



The Mobile Museum: An Archaeology Experience supplemental lessons are designed to be used in your classroom before or after the Mobile Museum residency at your school. These grade-appropriate lesson plans will provide your students with a deeper understanding of Native Peoples of Southern California through the science of archaeology.

Table of Contents

Neighborhood Survey	1
Classification: Natural Resources	5
Mystery Artifact Question Game	8
Close Looking	12
Measure Up	15
Storytelling as Cultural Transmission	17
Artifacts in Context: Understanding Daily Life at a Coastal Village Site	20
Edible Archaeology	27
Regions and Resources of California	30
Evidence of Daily Life from Long Ago	34
Nature Journal: Chia from seed to plant	38
Sifting for clues about food	42



Neighborhood Survey

Archaeology Experience Pre-visit Lesson

Time needed:

40 minutes

Standards:

CA State H-SS 3.3.1;
3.3.2
NGSS 4-ESS1-1; 4-
ESS2.A; 4-ESS2.E; 4-
ESS2-1; 5-ESS2-1
CCSS ELA RI.3.1;
W.3-5.1.A-D; W.3-5.7-
8 W.4.7-9

Materials:

Small paper bags

image of Chumash
Basketry Jar

Neighborhood
Objects Worksheet

student chart to write
observations and
inferences

tape

graphic organizer for
whole group
discussion

Thinking like archaeologists, students survey their environment and consider what the objects around us might reflect about daily life.

Objective

Students will be able to sort and classify objects.

Students will be able to make scientific observations of objects and make inferences based on these observations.

Goals

To make students more aware of objects in their community by looking at them through the lens of an archaeologist.

Students continue hands-on exploration of objects in their own immediate surroundings after their experience with archaeological artifacts on the Mobile Museum.

The Big Question

Can we see connections between our practice and the practice of peoples of the past to assist in understanding people from long ago? In what ways are objects important in our own culture and what is the evidence of their significance?

Background Information

Archaeologists often implement a survey before undertaking an excavation. One kind of survey involves archaeologists walking a grid, or transect, and recording their findings at regular intervals, say every 5 meters. This method has many advantages: it is not invasive, it allows archaeologists to cover a lot of ground and it can sketch a picture of activities that may have happened in the region in the past. The findings can also help determine if and where excavations should take place. In the Mobile Museum site, LAC-602, student archaeologists do a modified survey taking in all the details of the site. Most importantly, they look for clues that people might have been at the site in the past. Rock art on the walls and hints of

artifacts from long ago serve as evidence that LAC-602 would be a good place to excavate. Surveying also serves as a good reminder to students to use their eyes before they use their hands since archaeological sites are destroyed by excavation.

Focus Object

Chumash Basketry Jar (Catalog Number: A.5697.47-17)

<http://collections.nhm.org/anthropology/Display.php?irn=922088&QueryPage=%2Fanthropology%2F&BackRef=ResultsList.php>.

Grasses and reeds were very important to Chumash peoples of the past and continue to be important to basket weavers today. Like the plastic of today, plant fibers may be woven into many different forms for many different functions. From the traditional house, called an 'Ap, to clothing and baskets, items made of reeds and grasses were woven into the fabric of everyday life of Chumash peoples. Many items made of plants do not survive in the archaeological record, however, sometimes conditions such as xeric, or extremely dry, environments can allow for the preservation of plants items over long periods of time. Other baskets do survive over time, being passed down from generation after generation. The artistry of basket weaving also survives over time having been passed down from skilled people long ago to their descendants today. Contemporary Chumash peoples continue to collect reeds and grasses to transform into works of art.

Sequence of Learning Activities

Introduction:

- Students observe a photograph of the Chumash Basketry Jar. Ask them to pair share with a partner what comes to mind when they see this image. Prompt students on what they observe, any connections they have and what they infer about the people who created and used this object.
- Introduce idea that there are objects in our everyday lives that tell a story about how we live.
- Discuss how archaeologists recover artifacts from people long ago to learn more about the way they lived. Mostly we think of archaeologist digging for artifact but often before they dig they survey they area they are interested in, walking the grounds and looking for clues on the surface before they break ground.

Survey:

- Choose an area outside on the grounds where you can find items that have been left behind.
- Students will act as archaeologists on the school grounds collecting objects that they find.
- Take 5-10 minutes for students to survey the grounds collecting finds in their paper bags.

Sort and Classify:

- Once students return to class, in pairs they sort objects into "natural" and "human made" categories.
- Students further classify the objects they found based on the similarities between them. Do some objects serve similar purposes or have common properties? Might they be sorted by color, shape, material?
- Students share their objects with the class.

Hypothesize:

- Students consider what their found objects reveal about the people who made and used them by making inferences. An Inference is an explanation based on gathered data, or a hypothesis based on evidence. You can also provide sentence frames for students such as "I observe _____ about my object, therefore I infer that this object _____".
- For example: if I found a candy wrapper, I might say "I observe that this object is made of plastic material, it has text on it, and it is brightly colored. I infer that this object came from a society that can read and that the society likes sweet food."

- Once students understand the difference between observation and inference, they will be analyzing their own collected objects and completing an archeological chart on these items (See worksheet). They will tape down an object on the worksheet and then fill out the chart. The chart asks them to answer how they classified the object, what they observed using their senses, and what they can infer from their observations.

Synthesize:

- As a class, discuss some of the objects discovered and fill out a class chart about how they classified the object, what they observed, and what they inferred.

Assessment

There are multiple times students will be informally and formally assessed during this activity. The pair share time is a great informal assessment to understand students' prior knowledge. The worksheet filled out is the formal data to see if students can classify and understand difference between observation and inferences. The optional worksheet can also serve as one final formal assessment.

Extensions/Follow Up

As a class students create a large map marking where their finds are from. Working in pairs, students with adjacent finds present evidence based arguments about the activities that may have been going on based on their finds.

Students write a "museum label" for their find detailing when and how the object was found and what significance it has for the culture who created and used it based on their observations and inferences.

Students write an informative text about the people who live at the site they surveyed utilizing the class observations and inferences chart. In a second portion they consider what is missing from their cultural profile from the limitation of finds. Post-Mobile Museum students revisit their writing assignments and consider what limitations their finds on the Mobile Museum had on creating a complete profile of Chumash culture.

Accommodations/Adaptations

Provide English Language Learners with sentence frames to support vocabulary. The visual examples are a great resource to understand directions and differences between observations and inferences.

If students are unable to explore campus, you can provide a bag already filled with common objects found in the school or have students do a survey of the classroom space instead.

Additional Resources

Anderson, M. Kat. *Tending the Wild: Native American Knowledge and the Management of California's Natural Resources*. Berkeley: University of California Press, 2006.

*Duke, Kate. *Archaeologists Dig for Clues*. New York: Harper Collins Publishers, 1997.

Hudson, Travis and Thomas C. Blackburn. *The Material Culture of the Chumash Interaction Sphere*. 5 vols. Los Altos: Ballena Press, 1986.

Gamble, Lynn H. *The Chumash World at European Contact: Power, Trade, and Feasting Among Complex Hunter-Gatherers*. Berkeley and Los Angeles: University of California Press, 2008.

Sonneborn, Liz. *Native American Histories: The Chumash*. Minneapolis: Lerner Publications Company, 2007.

Name: _____

Date: _____

Neighborhood Objects

Directions: Tape an object you found in the left column. Then fill out the rest of chart that classifies the object, notes observed properties, and makes inferences based on observations.

Object	Classification	Observations	Inferences
<p>Example:</p> 	<p>Manmade; container</p>	<p>Circular, patterns around artifact, made with plant material, colorful</p>	<p>This society needed to store items. This may make it easier to transport materials. Society found decorating it with patterns to be important.</p>



Classification: Natural Resources

Archaeology Experience Pre-visit Lesson

Time needed:

40 minutes

Standards:

CA State H-SS 3.1.1, 3.1.2, 3.2.1, 3.2.2, 4.1.3, 4.1.4, 4.1.5, 4.2.1

CCSS ELA SL.3.1, SL.4.1, SL.5.1

Materials:

Everyday objects in the classroom –the contents of a backpack. You may prepare a simulation of a typical student backpack or ask to borrow backpacks from students for the activity.

Alternatives could be the contents of a desk, contents of a purse, contents of the garbage (!), a breakfast tray (not just the foods but also the containers and utensils, etc.).

Students make connections between daily life and nature by tracing the roots of everyday objects back to natural resources.

Objective

Students sort everyday objects into categories based on what they are made of – animal, plant, rock/mineral.

The class creates a thinking map of natural resources and objects in the classroom.

Goals

Students see the relationship between everyday objects and the natural resources from which they're derived.

The Big Question

In world surrounded by industrially-made objects are we still able to see nature?

What is our relationship to the natural world around us?

Background Information

Natural resources are an important part of what makes Southern California so special. The richness and diversity of natural resources in California have helped build the success of many peoples here from the Chumash and Tongva to the gold miners to the farmers of the central coast today.

Today, with many of the objects in students' lives being processed and made outside the home it can be difficult to feel our connection with nature and the resources that nature provides. By exploring our relationship to natural resources, student will be prepared for complex discussions that arise during the Mobile Museum program. As a part of the learning activities, students are asked about the relationship between natural resources and artifacts. Students' own research questions often center around this topic as well with examples such as – why did Chumash people like to live at the coast? What did they do with animals? What did Chumash people like to eat? How did they make tools? Pursuing the answers to the questions is enriched by a deeper understanding of natural resources.

Focus Object

Digging weight



The donut shaped digging weight that students excavate on the mobile museum is made of a material called soapstone, or steatite, an important natural resource that is found on the Channel Island of Catalina. The island is an area where Tongva peoples have lived and the Tongva name for Catalina is *Pimu*. Interestingly, Chumash peoples called the island *Huya* which means soapstone. The presence of this natural material as well as artifacts made from it at many Chumash sites highlights the close relationship between these two coastal communities of Southern California.¹ Many of the artifacts students will explore during the Mobile Museum program are made of this natural resource.

These artifacts in the matching activity are made of some of the most prominently used natural materials – rock (soapstone or steatite, basalt and asphaltum), bone (fish and deer) and shell (abalone and olivella).

Sequence of Learning Activities

Set up:

- Divide students into small groups.

Activity:

- Students unpack the backpacks and categorize the contents based on their own categories.
- Students share their rationale for organization with other groups.
- Facilitate discussion of categories
- Instruct students to reorganize the contents based on natural resources – animal, plant, rock/mineral.
- Create thinking map recording all of their finds
- Discussion of those that are difficult to categorize

Conclusions:

- Pair share – what can we learn by looking at natural resources? What do they say about us? What might they reflect about people of the past?
- Archaeology connection – categorization and sorting is one of the first steps of an archaeologist

Assessment

Students are informally assessed as they categorize the contents of their backpacks.

Extensions/Follow Up

¹ Richard B. Applegate, "Chumash Placenames," *The Journal of California Anthropology*, 1(2) (1974): 192.

Locavore? What does the origin of a natural resource tell us about the people using it? What are some advantages of purchasing items that are local?

Argument/Civil Discussion: Chumash peoples thrived in their resource rich locale of Southern California but they also had an extensive trade network. Were they locavores or importers/exporters?

Post-visit activity: Archaeologists uncover our classroom! Using what students have learned about what survives over time, make a grid (possibly using tiles on the floor) of what archaeologists would be likely to find if they uncovered your classroom in 500 years. (SEE: Artifacts in context mapping activity)

Accommodations/Adaptations

Beginning students - Students start classifying items in their pencil boxes. Erasers, colored pencils or markers, pencils, all in their own piles.

Additional Resources

Anderson, M. Kat. *Tending the Wild: Native American Knowledge and the Management of California's Natural Resources*. Berkeley: University of California Press, 2006

Applegate, Richard B. "Chumash Placenames." *The Journal of California Anthropology*. 1(2) (1974): 187-205.

Gamble, Lynn H. "Chapter 2: The Environment and Its Management." in *The Chumash World at European Contact: Power, Trade, and Feasting Among Complex Hunter-Gatherers*, 17-36. Berkeley and Los Angeles: University of California Press, 2008.

King, Chester. *Overview of the History of American Indians in the Santa Monica Mountains*. Draft manuscript.



Mystery Artifact Question Game

Archaeology Experience Pre-visit Lesson

Time needed:

40 minutes

Standards:

CA State H-SS 3.1.1, 3.1.2, 3.2.1, 3.2.2, 4.1.3, 4.1.4, 4.1.5, 4.2.1
CCSS ELA SL.3-5.1

Materials:

Mystery Artifact game sheet

PowerPoint with images (and/or Archaeology Times)

In this game, student inquiry leads to the identity of unknown artifacts.

Objective

Students ask a series of who, what, where, when, why and how questions to gain a greater understanding about artifacts.

Students will use the data/answers from their teammates to identify what artifact they are.

Students will learn about five artifacts created by Chumash peoples.

Students will explore being archaeologists by asking questions, gathering data and making conclusions.

Goals

Students will develop critical thinking questions to help them identify artifacts and think about the people who made and used them and the circumstances in which they were found.

The Big Question

How might our questions lead us to gaining knowledge about unknown objects?

How can our own interests match with our learning and understanding of the natural and cultural world? (Student scientist driven research)

Background Information

Archaeologists are scientists who study people of the past through the things they left behind. Anything made or used by people who lived in the past is considered to be an artifact. Archaeologists collect artifacts while on digs and often bring them back to a lab to study more closely. Students will be taking on the role of an Archaeologist while participating in the Mobile Museum program. In the field, we explore the questions “what made the site a good place to live?” and also “is there evidence of trade with Tongva peoples?” In our lab, students’ questions guide the research that they conduct. Frequently, they ask about the food Chumash peoples ate, the natural resources of different regions, and the tools that Chumash peoples made.

This activity provides practice in asking the most basic of questions – the foundations of scientific inquiry. Students are invited to ask questions to learn more about unknown artifacts and to piece together the answers to these questions in order to identify an unknown artifact and understand more about the people who made it and the resources they utilized. Group discussion of all the unknown artifacts and the questions asked to understand them will lay a great foundation for curious minds during the program (Scaffolding).

Artifacts from this activity are featured in the *Archaeology Times* and also in the dig on the Mobile Museum as well as the crates from different Chumash sites. A Chumash man named Kitfox made these replica artifacts to the specifications of those found at real archaeological sites using authentic materials and techniques.

N.B. Introducing the artifacts to the students before the activity will be a key to their success.

Focus Object

Deer Bone Awl



The awl is an artifact featured twice in the program in two differing forms, once in the H'elxman crate and also in the Green trench on the Mobile Museum. In an ethnographic account recorded by Chumash linguist and scholar John P. Harrington, Fernando Librado describes that awls were used for basket making but goes on to explain that they could also be used by shoemakers to drill through or perforate the leather.² In an account from 1769, Pedro Fages wrote that “the awl, used by the women, is a bone ... from the foreleg, next to the shinbone of the deer.”³ Harrington recounts that the awl handles were often wrapped in leather or covered in asphaltum.⁴ Good discussion points could include how we know about the tool when much of what it made does not survive overtime (leather, baskets). Archaeology is only one way that we know about peoples of the past.

Sequence of Learning Activities

Set up:

- Introduce vocabulary to students.
- Use Powerpoint of images to familiarize students with different kinds of artifacts.
Alternatively use the Archaeology Times.
- Model good questions.

Game:

- Divide students into teams of four.
- Tape one unknown artifact on the back of each student (see worksheet).
- Explain the rules – students take turns asking one another questions to try to identify the artifacts on their own backs.
- Working within their teams of four, students ask one another questions about their artifacts until they are able to identify them.

Follow up:

- Reorganize students by artifact type.

² Travis Hudson and Thomas C. Blackburn. “Volume 1: Food Procurement and Transportation,” in *The Material Culture of the Chumash Interaction Sphere*. (Los Altos: Ballena Press, 1986), 244.

³ Fages led the shipborn portion of the Gaspar de Portola expedition. As recounted in Hudson and Blackburn, “*The Material Culture of the Chumash Interaction Sphere*,” 244.

⁴ Harrington (1942:13) as quoted in Hudson and Blackburn, “*The Material Culture of the Chumash Interaction Sphere*,” 244.

- In their new artifact groups, students share the questions they asked to reach their conclusions.
- With the class share what kinds of questions were asked. Students reflect on the role of their questions in acquiring new information about artifacts and learning their identities.

Assessment

There are multiple times students will be informally and formally assessed during this activity.

Extensions/Follow Up

Creative writing:

Students write a story about their artifact, assuming its point of view. As a follow up students might ponder which of our belongings could be a mystery to archaeologists of the future?

Accommodations/Adaptations

Play the game “Animal, Mineral, Vegetable?” to get students warmed up and thinking about how we learn through questioning.

Students may work in pairs to identify an unknown artifact – as pairs they question other teams about their identity and use.

For a shorter lesson, students are divided into teams of three to identify three unknown artifacts rather than five.

Additional Resources

*Duke, Kate. *Archaeologists Dig for Clues*. New York: Harper Collins Publishers, 1997.

Gamble, Lynn H. *The Chumash World at European Contact: Power, Trade, and Feasting Among Complex Hunter-Gatherers*. Berkeley and Los Angeles: University of California Press, 2008.

Hudson, Travis and Thomas C. Blackburn. *The Material Culture of the Chumash Interaction Sphere*. 5 vols. Los Altos: Ballena Press, 1986.

Mystery Artifact Game Sheet



Who made it: _____
 What is it: _____
 Where was it found: _____
 When was it made: _____
 Why was it made: _____
 How was it used: _____



Who made it: _____
 What is it: _____
 Where was it found: _____
 When was it made: _____
 Why was it made: _____
 How was it used: _____



Who made it: _____
 What is it: _____
 Where was it found: _____
 When was it made: _____
 Why was it made: _____
 How was it used: _____



Who made it: _____
 What is it: _____
 Where was it found: _____
 When was it made: _____
 Why was it made: _____
 How was it used: _____



Who made it: _____
 What is it: _____
 Where was it found: _____
 When was it made: _____
 Why was it made: _____
 How was it used: _____

Procedure

- Each student in the team should have a different artifact taped to his/her back (omit one so they can't rule out which is theirs)
- Students ask one another yes/no questions such as: "Am I made of rock?" or "Am I used to grind?" to try to identify their artifact
- Students should refrain from asking "Am I a fish hook?" to prolong the game
- Students play until all have figured out what artifact they are

From left to right, top to bottom:

Deer bone awl, basalt mortar and pestle, abalone fish hook, soapstone digging weight, fish bone earrings



Close Looking

Archaeology Experience Pre-visit Lesson

Time needed:
30 minutes

Standards:
CA State H-SS
4.1.5
CCSS ELA RI.3.3;
SL.3-5.1

Materials:
Paper (1 per student)

pencils (1 per student)

apples (three different similarly colored species e.g. Gala, Pink Lady, McIntosh -1 per student)

Close observations help archaeologists record their finds accurately. Noticing the smallest and subtlest of details may help us understand more of the who, what, where, when, why and how of artifacts and the people who made them.

Objective

Students will utilize drawing and describing exercises to increase their observation skills.

Students will hone their observation skills by taking on tasks with increasing levels of difficulty and mark their improvement by comparing their results with other students.

Goals

Through a close looking activity students will gain a greater appreciation for objects and notice nuances between similar objects.

The Big Question

Why are small differences important to Archaeologists? How can our observations improve our interpretations and increase our understanding of peoples of the past?

Background Information

Slowing down and being particularly observant and careful are a big part of archaeology. Before a shovel ever hits dirt, archaeologists have made and recorded many, many observations. On a daily basis archaeologists sketch the spaces where they dig, or trenches. This visual record becomes a part of the recording of the site and can be referenced by future archaeologists to give context to the finds. The finds, too, are also closely studied and oftentimes drawn and photographed. One reason for such close looking and observation is to record the site and finds accurately but another is to foster greater understanding on the part of the archaeologists. Often, it's through close looking and intimate, first-hand knowledge of artifacts that archaeologists are able to distinguish

different hands (or different makers), subtle differences which can represent larger trends (e.g. the use of larger ornamentation over time), as well as close knowledge of materials (e.g. rocks that are from local sources or far away). Close looking can directly lead to identification as well as advances in interpretation and understanding.

During the Mobile Museum program, while excavating LAC-602 and studying the finds, students will utilize close looking along with sketching to get to know their finds. This activity along with description and measurement will give students the tools they need to identify their finds and interpret themes in their trenches.

Focus Object

Fish Hook Blanks from the NHM collection

<http://collections.nhm.org/anthropology/Display.php?irn=2135&QueryPage=%2Fanthropology%2F&BackRef=ResultsList.php>

The fish hook used by Chumash peoples has a familiar shape – today’s metal hooks are quite reminiscent of the shape. Circular hooks are fairly easily identified by archaeologists, student and pro alike! Discovering an artifact’s identity is only half the battle for archaeologists – if artifacts were merely identified, think of all the information we might overlook. Size, material and style are important to acknowledge along the path toward interpretation of material culture. Like fishers today, Chumash fishers of the past would utilize different sized hooks for different sized fishes.⁵ Chumash peoples also utilized different kinds of shells to make their hooks— haliotis, mussel shell, as well as abalone shell. Before shell became popular people used bone – by understanding that people used different natural resources over time we can see that looking closely at materials might help with dating an artifact.⁶ Looking closely, archaeologists may even be able to recognize the hand of an individual maker!

Sequence of Learning Activities

Set up:

- Divide students into groups of three.
- Give each group one apple.

Activity:

- Quick write – 90 seconds timed. Students spend 90 seconds observing an apple and writing a description.
- Students must try to identify apples based on other groups’ descriptions (highly improbable – on purpose).
- Students revisit their apples and do a detailed sketch.
- After sketching students write a more detailed description.
- Students share their work and others try to identify based on detailed drawings and descriptions.

Discussion:

- Facilitated discussion of why drawings and descriptions need to be specific. What could nuances tell us?
- How does this apply to archaeology – what might subtle differences in tools tell us? Why do archaeologists need to record details correctly? Brainstorm – what about larger arrowheads vs. smaller arrowheads? Larger earrings vs. smaller earrings? What might be some reasons why?

Assessment

Students are informally assessed when they are identifying the drawings based on the description.

⁵ Travis Hudson and Thomas C. Blackburn. “Volume 1: Food Procurement and Transportation,” in *The Material Culture of the Chumash Interaction Sphere*. (Los Altos: Ballena Press, 1986), 174.

Extensions/Follow Up

One student describes an object and a partner makes a drawing based on the description. The pair compares the two and adds details to the description if needed. Wrap up with a large group discussion centered on why detailed descriptions and drawings are important to scientists recording their observations.

Students research careers that involve the arts and sciences and present them to the class. Examples include an exhibit designer, scientific illustrator, and taxidermist.

Accommodations/Adaptations

Students try writing descriptions based on touch rather than sight. Students practice using new vocabulary words as part of the description writing process.

Additional Resources

Hudson, Travis and Thomas C. Blackburn. "Volume 1: Food Procurement and Transportation." in *The Material Culture of the Chumash Interaction Sphere*, Los Altos: Ballena Press, 1986.



Measure Up

Archaeology Experience Pre-visit Lesson

Time needed:

30 minutes

Standards:

CCSS ELA RI.3.3;
W.4.7; W.4.8; W.5.7
CCSS Mathematics
MP.2; MP.4; MP.5;
3.MD.B.4
NGSS 5-PS1-3

Materials:

Rulers (1 for every
two students)

pencils (standard
sized used wooden –
one for each student)

erasers (standard
sized used pink
erasers – 1 for every
two students)

notebooks (standard
sized 8.5"x11" inch
used notebooks – 1
for every two
students)

scales if available

Students gain experience using rulers and then use measurements to form hypotheses and draw conclusions about everyday objects and the people who used them.

Objective

Students will successfully use rulers and measure length and width in centimeters.

Students will compare their data to draw conclusions about everyday objects.

Goals

Students gain experience using rulers and scales and interpreting data.

The Big Question

Why are measurements important? How can we interpret the data we collect and how can it shape our hypotheses?

Background Information

Archaeologists carefully record every detail about artifacts they find. In the field, the exact location of an artifact is recorded before it ever leaves the ground. A grid map of an excavation shows all the finds in context of one another and major features. Once back in the lab, artifacts are carefully measured and weighed. Archaeologists interpret this data to learn more about the artifacts and the people who made them.

On the Mobile Museum, students measure and weigh their finds in addition to mapping them. Identifying the artifacts and thinking about them in relationship to the other objects in their trenches allows students to draw conclusions from their observations and the data they collect.

Focus Object

Mortar and Pestle

<http://collections.nhm.org/anthropology/Display.php?irn=924826&QueryPage=%2Fanthropology%2F&BackRef=ResultsList.php>

Mortars and pestles are grinding devices used both in the past as well as today. The cylindrical shape of a pestle tells us about its function but can also help distinguish it from other items that could be similar in shape, size and material. We frequently think of pestles as half of a pair along with a bowl shaped mortar. In the past, a mortar could also be a part of the landscape and fashioned in the bedrock right near oak trees that provided the acorns to grind. A pestle out of context – possibly found near a bedrock mortar that went unrecognized – could be mistaken for other objects with cylindrical shapes like cooking stones, manos (another grinding implement), etc. Measurements are an important way that Archaeologists are able to identify what it is that they have uncovered and distinguish between similar artifacts. During our excavation, students will utilize measurements as one step to help them to identify the artifacts that they excavate.

Sequence of Learning Activities

Warm up: Getting started using a ruler

- Students play a warm up game to get used to using a ruler, measuring in cm and distinguishing between length and width
- Calling out everyday items as students to measure e.g. “Who can find something ___ cm wide?”:
 - A piece of paper
 - A notebook
 - A pencil box
 - Other items on their desks

Measuring:

- Guide students through measuring the pencil, eraser and notebook modeling use of vocabulary length, width, centimeter
- Advanced – students measure the depth of a notebook

Conclusions:

- Facilitating sharing data and making hypotheses
 - Who has the shortest pencil?
 - Who has the biggest eraser?
 - Who has the notebook with the greatest depth?
 - What are some ways we might interpret this data?

Assessment

Students are informally assessed as they make their measurements and interpret that data.

Extensions/Follow Up

Students design their own measuring experiments based on questions they develop.

Students write a persuasive piece based on the data they record. Students build an argument about the object they are measuring based on the evidence they measure, weigh and record. e.g. I must be the smartest student in the class because my pencil is the longest, my notebook is the shortest and, most importantly, my eraser is the biggest.

Accommodations/Adaptations

Students who are just learning to measure may use inches and ounces.

Additional Resources

*Duke, Kate. *Archaeologists Dig for Clues*. New York: Harper Collins Publishers, 1997.



Storytelling as Cultural Transmission

Archaeology Experience Pre-visit Lesson

Time needed:

Six 45-60 minute sessions

Standards:

CCSS ELA:
 RL.3.2; W.3-5.1.A-D;
 W.3-5.7-8
 VAPA Theater:
 3.HCC.3.0; 3.HCC.3.1;
 3.HCC.3.2; 4.HCC.3.0;
 4.HCC.3.1; 5.HCC.3.0;
 5.HCC.3.2

Materials:

Paper

 Pencils, colored pencils, crayons or markers

Students explore the tradition of storytelling in Chumash culture. Students explore connections across cultures by share stories from their own families and communities.

Objective

Students will compare and contrast stories from their own culture with stories of Chumash origins.

Goals

Students will gain an appreciation for the Chumash storytelling tradition and language by reading and analyzing *The Sugar Bear Story* by Mary J. Yee and Erenestine Ygnacio-De Soto.

Students will gain a new appreciation for diverse cultures through recounting stories, including fables, folktales, and myths and engaging effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners.

Students will read and review characteristics of stories from various cultures and review or be introduced to the characteristics of Native American storytelling traditions. They will compare and contrast the themes and content across the different cultural traditions.

The Big Question

What themes are universal in traditional stories?

Background Information

Many cultures have strong oral storytelling traditions. In Chumash culture, just like in many other cultures, stories were told and passed down usually by the elders in the community. According to Kay Sanger "...children who listened to these stories found answers to many of their questions about life's mysteries: how people were made, how the sun moves, where the stars came from and why the animals have certain traits. The stories also taught them how to behave. By observing the reactions of animals in the stories, children learned about human values."

Focus Text

Mary J. Yee and Ernestine Ygnacio-de Soto. *The Sugar Bear Story*. San Diego: Sunbelt Publications, 2005.

The Sugar Bear Story was told to Ernestine Ygnacio-de Soto by her mother, Mary J. Yee. This fable offers a life lesson in how to treat others. Stories such as this were passed from generation to generation and this story represents the sharing of values, culture and language. In addition to being presented in English, the book is also written in Barbareño Chumash.

Sequence of Learning Activities

Introduction:

- Pass out blank sheets of paper and pencils, colored pencils, crayons or markers may also be used.
- Students fold the paper in half and in half again. They unfold to show four boxes.

Sketch to Stretch:⁷

- Read *The Sugar Bear Story* to the class and have the students “sketch to stretch.” Read one sentence at a time allowing time after each for the students to sketch.
- Students listen to one sentence and draw what they imagine in the first box of their paper. The listen to the second sentence and draw in the second box, continuing until the story is over. The story is four sentences long.

Share illustrations:

- Reread the story sharing the illustrations in the book.
- Students read, looking at the illustrations and share their own drawings with the class.

Share language:

- Read through the book again showing the Barbareño Chumash. Using the vocabulary and pronunciation guide try pronouncing some of the words. Students may recall the word for house, ‘ap. Use the map in the book to show where Barbareño Chumash is spoken.
- Students try pronouncing some of the words that they read.

Discussion:

- In small groups, students share their ideas about the meaning of the story.
- Students share about their family stories.

Follow up:

- Interview a family member about stories that have been passed down.
- Students share their stories in small groups.
- Discuss origin of their stories and similarities and differences between the stories.
- Students then list similarities and differences on poster board of their respective stories to Chumash story that was read in class on Day 1.
- Students also share ways their stories are similar to or different from *The Sugar Bear Story*.

⁷ The “sketch to stretch” strategy was developed by Burke, Harste and Short in order to encourage students to visualize text and then interpret the concept by drawing it. It’s a great activity to use to enable students to understand text through visual means and encourage better comprehension and retention of written and read text.

Assessment

Students are informally assessed in their group discussions and their presentations.

Extensions/Follow Up

Invite a guest from the community to class to model storytelling or share a family story. This may be a Chumash or a Tongva storyteller as well as some of the parents grandparents of the students with a good story to share. Contact the Mobile Museum team at the Natural History Museum for referrals of local storytellers.

As an extension, class reads “*Thunder and Fog*” in Sanger, Kay. *When The Animals Were People: Stories Told by the Chumash Indians of California*. Banning: Malki Museum Press, 1983. This story explains the formation of the mountain landscape. Students contrast with *The Sugar Bear Story* to learn about different kind of stories and lessons.

Students compare and contrast the story of Thunder and Fog with other stories that explain natural phenomena. One example is the story of Demeter and Persephone in Greek mythology that explains the reason why we have winter.

Accommodations/Adaptations

Teacher reads the story, then students read and discuss in small groups through think-pair-share strategies.

Class reads *The Chumash through a Child's Eyes* and compares daily life today with the daily life of Chumash peoples long ago.

Additional Resources

Seale, Doris, and Beverly Slapin, eds. *A Broken Flute: The Native Experience in Books for Children*. Berkeley: AltaMira Press and Oyate, 2005.

Seale, Doris, and Beverly Slapin. *How to Tell the Difference: A Guide to Evaluating Children's Books for Anti-Indian Bias*. Berkeley: Oyate, 2000.

These resources provide excellent guidelines for evaluating and choosing books for use in the classroom that avoid bias and stereotypes.

Applegate, Richard B. *Samala English Dictionary*. Published by Santa Ynez Band of Chumash Indians, Santa Ynez CA, 2007.

Blackburn, Thomas C. ed. *December's Child: A book of Chumash Oral Narratives*. Berkeley and Los Angeles: University of California Press, 1980.

Burke, Carolyn, Jerome Harste and Kathy Short. *Creating Classrooms for Authors and Inquirers, Second Edition*. Portsmouth: Heinemann Press, 1996.

Perini, Matthew J., and Harvey F. Silver. *The Core Six: Essential Strategies for Achieving Excellence with the Common Core*. Alexandria: ASCD, 2012.

Sanger, Kay. *When The Animals Were People: Stories Told by the Chumash Indians of California*. Banning: Malki Museum Press, 1983.

Wilcox, John and Kate Yarbrough (illus.). *The Chumash through a Child's Eyes*. Santa Barbara: Shoreline Press, 1997.

Wood, Audrey. *The Rainbow Bridge*. Singapore: Tien Wah Press, 1995.

Yee, Mary J., and Ernestine Ygnacio-de Soto. *The Sugar Bear Story*. San Diego: Sunbelt Publications, 2005.



Artifacts in Context: Understanding Daily Life at a Coastal Village Site

Archaeology Experience Pre-visit Lesson

Time needed:

1-3 Class periods

Standards:

CA State H-SS
 3.1.1; 3.1.2; 3.2.1;
 3.2.2; 4.1.4; 4.1.5;
 4.2.1
 NGSS
 4-ESS1-1; 4-ESS2.A;
 4-ESS2.E; 4-ESS2-1;
 5-ESS2-1
 CCSS ELA
 RI.3.1; RI.3.2; SL.5.5;
 W.4.7; W.4.8; W.4.9;
 W.3-5.1.A-D; W.3-5.7-8
 VAPA Theater
 HCC.3.3.0; HCC.3.3.1;
 HCC.3.3.2; HCC.4.3.0;
 HCC.4.3.1; HCC.5.3.0;
 HCC.5.3.2

Materials:

Map of Pitas Point

Worksheet with artifacts and first person accounts

Poster or large paper for making a mural

Markers

Students learn about daily life at Pitas Point, a coastal village, through 2D and 3D mapping of archaeological discoveries, or finds from a house.

Objective

To gather information from several primary sources and interpret data to understand daily life of Chumash peoples in the past.

To explore and learn about how artifacts and archeological features provide insight into how Chumash peoples lived.

To learn about site mapping and the importance of context for our understanding of the use and function of artifacts.

Goals

Create a 3D model of an archaeological site based on a 2D map where students discover how the Chumash lived based on artifacts and context in which objects are found.

Class creates a mural of daily life in a coastal Chumash village, based on evidence including maps and first person accounts and deliver oral presentations in small groups.

The Big Question

What was daily life like in the Chumash community of Pitas Point based on the physical evidence that archaeologists were able to recover?

What do first person accounts add to our understanding of daily life of Chumash peoples of the past?

Background Information

Mapping is an essential practice of archaeologists. Objects with no context, collected without data and the benefit of knowing what they were found nearby, are nearly worthless to furthering our understanding of the past. By mapping a

site, archaeologists document where objects such as artifacts and natural resources as well as features were found. Mapping the different layers of a site documents changes over time and looking through the maps can be a bit like looking through a flipbook of the history of a place. In the Mobile Museum program student-archaeologists study one site where this is particularly interesting—Pitas Point, a coastal village site near present-day Ventura that dates from 1000-1550 A.D. One of the houses excavated there, known in the excavation reports as Area 3, was occupied by several different families over time. The activities and features of the house as mapped out over time show how the different inhabitants and their activities shaped the physical space of the house. Most interestingly, the house had six different locations for the hearth over time. It turns out that peoples of the past also liked to remodel!

The distribution and location of artifacts at Pitas Point and specifically in Area 3 show that different activities happened inside the house than the ones outside. Archaeologists also feel that the activities inside and outside the house may have been divided by gender with women working inside the home and men working outside. Artifacts and features found inside the house at Area 3 show that water bottles were being produced inside by the women of Pitas Point. Although the basket water bottles do not tend to remain over time due to decomposition all the tell-tale signs of their production remain. At the house there are basket impressions left of the asphaltum interiors of long gone baskets. The tools with which the women lined the baskets with asphaltum are here too – tarring pebbles made of soapstone are found near the hearth. We can tell where the hearths are as well because of the fire cracked rocks that had encircled the glowing embers long ago. A soapstone bowl also was found nearby. The tool for weaving basketry – a bone awl – was also found at the house. Basket making was not the only activity inside; clues about making food were in the house – mortars and pestles were found inside as well. The clues from outside the house paint a picture of men working on their fishing gear – fish hooks, harpoons as well as fish bones underscore the importance of the resources from the ocean. The interior and exterior of the home also draw a distinction for the different work areas of women and men at Pitas Point.

Focus Object

Basketry Water Bottle

Water bottles were created to transport water long ago. Women traditionally made the baskets by twining reeds of juncus or tule. To make the bottles waterproof, the women would apply asphaltum to the interior in a very interesting manner. The sea captain George Nidever who encountered the so-called Lone Woman of San Nicholas Island saw her make a water bottle and described her process:

She had built a fire and had several small stones about the size of a walnut heating in it. Taking one of the vessels, which was in shape and size very like a demijohn [a large antique wine bottle], excepting that the neck and mouth were much longer, she dropped a few pieces of asphaltum within it, and as soon as the stones were well heated they were dropped in on top of the asphaltum. They soon melted it, when, resting the bottom of the vessel on the ground, she gave it a rotary motion with both hands until its interior was completely covered with asphaltum.⁸

These baskets came in smaller personal sizes as well as larger household sizes. While some baskets have been discovered by archaeologists, oftentimes all that is left of the water bottles is the asphaltum interior imprinted with the twined pattern hinting at its use long ago.

Sequence of Learning Activities

Preparation:

- Teacher makes copies and distributes the map worksheet in the classroom.
- Teacher chooses an area to recreate a 10 x10 meter map (depending on space a 10 x 10 foot space could be used to represent the site). Ideally the space can be an outdoor playground, or indoors where measurement can be made on floor tiles, carpet on floor, etc.

⁸ George Nidever. "The Lost Woman," *Thompson and West's history of Santa Barbara County*, 1883. Quoted in R.F. Heizer, and A.B. Elsasser, eds., *Original Accounts of the Lone Woman of San Nicholas Island*. (Ramona: Ballena Press, 1973), 28-37.

Introduction:

- Introduce the map of Pitas Point using a projector.
- Explain that knowing where an artifact is found can provide details of daily life.

Activity:

- Class physically recreates this map on a larger scale to help with understanding where everything belonged.
- Discuss orientation (bird's eye view), organization,(grid), and scale to support – translating map into meters.
- Ask students what they have discovered about daily life at Pitas Point by looking at the map?
- Introduce background information about Pitas Point to students and discuss the importance of artifacts.
- Assign groups of 2-3 students.
- Assign one artifact on map to each group.
- Each card will have first-hand information about the artifact (material, size, what it was used for) found at Pitas Point.

Mapping:

- Move the class to outside area or they use the classroom floor in order to physically recreate the map.
- If possible, have students step outside and draw map to scale with sidewalk chalk. Instruct each group of students to position themselves on the map according to the location of their given artifact.

Making Meaning of Mapping:

- While students are still in the map configuration, have them share with neighboring groups about their respective artifacts and how they were used. Have them make sense of the location of all of the respective artifacts and share about why the artifacts and their placement in these given locations is important.
- Invite students to sit on the map and flip to the back of the worksheet. Here students will find first person accounts of the creation and use of their artifacts
- Invite small groups to explain their section of the map and to present evidence based ideas about what people may have done at this place in the past, using the location on the map, nearby artifacts, their own artifact cards and first person accounts. This can expand into a more formal presentation back in the classroom.

Discussion Questions about life at Pitas Point:

- Why is mapping an important activity for archaeologists?
- What has the experience of recreating the map and reading first person stories taught us about Chumash life at Pitas Point?
- What features of Pitas Point and artifacts found there describe the division of gender roles in the families who occupied these houses?

Assessment

Students are informally assessed throughout the activities: when translating the 2D map to the 3D map, presenting their artifacts and making the mural.

Extensions/Follow Up

Students write a reflection piece about their artifact using the first person accounts and nearby artifacts and then present it in class.

As part of the post-visit experience, students are encouraged to do a research project on a different archaeological site that they learned about during the Mobile Museum visit. Structure the research based on their experience with reading maps and recreating a site through mural making and finding stories about prominent artifacts found there.

Students create a larger mural that includes the different regions and sites. Students use prior knowledge to include the different regional resources and activities of the different kinds of locations (houses, sweatlodges, workshops).

Accommodations/Adaptations

The location for mapping can be modified from the outside playground area to the inside classroom or other larger area to work with.

Students turn their mural sharing into individual writing projects where they write an essay or a report about Chumash life at Pitas Point, based on the mural drawing experience.

Additional Resources

Gamble, Lynn H. "Chumash Architecture: Sweatlodges and Houses," *Journal of California and Great Basin Archaeology* 17 (1995): 54-92.

_____. "The Organization of Artifacts, Features, and Activities at Pitas Point: A Coastal Chumash Village," *Journal of California and Great Basin Anthropology* 5 (1983): 103-129. <http://escholarship.org/uc/item/32w98124>.

Hudson, Travis and Thomas C. Blackburn. *The Material Culture of the Chumash Interaction Sphere. 5 vols* Los Altos: Ballena Press, 1986.

Heizer, R.F. and A.B. Elsasser, eds. *Original Accounts of the Lone Woman of San Nicholas Island*. Ramona: Ballena Press, 1973.

Sonneborn, Liz. *Native American Histories: The Chumash*. Minneapolis: Lerner Publications Company, 2007.

Tarring pebbles	“The [water bottle] is made of juncus... They put some pulverized [asphaltum] in the jug when they get the weaving finished. Then they heat the [tarring pebbles]. They drop them in one by one. The [asphaltum] goes all over inside the basket...” <i>Fernando Librado</i>
Asphaltum basket impression	“The [water bottle] is made of juncus... They put some pulverized [asphaltum] in the jug when they get the weaving finished. Then they heat the [tarring pebbles]. They drop them in one by one. The [asphaltum] goes all over inside the basket...” <i>Fernando Librado</i>
Asphaltum	“The [water bottle] is made of [juncus]... They put some pulverized [asphaltum] in the jug when they get the weaving finished. Then they heat the [tarring pebbles]. They drop them in one by one. The [asphaltum] goes all over inside the basket...” <i>Fernando Librado</i>
Bone awl	“ Awls for making baskets. Women here used them very much. Made first of bone , later of iron.” <i>Luisa Ygnacio</i>
Chert	“I am going to make an abalone fishhook. I take a rock and I break an abalone shell, finding a piece about the size of the fishhook I wish to make. I grind the piece of the shell to shape and smooth it. Then I cut a round hole in the blank using a piece of chert ... I make a groove on the shank to tie on the fishline.” <i>Fernando Librado</i>
Soapstone Bowl	“Called stone ollas... used for cooking islay [wild cherries] and other things.” <i>Candalaria Valenzuela</i>
Post holes	“ Houseposts are put in the ground about 1 ½ feet apart.” <i>Fernando Librado</i>

Knife	<p>“There were flint knives with wood handles stuck on with tar and wrapped with red milkweed string.” <i>Anonymous Chumash consultant</i></p> <p>“Used to cut wood, meat, fish.” <i>Maria Solares</i></p>
Knife flakes	[from making knives]
Firecracked rocks	<p>“There were no holes for the fireplace... they merely put firestones, three of them, about 8 inches apart... They cooked on this fire in the house.” <i>Fernando Librado</i></p>
Harpoon	<p>“Used to get the otter” <i>Fernando Librado</i></p> <p>[Also used for fish and sea mammals]</p>
Mortar	<p>“They made them 10 inches in diameter. Generally women ground with them, but sometimes med did too. They would grind acorns, chia, oats, and other such things in them until then were very finely pounded.” <i>Fernando Librado</i></p>
Pestle	<p>“They had pestles for pounding.” <i>Candelaria Valenzuela</i></p>
Fish Vertebrae	[from catching fish]
Abalone	<p>“I am going to make an abalone fishhook. I take a rock and I break an abalone shell, finding a piece about the size of the fishhook I wish to make. I grind the piece of the shell to shape and smooth it. Then I cut a round hole in the blank using a piece of chert... I make a groove on the shank to tie on the fishline.” <i>Fernando Librado</i></p>
Flaking Hammer Stone	[to transform chert into knives and tools]



Edible Archaeology

Archaeology Experience Pre-visit Lesson

Time needed:

45 minutes

Standards:

NGSS
4-ESS1-1; 4-ESS2.A; 4-ESS2-1; 4-ESS2.E; 5-ESS2-1
CCSS ELA
W.3-5.1.A-D; W.3-5.7-8; W.4.7-9; SL 5.5

Materials:

Clear plastic cups

To create strata layers: pudding mix (chocolate or butterscotch), crushed graham crackers, crushed Oreos.

Artifacts and natural resources: animal crackers, Smarties, any other small edible items

Students learn about archaeological field work by creating a model of the layers of an archaeological site using edible items.

Objective

Students will be able to describe an archaeological site and understand the basics of how archaeologists excavate.

Goals

To learn about archaeological field work through hands-on experience with a relevant project, modeling an archaeological site using common grocery materials.

To learn how to read, record, and analyze relevant data from a hypothetical dig site.

The Big Question

How do archeologists work out in the field? What are the steps and precautions during the excavation process?

How do sites form over time? How can archaeologists tell how old items are and what time period they came from?

Background Information

When archaeologists excavate to learn more about people of the past, they carefully dig through the dirt. Soil builds up in layers over time and archaeologists excavate through it layer by layer, like peeling back an onion. These layers are like time capsules and each layer, or context, contains objects from the same time period. The next layer down will be older, and the layer beneath that even older. If an archaeologist were to dig a deep hole and disregard the layers, he would mix up older and younger objects making it much harder to tell what activities were going on. When an object is found out of context, as often happens when people loot archaeological sites, it can lose its meaning.

At LAC-602, the simulated site on the Mobile Museum, these archaeological layers, or strata, are visible in the walls. At real archaeological sites these layers are frequently identifiable by the untrained eye. As you look you can see changes in color and texture in the different layers. Frequently, as archaeologists dig, they leave a balk next to their dig pits for context. Imagine a site to be a layer cake with every other slice removed. The remaining slices, balks in this analogy, serve as reminder and context for the excavated trenches where the layers have been removed.

Focus Object

Helo' coastal site

Layers in the earth build up over time so that the most recent are on the top and the oldest are on the bottom; this is called the law of superposition. Inside the Mobile Museum at LAC-602, the layer that students excavate is a sandy brown color. The area above it is a reddish brown layer that has already been excavated. It is studded with artifacts and natural resources from long ago – but not as old as the ones student archaeologists are looking for as they excavate! The most recent layer in the soil is on the top of the site – it is a gray layer marked by the fence that was installed around the site by the archaeologists.

One exception to all new layers being higher than older layers happens where people of the past dug holes. Helo', a coastal site that students study during the Mobile Museum visit, has a house with a storage pit in the floor.⁹ When the hole for this was dug, the people creating this storage area had to dig through older layers of dirt. When archaeologists excavate an area like this they must be careful to detect changes in soil looking carefully to notice that an area has been disturbed. The result is that a newer or younger layer is surrounded by older layers. If an archaeologist does not distinguish a hole dug in the past it can confuse the context artifacts and muddy the interpretation of activities of the past. The pit at Helo' was easier to detect as it was lined with clay. This clay, along with evidence obtained from the tiniest clues in the soil, suggests that it had been used for storing food in the past.

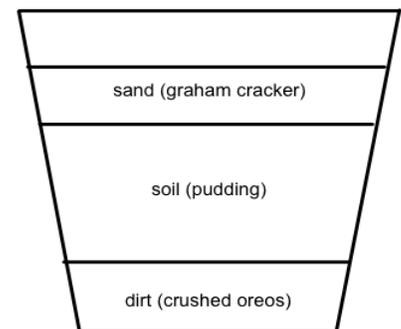
Sequence of Learning Activities

Set up:

- Write the word “Archaeology” in the center of a chart paper or the white board.
- Students pair share what they know about archaeology.
- Group share, writing down students’ answers on the board. Words you may want to watch out for include “digging”, “exploration”, “bones”, “history”, etc.
- Ask students what might be the purpose of excavating and archaeology? (*To discover artifacts that tell a story of ways of life in the past*).
- Write this on the same chart paper, highlighting artifacts and excavation as academic vocabulary.
- Discuss why archaeologists work with a process and plan out an excavation.

Building a site:

- Explain to students that they will be creating their own archaeological site using food. Pass out clear plastic cups and Edible Archaeology Worksheet.
- Tell students to imagine a time one thousand years ago. Chumash peoples are thriving at your “archaeological site”.
- Students create the foundation by putting a layer of crushed Oreos on the bottom of the cup.



⁹ Lynn Gamble, “Chumash Architecture: Sweatlodges and Houses,” *Journal of California and Great Basin Anthropology*, 17(1) (1995): 82-86.

- Other candies represent the artifacts natural resources people were using. Discuss what the candies symbolize and add them over top of the Oreo layer.
- Explain that over many years these items would become buried. Add a layer of pudding over the “artifacts” and “natural resources” covering that layer entirely.
- Over time, the site changes and another layer of earth eventually builds on top of the site. Add another layer over the pudding (crushed graham crackers).
- Option: add another layer of artifacts and natural resources and discuss people living at a site over time.

Reflection:

- Discuss with students what they notice about their archaeological site. Introduce the concept of strata, which are different layers of Earth made out of rock and soil. Ask students what they think formed these strata.
- Next, have a discussion on the artifacts they placed in their archaeological site. Ask them where more recent artifacts are situated in the earth and where older artifacts are. Ask students how archaeologists help us uncover these artifacts.
- Pass out the Edible Archaeology worksheet to the students.
- Collect worksheets from students when finished and have them clean up the project area.

Assessment

There are multiple times students will be informally and formally assessed during this activity. The discussion at the beginning is a great way to informally assess what students know about archaeology. During the class activity, walking around and listening to students’ conversations about the topic is another great way to informally assess knowledge. Finally, the worksheet serves as a more formal assessment to see if students were able to understand what an archaeological site may look like and the importance of excavating to uncover artifacts.

Extensions/Follow Up

After reading the book *Archaeologists Dig for Clues* that is included in their classroom packet, students work in small groups to make connections between this story about the work of archaeologists and their own hands-on experience with their Mobile Museum experience and edible archaeology project. If technology is available, have them create a summative presentation on their excavation experiences as a video with iMovie or a presentation using Keynote, PowerPoint or Prezi.

Students to write a short narrative from the excavating archaeologists’ point of view about one of the sites they studied in the lab, Mikiw, Helo’, H’elxman, Pitas Point or Santa Cruz, etc., based on the evidence in the crates and the evidence from their research in the Mobile Museum lab.

Accommodations/Adaptations

If food is not allowed at your school, you can easily replace this activity with other materials, such as sand, soil, and non-edible artifacts.

Keeping the chart up at the beginning will help English language learners with the new academic vocabulary.

Additional Resources

Duke, Kate. *Archaeologists Dig for Clues*. New York: Harper Collins Publishers, 1997.

Erlandson, Jon M., and Rick Torben C. *A Canyon Through Time: Archaeology, History, and Ecology of the Tecolote Canyon Area, Santa Barbara County, California*. Salt Lake City: The University of Utah Press, 2008.

Gamble, Lynn H. “Chumash Architecture: Sweatlodges and Houses.” *Journal of California and Great Basin Anthropology* 17 (1995): 54-92.



Regions and Resources of California

Archaeology Experience Pre-visit Lesson

Time needed:

60 minutes

Standards:

CA State H-SS 3.1.1, 3.1.2, 3.2.1, 3.2.2, 4.1.5, 4.2.1
 CCSS ELA RL.3.2
 NGSS ESS2.E, ESS3.C

Materials:

Pencils

Projector

Images (circle map, Mountain, Coast)

The abundance of natural resources in Southern California shaped the daily life of the daily life of Chumash peoples. By looking at images of the different regions where Chumash people have lived over time, students brainstorm ideas about the resources available in different areas.

Objective

Students will analyze images depicting the coast, island and mountain regions of Southern California to identify key natural resources that were important to the daily life of the ancestors of the Chumash people. Students will discuss with their peers how and why Chumash peoples may have used these natural resources.

Goals

Students learn to hypothesize about natural resources based on visual evidence and build evidence based arguments using objects and images of natural resources *in situ*.

Reflecting on their experience on the Mobile Museum, students work collaboratively to evaluate their hypotheses about which natural resources were available to Chumash peoples in the past.

The Big Question

How have local resources shaped the way of life for peoples of the past? [e.g. the Chumash peoples were among the most complex and thriving groups of hunter-gathers an achievement many attribute in part to the rich resources and mild climate of Southern California]

Background Information

Natural resources are a main character in the story of the thriving cultures of native peoples of Southern California. The mountain and coastal regions including the Channel Islands where Chumash peoples lived were filled with diverse natural resources from the land and sea. Chumash peoples manipulated these raw materials into any manner of objects and the parts that remain over time are found as artifacts by Archaeologists today. The presence of natural resources at Chumash sites that are not native to the area where Chumash peoples were living reflect the exchange between cultures. Chumash peoples traded with neighboring communities in California and beyond, from as far away as what is now Arizona.

Focus Object

Bone Whistle in the NHM Collection

<http://collections.nhm.org/anthropology/Display.php?irn=954584&QueryPage=%2Fanthropology%2F&BackRef=ResultsList.php>

The Deer Bone Whistle is an object that students excavate at LAC-602 during the Mobile Museum program. The natural resources that the whistle is made of, deer bone, seashells and asphaltum, tell a story about the interaction of Chumash peoples living in different regions. The whistle itself is made of a deer bone, specifically of tibia from mule deer and they were sometimes made in pairs from the left and right tibia of the same deer. John P. Harrington was a linguist and ethnologist who studied the language and culture of the Chumash people and one of the ways that he did this was by interviewing Chumash peoples. In an interview with Fernando Librado, Harrington asked about making the whistle; Librado explains, "In making the whistle I make a hole in the side of the bone, and I put tar (asphaltum) and afterwards shell bead inlay."¹⁰ A few rare whistles from the archaeological record have complex shell inlays that are thought to represent constellations.¹¹ Magdalena Olivas explains to Harrington that whistles were played at *fiestas*, or ceremonial feasts, where coastal chiefs known as *wots* would host visitors from the island and mountain villages to celebrate as well as exchange goods.¹² The materials used in the making of the whistle reflect the exchange of natural resources from different regions: the deer bone, abalone or olive snail shells and asphaltum. These materials were possibly exchanged at the very place the whistle may have been played – a fiesta on the coast.

Sequence of Learning Activities

Set up:

- Break class into small teams of three or four students.
- Groups assigned a color red, blue or green (there may be multiple teams with the same color).

Make Observations:

- Introduce coast, island and mountain regions via images.
- Pass out one circle map and image of one region to each group: red - coast, blue - island, green – mountain.
- Ask students to share what they observe. Give them one minute to share what animals they observe, a second minute for plants, a third minute for non-living items. After they have completed recording what they see, students fill in the area outside of the circle with their predictions for plants and animals that might be in this region based on their past experiences. Ask evocative questions about the smallest living things and what the soil might be like there, etc.

Sort and Classify:

- Draw circle maps on board – plants, animals, rocks and minerals.
- Students write resources on board using colored markers to track their answers (red for coast, etc.).
- Facilitate discussion on regions and resources: What animals do we observe in the coast region? Are these the same animals in the mountain region? Do you think people in different regions would have the same kinds of clothes or eaten the same kinds of foods?

Make Predictions:

- Draw circle maps on board – food, clothing, shelter, tools and other topics of interest to the students.

¹⁰ Travis Hudson and Thomas C. Blackburn. "Volume 1: Food Procurement and Transportation," in *The Material Culture of the Chumash Interaction Sphere*. (Los Altos: Ballena Press, 1986), 355.

¹¹ Travis Hudson and Ernest Underhay. *Crystals in the Sky: An Intellectual Odyssey Involving Chumash Astronomy, Cosmology and Rock Art*. (Los Altos: Ballena Press, 1978), 131. Two whistles in the Ventura Museum have olivella patterns that appear to depict the Pleiades and Orion's belt among other constellations. These appear to be special items that may not have been used as indicated by the fact that they are unplayable due to their form.

¹² Travis Hudson and Thomas C. Blackburn, "Volume 4: Ceremonial Paraphernalia, Games, and Amusements," in *The Material Culture of the Chumash Interaction Sphere*. (Los Altos: Ballena Press, 1986), 356.

- Ask students to share their ideas about what people may have eaten, worn, lived in, and used based on the resources they have observed?

Conclusions:

- Introduce image and story of deer bone whistle.
- Facilitation discussion about trade, asking students to consider how an artifact like this could have been made with resources from different regions.
- Recount story about cultural significance of music and use at fiestas.

Assessment

Students are assessed on their critical thinking skills, linking the use of natural resources by Chumash peoples' in different regions to fulfill their needs.

Extensions/Follow Up

Students revisit their circle maps after completing the Mobile Museum program and see if their predictions about uses of natural resources were on track. Students discuss what they know now about the regions and resources of California.

Explore how natural resources and artifacts are meaningfully represented in literature from the Chumash community. Students listen to stories from *When the Animals were People*. *Coyote Goes to the Bottom of the Sea*, *Thunder and Fog* and *Coyote and Bat* are good choices for this exercise in listening for understanding. While the teacher is reading, students actively listen and write down the references to natural resources and artifacts as they hear them. Ask students to consider how these objects are important in the story and also played a role in the daily lives of the ancestors of Chumash people.

Students may research the ethnobotanical significance of the flora featured in the natural resources chart. In small groups, student research and present their findings on how these plants may have been used for food, medicine, art and music, and to make other objects of daily life. Jan Timbrook's *Chumash Ethnobotany: Plant Knowledge Among the Chumash People of Southern California would be an excellent resource from which to draw evidence*. Students may present their findings in a poster session that illustrates the parts of their plants as well as the artifacts and daily life uses of these essential natural resources.

Accommodations/Adaptations

Warm up beginning students by discussing natural resources in the region of the school. Discuss everyday items and what natural resources they came from.

Additional Resources

Brown, Kaitlin M. "Sourcing archaeological asphaltum (bitumen) from the California Channel Islands to submarine seeps," *Journal of Archaeological Science* 43 (2014): 66–76.

Gamble, Lynn H. *The Chumash World at European Contact: Power, Trade, and Feasting among Complex Hunter-Gatherers*. Berkeley: University of California Press, 2008.

Chapter 6, Subsistence and Feasting is good to read more about *fiestas*, and chapter 8, Economics and Exchange: Manifestations of Wealth Finance discusses exchange, shell bead money, and luxury goods. Chapter 2, The Environment and Its Management has great information about natural resources.

Hudson, Travis and Ernest Underhay. *Crystals in the Sky: An Intellectual Odyssey Involving Chumash Astronomy, Cosmology and Rock Art*. Los Altos: Ballena Press, 1978.

Hudson, Travis and Thomas C. Blackburn. "Volume 1: Food Procurement and Transportation." In *The Material Culture of the Chumash Interaction Sphere*, 355-6. Los Altos: Ballena Press, 1986.

King, Chester. *Overview of the History of American Indians in the Santa Monica Mountains*. Draft manuscript.

McCall, Lynne and Rosalind Perry. *The Chumash People: Materials for Teachers and Students*. San Luis Obispo: EZ Nature Books, 1991.

This resource has a good overview of natural resources and their uses by Chumash peoples.

Sanger, Kay. *When The Animals Were People: Stories Told by the Chumash Indians of California*. Banning: Malki Museum Press, 1983.

Timbrook, Jan. *Chumash Ethnobotany: Plant Knowledge among the Chumash People of Southern California*. Berkeley: Santa Barbara Museum of Natural History, 2007.



Evidence of Daily Life from Long Ago

Archaeology Experience Pre-visit Lesson

Time needed:

1 month; 1 observation session per week (25 minutes)

Standards:

NGSS
3-LS1-1, 5-LS2-1.

Materials:

Worksheet

Compost Materials:

1. Carbon-rich “brown” materials, such as dry leaves, straw, dead flowers, and shredded newspaper.
2. Nitrogen-rich “green” materials, such as grass clippings, plant-based kitchen waste (vegetable peelings and fruit rinds, but no meat scraps).
3. A shovelful or two of garden soil.
4. A site or container that’s at least 3 feet long by 3 feet wide.

(Preferably with visible sides to observe compost layers).

Objects to place in soil i.e. Sticks, rocks, seaweed, plants, bone, plastic containers, paper, feathers

Tools: Pitch fork/ shovels, hose/ watering can, thermometer

What remains and what disappears over time? Students learn about the archaeological record by conducting a hands-on decomposition experiment.

Objective

Students understand what decomposition is and why archaeologists rarely find items in the same state in which they were originally used.

Students learn how to conduct a scientific experiment by hypothesizing, gathering and recording data, measuring, and analyzing their results.

Goals

To conduct a hands-on scientific investigation focused on decomposition.

To link the experiment with understanding of which items from our material surroundings survive over time and which do not.

To understand the limits of archaeology. Archaeology alone does not paint a complete picture of the daily life of peoples of the past; items that disappear from the archaeological record through decomposition can leave a gap in our understanding. We can get a fuller picture by looking to the ethnographic record and—most importantly—to descendant communities and the culture bearers of today.

The Big Question

What survives over time? Why do we only see certain artifacts in museums?

Background Information

Decomposition, or decay, is what can make an archaeologist’s job a bit like detective work. A complete story, in the form of complete artifacts, is rarely presented to an archaeologist. Some materials tend to decompose quickly, such as plant material and animal hide; where as other materials remain much longer, such as rock and bone. Between artifacts that decompose completely and those that remain in part, archaeologist can only paint a partial picture of the past.

This is not to say that plants *never* remain in the archaeological record. Xeric, or extremely dry, conditions in the mountain region have preserved many Chumash artifacts made of typically perishable materials.¹³ Archaeologists who specialize in plant remains, called archaeobotanists, have techniques to find traces of plants where very little remains. In a technique called floatation, archaeologists mix soil that has been excavated with water and then sieve this muddy water mixture. Three layers of mesh, each successively smaller than the last, catch some of the tiniest remains such as carbonized plant materials and tiny seeds. Helo'--a coastal site with houses from the historic period that the students study during the Mobile Museum lab--reveals a story about the use of plants by Chumash peoples. Archaeologists have recovered pollen and fragments of plants that give clues as to what the people were eating in one of the houses. Manzanita berries and islay, or wild cherry, were two of the foods found. Artifacts that were excavated there also support this hypothesis; an anvil for shelling acorns and an asphaltum impression from a food storage basket were also in the same house.

Archaeology is only one way we can learn about the past. Knowledge about artifacts that readily decompose and their significance in the lives of Chumash and Tongva peoples can still reach us through written and oral accounts.

Focus Object

Arrowhead or projectile point from NHM Collection

<http://collections.nhm.org/anthropology/Display.php?irn=954581&QueryPage=%2Fanthropology%2F&BackRef=ResultsList.php>

Arrowheads are commonly found artifacts that represent only part of the entire object, an arrow, which would also be accompanied by a bow. When studying the arrowhead, the question of what happened to the rest can require a stretch of the imagination. Arrowheads were frequently made of a natural resource called chert, a sedimentary rock related to flint that is found in many locations in Southern California. The color of the chert can give archaeologists clues as to where the natural resource came from. Two important types of chert found locally are Monterey chert which can be white, tan, brown and black and originate from several areas including Malibu Coast and Modesto.¹⁴ The other type of frequently found in the area is Franciscan chert; these red and green rocks can be found at 19 Oaks.¹⁵ While the chert arrowheads are found by archaeologists, the rest of the tool would decay and disappear over time. For more information on the shafts and bows we can look to Chumash descendants. Fernando Librado explains that the shafts of arrows would be made of toyon and the bows would be made from piñon and backed with deer sinew.¹⁶

Sequence of Learning Activities

Introduction:

- Show pictures of decomposition and introduce background vocabulary to explain the process.
- Introduce objects on worksheet: Decompose or Future Artifact?
- Discussion: What objects do you think might remain whole after being buried for a month? Which objects might decompose or rot?

¹³ Wendy Elizabeth Whitby, "Wrapped in Meaning: Chumash Cache Caves." (PhD diss., University of Central Lancashire, 2012).

¹⁴ Chester King, "Chapter 2: Sources of Knowledge of Native Societies," in *Overview of the History of American Indians in the Santa Monica Mountains*, (Draft manuscript), 131, 154.

¹⁵ King, "Draft manuscript," 131, 154.

¹⁶ Travis Hudson and Thomas C. Blackburn. "Volume 1: Food Procurement and Transportation," in *The Material Culture of the Chumash Interaction Sphere*. (Los Altos: Ballena Press, 1986), 93, 131.

Set up:

- Assign students to small teams. Each team will study one of these objects and track its decomposition during the experiment.
- Before the experiment, students make observations by sketching and describing their objects. They also measure and weigh objects and record this data as well as hypotheses about what will happen to the objects when they are buried making predictions if the object might decompose either in part or in whole.

Hands-On Activity/Experiment

- Start by spreading a layer several inches thick of coarse dry brown material like straw, cornstalks or leaves where you want to build the pile.
- Top that with several inches of green material.
- Add a thin layer of soil.
- Have each group put their team's object to be buried in compost, mapping the placement.
- Add a layer of brown material.
- Moisten the three layers.
- Continue layering green material and brown material with a little soil mixed in until the pile is 3 feet high. Try to add material in a ratio of three parts brown to one part green. (If it takes a while before you have enough material to build the pile that high. Keep adding to the pile until it gets to at least 3 feet high.)
- Over a 4-week period, the class will make weekly observations and measurements of the compost pile.

Follow up:

- At the end of 4 weeks, the class will uncover the remains, and revisit their hypotheses to draw conclusions about decomposition.

Assessment

Using the knowledge from their classroom experiment, they should be able to explain why certain artifacts are found in the archeological record and why others are not. Students link their classroom discoveries about archaeological record to the artifacts and the natural resources they see on the Mobile Museum.

Extensions/Follow Up

Using the NHM online database, teacher shares other objects that don not remain wholly intact over time, such as hopper mortars and basketry water bottles. Archaeologists only find parts of a whole.

Students could be shown a whole hopper mortar, predict what would decompose and then be shown an image of what archaeologists actually find (the rock base). Please see these links to the hopper mortar and the basketry water jar entries in the NHM online collections below. You can also use the search words "hoper mortar" and "water bottle" or other specific search terms to find these and other items in the NHM online database:

<http://collections.nhm.org/anthropology/>

Hopper Mortar:

<http://collections.nhm.org/anthropology/Display.php?irn=963862&QueryPage=%2Fanthropology%2F&BackRef=ResultsList.php>

Basketry Water Jar:

<http://collections.nhm.org/anthropology/imagedisplay.php?irn=12912&reftable=ecatalogue&refirn=2164>

Visit the Natural History Museum and explore the Nature Garden. In the Get Dirty Zone, Students can see decomposition in action in the compost bins and predict which natural materials will decay faster.

Follow up experiment: Flotation is an important archaeological process in which water is used to separate material from a soil sample. Construct your own flotation device and do a hands-on flotation activity with the students using these online resources:

Flotation description and origin:

<http://archaeology.about.com/od/fterms/g/flotation.htm>

Bucket Flotation activity instructions and video:

<https://sites.google.com/site/archaeobotany/buckets>

<http://www.youtube.com/watch?v=Nbkfe0B4zBg>

Accommodations/Adaptations

Students choose self-selected items to bury and hypothesize if they decompose or remain intact. Students look at objects in their classroom or home and predict what will survive over time in a journal.

Alternatives to compost piles might include a large plastic storage bins (clear) or large glass jars (transparent materials recommended so students can see various layers).

Additional Resources

Bial, Raymond. *A Handful of Dirt*. New York: Walker, 2000.

Duke, Kate. *Archaeologists Dig for Clues*. New York: Harper Collins Publishers, 1997.

King, Chester. "Chapter 2: Sources of Knowledge of Native Societies." in *Overview of the History of American Indians in the Santa Monica Mountains*, 131, 154. Draft manuscript.

"The Dirt on Composting: Composting 101," last modified November 16, 2013, <http://www.gridphilly.com/grid-magazine/2011/11/16/the-dirt-on-composting-composting-101.html>.

Glaser, Linda. *Garbage Helps Our Garden Grow: A Compost Story*. Minneapolis: Millbrook Press, 2013.

Hudson, Travis and Thomas C. Blackburn. "Volume 1: Food Procurement and Transportation." in *The Material Culture of the Chumash Interaction Sphere*, 355-6. Los Altos: Ballena Press, 1986.

Lavies, Bianca. *Compost Critters*. New York: Dutton Juvenile, 1993.

Rathje, William and Cullen Murphy. *The Archeology of Garbage*. Arizona: University of Arizona Press, 1994.

Siddals, Mary McKenna, and Ashley Wolff. *Compost Stew: An A to Z Recipe for the Earth*. New York: Tricycle Press, 2010.

Whitby, Wendy Elizabeth. "Wrapped in Meaning: Chumash Cache Caves." PhD diss., University of Central Lancashire, 2012.



Nature Journal: Chia from seed to plant

Archaeology Experience Pre-visit Lesson

Time needed:

8 sessions, 1 per week for 8 weeks

Standards:

NGSS
3-LS1-1; 3-LS1.B; 3-LS4-4; 3-LS4-4; 3-LS2.C; 3-LS4.D; 4-LS1-1; 4-LS1.A; 5-LS1-1; 5-LS1.C

Materials:

Water

Raw chia seeds - 10 per student (Salvia Hispanica preferred)

bulb dropper

graduated cylinders (or other ml measuring tool)

seed starter planters (paper egg crates work nicely) - 1 per student

permanent marker

drain tray or basin to hold planters

plastic wrap

light, porous potting soil - 1 large bag

large outdoor planter with direct sunlight

craft sticks - 1 per student

This unit engages students in hands-on discovery learning exploring an important plant food in Chumash culture; students journal to document and reflect on the Chia from seed to plant.

Objective

Students will carry out a chia plant investigation, growing fully mature plants from seed.

Students will record data and journal throughout the investigation including direct observations and inferences.

Goals

To conduct a hands-on, scientific experiment from start to finish, germinating, growing and consuming chia seeds while collecting scientific observations and data.

To create a nature journal tracking observations and changes over time by observing, reflecting, writing and drawing.

The Big Question

Based on your own experience growing chia plant from seeds, what is the process by which it is harvested? Why was the harvesting of chia seeds so important to the Chumash peoples in the past and what role did this nutrient rich food play in their diet?

Background Information

Chia was one of the favorite plant foods of Chumash peoples. The seeds were gathered in large quantities at the end of spring and during the summer. The tiny seeds could be gathered with the aid of a seedbeater and they were stored in the home for consumption throughout the year. According to ethnographic accounts, seeds were traditionally toasted and then ground with a mortar and pestle to be made into a drink.

Focus Object

Coastal archaeological site of the Chumash village Helo' near present day Santa Barbara

This lesson specifically connects to the archaeological site of Helo' (SBA-46), featured in the Mobile Museum lab, where students investigate natural resources and artifacts from the site of an 'ap (Chumash home) where food was stored, processed, and eaten. This site is unique because of the variety of plant food sources that we found at the site. Pollen was studied which showed many plants for the marshes surround the coastal village. Archaeologists performed floatation on the soil from a storage pit in the floor of an 'ap from Helo'.¹⁷ The scientists combined the soil in the pit with water and poured the mixture through a series of sieves. The plants that remained included many nuts and seeds that could be dried and stored to be eaten throughout the year. Gathering was an important way that Chumash peoples procured their food; many consider the Chumash to be among the most successful hunter gatherers.

Students study the Chia plant from seed to seed and enjoy a chia fresca to understand the labor required in gathering Chia while also appreciating the labor required in finding the Chia due to its tiny size! (see the Decomposition lesson for an extension on floatation).

Sequence of Learning Activities

Lesson 1 (Day 1): Introduction

- Review the basic requirements for plant growth and reproduction with students.
- Pass out 10 chia seeds to each student. Talk with them about the seeds, letting them know what type of seeds you will be investigating over the next 8 weeks. Encourage them to look closely at the seeds - What do they see? How big are the seeds? What color(s)?
- Distribute the journals. Students write descriptions and draw sketches.
- Next, pass out graduated cylinders of water, bulb droppers, paper towels, and starter planters (student names should be written on the planters using permanent marker) to students.
- Students transfer their seeds into the planters and then add drops of water to the seeds, keeping track of exactly how much water they've used by taking note of the water remaining in the cylinder. The seed coat and mucilage around the chia seed will begin to swell immediately and will be 7-10 times larger within 5 minutes.
- Students record their first observation of the seeds in their journals.
- Collect the planters and store in the drain tray or basin out of direct sunlight. Cover the basin with plastic wrap if the room is particularly dry so that the seeds do not dry out.

Lesson 2 (Day 3-4): Roots

- The chia roots will appear in 3 days. If possible, conduct the second lesson after the roots have appeared but before the stem and leaves appear on day 5 or 6.
- Distribute student planters with seeds and new journals.
- Students study the newly sprouted chia roots and review their purpose with the teacher.
- Students complete the new Chia Data Sheets and record their observations on their own sheets. Take some time to let students share out novel and unique observations and inferences.

¹⁷ Lynn H. Gamble, *The Chumash World at European Contact: Power, Trade, and Feasting among Complex Hunter-Gatherers*. (Berkeley: University of California Press, 2008) 174-178.

- Students share unique observations and inferences about the sprouted chia roots.
- If their plants need additional water, students add water using the cylinders and droppers as before.

Lesson 3 (Day 5-7): Stems and Leaves

- The chia stems and leaves will appear on day 5 or 6.
- Distribute student planters with seeds and journals.
- Students will now see that tiny green stems with tiny curled leaves are growing from the seeds.
- Students observe chia roots and make new observations in their journals.
- If additional water is needed, students add water using the cylinders and droppers as before.
- Discuss the needs of all plants for growth. Do our seedlings have everything they need to grow? What steps do you think we should take to ensure that they will grow into healthy adult plants? Guide students in a discussion of the need for nutrients and explain that nutrients are found in soil. Let students know that next session, they will be adding soil to their planters.
- Once the journals are complete, return the planters to the trays.

Lesson 4 (Week 2): Adding Soil

- Distribute student planters with seeds and journals. Review the conversation from the previous week; that they will be adding soil to their planters this week.
- Model how to carefully add soil to a planter. Describe the importance of allowing the stems and leaves to be exposed to sunlight for photosynthesis. Pass out small cups of soil to students and have them add it to their planters.
- The planters will need water to moisten the soil and improve the likelihood of seedling survival. Distribute cylinders and droppers as before.
- Once students have completed their work with the planters, have them record their observations in their journals.
- As always, encourage students share out novel and unique observations and inferences. Once the journals are complete, return the planters to the trays. This time, store the trays in a sunny location.

Lesson 5-7 (Week 3-5): Growing and Changing

- Over the next 2-3 weeks, continue to conduct weekly observations of the chia plants, recording observations and reflections in the journal.
- Once the plants begin to outgrow the small starter planters, transplant them into the larger, outdoor planter.
- The chia will be fully mature in approximately 30 days.

Week 8: Chia Fresca

- Demonstrate how to harvest the seeds by tapping the flower heads with your hand into a small cup.
- There will probably not be enough seeds harvested to use for the Chia Fresca tasting, but certainly use some of the home-grown ones if at all possible.
- Students follow teacher lead to create the chia fresca drink step by step. Chia has no known allergic reactions; however, parent permission slips should be distributed for any tasting investigations in the classroom.

Chia Fresca (ingredients are per serving)

drinking cups

measuring cups

small (teaspoon sized) spoons

1 cup water

1 tsp. chia seeds

1 tsp. lemon or lime juice

1 tsp. honey, agave, sugar, or maple syrup

- Gather the ingredients and have them out so that students can each make their own Chia Fresca. This portion works best by modeling the procedure step by step (“I do; you do”).
- Add the chia to the water and let sit for 10 minutes. The chia seed coat will swell 7-9 times its original size.
- Stir the seed and water mixture to break up any clumps.
- After 10 minutes, stir in the citrus juice and sweetener.
- The Chia Fresca is now ready to enjoy. During the tasting, talk with students about the nutritional value of the chia seed.

Assessment

There are multiple times students will be informally and formally assessed during this activity. The discussion at the beginning is a great way to informally assess what students know about archaeology. During the class activity, walking around and listening to students’ conversations about the topic is another great way to informally assess knowledge. Finally, the worksheet serves as a more formal assessment to see if students were able to understand what an archaeological site may look like and the importance of excavating to uncover artifacts.

Extensions/Follow Up

Continue the chia life cycle by letting plant seeds drop directly into the outdoor planter. It now serves as an ongoing, living experiment right on school campus.

Encourage students to research other traditional chia recipes. They can bring the ingredients and do additional tastings.

Accommodations/Adaptations

Model the investigation processes and journaling more or less explicitly to meet the needs of all learners in the classroom.

There are no known allergens related to chia seeds. When sending out tasting permission slips, include the nutritional analysis to ensure that parents and guardians are fully informed about the materials being handled in the classroom.

Additional Resources

Anderson, M. Kat. *Tending the Wild: Native American Knowledge and the Management of California's Natural Resources*. Berkeley: University of California Press, 2006.

Dale, Nancy. *Flowering plants: The Santa Monica Mountains, coastal and chaparral regions of Southern California*. Santa Barbara: Capra Press, 1986.

Gamble, Lynn H. *The Chumash World at European Contact: Power, Trade, and Feasting Among Complex Hunter-Gatherers*. Berkeley and Los Angeles: University of California Press, 2008.

Timbrook, Jan. *Chumash Ethnobotany: Plant Knowledge among the Chumash People of Southern California*. Berkeley: Santa Barbara Museum of Natural History, 2007.



Sifting for clues about food

Archaeology Experience Lesson

Time needed:

2-3 Class periods

Standards:

CA State H-SS 3.3.1;
3.3.2
NGSS Science and
Engineering Practices 1-8
CCSS ELA W.3-5.7; W3-
5.9

Materials:

Informational text
"excavation report"
Embroidery hoop
Screen

For each small group:
1 tray
1 sheet of paper folded in
half and in half again
1 bowl
1 popsicle stick

"Soil Sample" recipe:
1 cup of sand
1 tsp chia seeds*
2 tsp sesame seeds*
3 tsp sunflower seeds*

*other options could be
rice, lentils, oats or any
small seeds or grains
from the bulk foods bins,
these are representative
of acorns, manzanita
berries and islay, or wild
cherry

Students learn about the diet of Chumash people at the coastal village site of *Helo'* by analyzing artifacts and soil samples found at the site.

Objective

To interpret and analyze different forms of data to learn about the diet of Chumash people who lived at *Helo'* in the past.

Goals

Students will gain a better understanding of how archaeologists learn about culture through diet.

The Big Questions

How do archaeologists learn about materials that decay over time?

How does diet reflect culture and lifestyle?

Background Information

The Chumash peoples of the past were extremely successful hunter-gatherers. The artifacts Chumash peoples left behind attest to their skill in creating hunting tools such as arrowheads and also fishing gear like harpoon points and fishhooks. While artifacts such as these are often prominent in the archaeological record, oftentimes, evidence of gathering can be much harder to find. Evidence of a fish dinner can survive for many years in the form of fish bones and fishhooks whereas the fruits, nuts and other plants that were a huge part of their diet decompose over time, along with the baskets and nets that were used to gather them.

One place that archaeologists can look for evidence of plants is within the very soil from a site. Soil can be sifted through screens or mixed with water and then screened to look for the tiniest remains of plants. Archaeobotanists, archaeologists who study plants, specialize in finding these plant remains.

Focus on Plants

The coastal village site of *Helo'* is unique in that we know quite a bit about what plants the people at this site utilized and ate. At the site of *Helo'* archaeobotanists studied the soil that was removed as the archaeological team excavated the artifacts and features of the site. This soil was studied very closely through a process called flotation where the soil is mixed with water and poured through sieves. These sieves catch small remains that the archaeobotanists can then study to learn more about the plants that people used and ate. The results of the flotation from a Chumash house, called an 'ap, at the site of *Helo'* revealed foods that the inhabitants of the house were storing and consuming. Three of those remains were acorns from coast live oak trees, manzanita berries and islay, or wild cherry.

Anthropologists know about the use of these plants through the accounts of Chumash descendants. J.P. Harrington was an Anthropologist who very intensely studied Chumash culture. He consulted with Chumash individuals and through their accounts we know more about the plants that were found at *Helo'*. According to Luisa Ygnacio, they pounded up islay (wild cherries valued more for their kernels than fruit) and boiled it in the field and brought it home, already prepared. An anonymous consultant added that it was served in small cakes. Manzanita berries were eaten fresh but could also be dried and ground up. Fernando Librado shared that they mashed manzanita berries with a mortar and pestle, dried them and winnowed them using an abalone shell. Acorns from the Coast Live Oak tree were a favorite food and Maria Solares' statement "Whatever one has, one eats with acorn mush" attests to their popularity. First person accounts of plant usage help us to bring life to archaeological remains and to achieve a greater understanding about life in the past.¹⁸

Sequence of Learning Activities

Preparation:

- Read the informational text "excavation report"
- Discuss the finds – what are some ways you could classify them?
- What natural resources are the artifacts made of?
- How do the artifacts reflect diet?
 - Harpoon for catching large fish and sea mammals, fishhooks for catching fish, metates for grinding food (similar to a mortar), comals for cooking food (similar to a frying pan) and bowl for cooking or serving food
- Ask students what clues they think they might find in the soil
- Students develop a hypothesis about their sifting experiment based on the evidence from the excavation report

Experiment set up:¹⁹

- Assemble sifter by placing screen in embroidery hoop
- Mix 1 cup of "soil sample" recipe for each small group of students – the three ingredients represent Acorns, Manzanita and Islay (wild cherry)
- Each group of students has one tray, one sheet of paper, one bowl, one popsicle stick or spoon and one cup of "soil sample"

Sifting lab:

- Working in small groups of 3 to 4, students sift their soil samples over the bowl
- One student can hold the sifter, one can pour the sample and one can use the popsicle stick to help work the sample through the screen
- The sifting is complete when all sand is in the bowl and only plant remains are on the screen

¹⁸ J.P. Harrington's work with consultants can be found in Travis Hudson and Thomas C. Blackburn. *The Material Culture of the Chumash Interaction Sphere. 5 vols* Los Altos: Ballena Press (1986).

¹⁹ This experiment is meant to represent the flotation work that was done at *Helo'*. Instead of water flotation we are sifting the soil samples. See *Helo': Plant Use at Contact* in Lynn H. Gamble, *The Chumash World at European Contact: Power, Trade, and Feasting Among Complex Hunter-Gatherers*. Berkeley and Los Angeles: University of California Press (2008) 166-178.

- Students place the paper which has been divided into four sections into the tray and gently pour the plant remains into the tray on top of the paper
- Utilizing the popsicle stick, students sort the remains into three piles each in a different section of the paper, anything that cannot be identified will go into the fourth section
- The three seeds will represent three of the foods found in the Chumash house – acorns, manzanita and islay (wild cherry)
- Share first person quote about the plants to deepen understanding

Lab report:

- Students count the plants and graph the results. *Advanced students can weigh their remains and graph the results of their sifting experiment by weight
- Students write a summary of what they found and what their findings tell us about Chumash people who lived at *Helo'*

Discussion Questions about life at *Helo'*:

- Based on the artifacts what do you think the people were eating?
- Based on the soil sample what do you think the people were eating?
- Why do our conclusions differ based on soil sample and artifact evidence?
- What do the artifacts and soil samples tell us about the diet of the people who lived at this site? What do the finds tell us about their lifestyle?
- Did we find all of the evidence? Did any of the plants slip through the screen? How might this skew our results? How might archaeologists deal with these same problems?

Assessment

Students are assessed in their discussion participation and on their lab reports and graphs.

Accommodations/Adaptations

For more authentic flotation, substitute fine potting soil for sand. Mix the recipe with water and add it to the screen. Pour a little water over the mixture at a time until all of the soil washes through the screen and only the plant materials remain. You might want to do this outdoors!

Adapt for beginning audiences by using larger “plant remains” and having students count their findings.

Additional Resources

Gamble, Lynn H. *The Chumash World at European Contact: Power, Trade, and Feasting Among Complex Hunter-Gatherers*. Berkeley and Los Angeles: University of California Press, 2008.

Hudson, Travis and Thomas C. Blackburn. *The Material Culture of the Chumash Interaction Sphere*. 5 vols Los Altos: Ballena Press, 1986.

Timbrook, Jan. *Chumash Ethnobotany: Plant Knowledge among the Chumash People of Southern California*. Berkeley: Santa Barbara Museum of Natural History, 2007.

Site: *Helo'* SBA-46
Excavation dates: July 14 – August 1, 1986

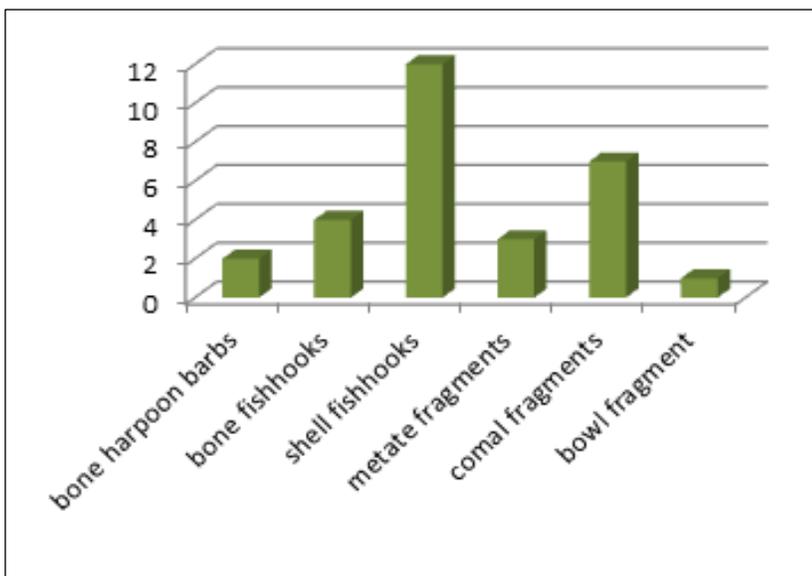
Excavation report

The archaeological site of *Helo'* is located on the coast, near Santa Barbara. There are plans to build an airport here. Before they could start construction, our team of archaeologists had to excavate the site for clues about the Chumash people who lived there long ago.

The site is divided into different areas. Area 1 is a place where Chumash people had built a house, called an *'ap*. We know this because we found the floor of the house when we excavated.

Research Question: What did the people who lived at *Helo'* eat?

We found many artifacts in Area 1. Some artifacts provided clues about the diet of the people who lived in the house. We excavated two bone harpoon barbs, four bone fishhooks, twelve shell fishhooks, three metate fragments, seven comal fragments and one bowl fragment. Table 1: Artifacts from Area 1 at *Helo'*.



As we excavated, we saved the samples of the soil that we dug up. I have sent these soil samples back to the lab.

Please sift the soil, sort and identify any remains. We need a report on the soil sample as soon as possible. If you gather any evidence about what the people were eating, please include that in your report. Please include a graph of your finds.

Table 1: Artifacts from Area 1 at *Helo'*