily rubs off and transfers onto objects it comes in contact with. Newspapers also contain a high amount of lignin (an organic found in the cell walls of plants). This makes them highly acidic. As you will learn in the next section, acid is a substance to avoid at all costs...
during the archival process. Unfortunately it is in a large number of the materials that have been used in the past by archaeologists.

Tape – Tape is another material that emits acidic byproducts overtime. It can also leave sticky residue on materials if it’s used to hold items together or attach labels. If used to hold materials together or to secure something there is also a chance that you could damage an artifact when removing tape from it.

Corrugated boxes/Shoe boxes – These are up there with newspaper and tape in the acidic leakage category. When excavating and transporting materials in cardboard boxes they can also disintegrate rapidly when exposed to moisture. When artifacts are stored in things such as shoe boxes it could be difficult to differentiate an important collection from an old pair of shoes.

Wooden boxes/cabinets – While it could be easy to assume that storing things in wood would be a good alternative you would find drawbacks there too. These cabinets and boxes can leech acetic acid and formaldehyde which can degrade artifacts.

After learning that these common, and affordable, household items have hidden negatives and should not be used to preserve one’s precious summer finds it’s important to know the good storage options which are out there. To avoid being discredited, made fun of in a hundred years when students pull out your research, or worse rendering a collection unusable follow a few of the guidelines below.

The NPS Museum Handbook (2001) and The Society for Historic Archaeology (2006) outline recommended storage materials. I have selected a few common materials to discuss below.

Resealable polyethylene bags - Polyethylene is a tough, light, synthetic material used for plastic packaging. This is an item that is a must have in the field as well as in the lab. Ziploc© bags qualify! Bags are handy for putting like objects together in the field, although from personal experience I recommended against labeling them solely with marker. Marker can wear off during transport and storage leaving you wondering what you put in the bag and where it came from months later when it is time to process the collection in the lab. In addition to marking the outside of the bag with provenience information put a label inside of the bag as well as a backup set of information. Remember that without proper context those artifacts will have no meaning for future researchers. Archaeological storage bags are sold in multiple sizes. Image 1 is from Hollinger Metal Edge an online retailer for archival products. They are also sold in a variety of thicknesses. While in the field it is ok to use a thinner quality plastic bag, which can help to save on costs. However when sorting in the lab make sure to use the thicker archival quality bags.
Acid free tissue & unbleached muslin - These are great materials to use in place of newspaper and can be used to help cushion and pack artifacts. On a field trip to the Portland Art Museum, I learned that tissue is useful in storing baskets. Packing tissue inside the basket helps it to keep its shape. Image 2 below shows a basket from the online collections page from the Portland Art Museum. This 1900 Chinook basket would not be in such good condition if it had not been properly stored. Another option is to use unbleached muslin cloth. This cloth can also be used to wrap objects and is good for cushioning delicate objects as it’s softer than tissue paper.

Acid-free corrugated boxes, paper, etc. - Along with acid free tissue, all archival products should be acid free. According to a National Park Service Conserve O Gram from July 1995, any paper with a pH level of 7 or higher is considered acid-free. In addition to acid-free, the Park Service also recommends using unbuffered paper. It is also easy to find acid free cardboard to store things in as needed.

Twine – Instead of using tape or rubber bands to secure objects a good alternative is binding things with undyed/unbleached cotton twine. This will eliminate the possible damage of artifacts and degrades much slower.

Metal/plastic storage – A good alternative for transportation is to pack artifacts into plastic bins. These will hold up well in all weather and protect artifacts without the corrosive gasses found in cardboard and wood. These boxes can also be used for short term storage of artifacts in the lab. For longer term storage it is good to get museum quality metal cabinets for your collection. This will provide a long term, safe, locked space for artifacts.

Remember, using these museum quality acid-free products help preserve your artifacts so that they last for generations. It’s important to spend time searching online for the products that you will need and you will find many sites that sell archival materials. It is also a good idea to work material costs into your research design and have materials on hand before going into the field, and waiting in the lab for when you return. Happy archiving!
Recommended & Cited sources

Brady, Colleen, et al.

http://www.sha.org/research/conservation_facts/process.cfm#L

This website has 16 sections of information that go way beyond the scope I discussed. The authors have written about labeling artifacts for museum quality, cleaning artifacts, as well as many more helpful topics. I referenced this page when addressing previous ways of caring for archaeological objects.

Muros, Vanessa

2011 Caring for Artifacts From the Field to the Lab: Packing and Storage of Archaeological Collections. http://www.academia.edu/

This link will bring you to a PowerPoint that Vanessa Muros, a conservation specialist at UCLA, gave at a workshop hosted by the Society for California Archaeology annual meeting in March 2011.

National Park Service

http://www.nps.gov/museum/publications/conserveogram/cons_toc.html

The NPS Conserve O Gram webpage is a wealth of information for many conservation questions surrounding archaeology and museums. Conserve O Gram 4/9 from July 1995 was referenced in my brief discussion on paper.

http://www.nps.gov/museum/publications/MHI/MHI.pdf

The 2001 NPS museum handbook was referenced in my discussion. It has since been updated. This handbook is a great reference point for any archival question.

2013 Managing Archaeological Collections  
http://www.nps.gov/archeology/collections/table/frame5.htm

The NPS has a ten-step distance learning course located on their website. Section 8, curation prior to the field, and Section 9, curation in the field and lab, are especially relevant to this topic.

Rodgers, B.A.

Reference this book for information on conservation of specific types of artifacts.

**Photos**

Image 1: Hollinger Metal Edge,

Image 2: Portland Art Museum,
http://www.portlandartmuseum.us/mwebcgi/mweb.exe?request=record;id=32939;type=101

5. **Glossary**

6. **Bibliography**

7. **Other Resources**

8. **Other?**

9. **Appendices**

10. **Lab Forms**