



## Making Rope and String by Hand

The making of cordage – rope and string – underpins California native technology: snares, sandals, bows, fish lines, nets, pole house frames and tule boats are only a few of the tools that were completed with some form of twisted plant fiber or sinew cordage. Some peoples used rawhide or the hide of sea lions, but perhaps most useful to California Indians were the cords made of vegetable fibers such as dogbane, nettles, cattails, iris, willow and cedar. Plant materials do not loosen or expand when wet and are found virtually everywhere.

Each material has specific requirements for extracting and preparing the fibers, but there are only two basic ways for using the fibers to make a cord: braiding (or plaiting) and twining. Braiding was usually done with flat, split materials such as cattail or flattened straw. The instructions in this article will deal only with twining, specifically with two ply (S-twist, Z ply, also called right handed) cordage.

### Suggested Materials for Simple Cordage Making

Dogbane (*Apocynum cannabinum*), also known as "Indian hemp," produces exceptionally strong cordage. (Please note that it is a poisonous plant: *Apocynum* means "poisonous to dogs".) For information about processing raw dogbane into cordage, see this excellent video series from East Bay Regional Park District naturalist Dino Labiste:

[http://primitiveways.com/cordage\\_video.html](http://primitiveways.com/cordage_video.html).

For a simple exercise in twisting plant fiber into cordage, consider buying natural string such as 10 lb. of 20 lb. hemp cord found at *Michael's* stores (see right).



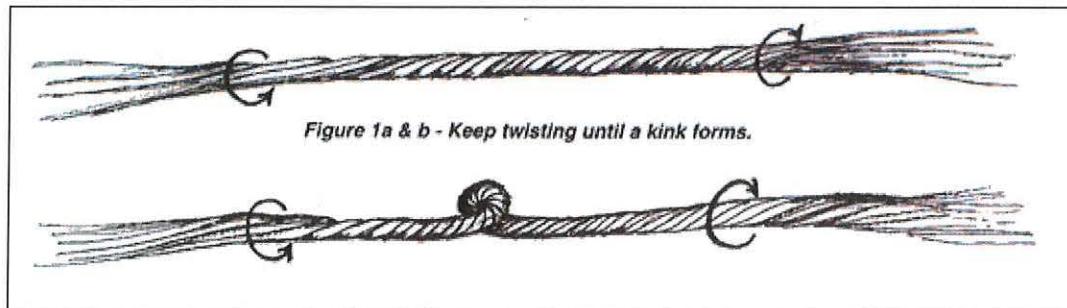
### Instructions for Simple Cordage Making

- (1) Cut the desired number and length (see below) of string. The number of strings you use depends on the thickness of cordage you want. A minimum of 2 strings is suggested, but you may go up to 6. You will always use an even number of strings.

Necklace = 5 ft.

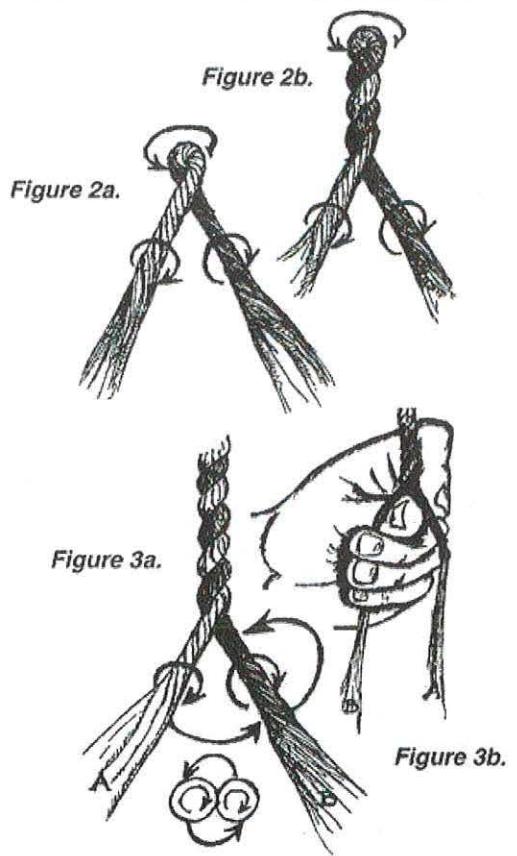
Bracelet = 2 ft.

- (2) Find the middle of the strings by touching the end of each length together. Grasp the strings about 1 – 1 ½ inches from either side of the middle point. Twisting the fibers clockwise with both hands, wind the bundle tight. Keep twisting until a kink forms (Fig. 1a & b). Note that you will be twisting each hand in an opposite direction: your right hand twists away from your body and



your left  
hand  
twists  
towards  
body.

(3) The kink should rotate on its own in a counterclockwise direction (Fig. 1a & b). Twist until two or three rotations occur (Fig. 2a & b). This is the start of a two ply cord. At this time you can attach the end to something solid (like a table or log) and begin twisting and counter-rotating. Use a push pin through the loop that you formed in the previous step.

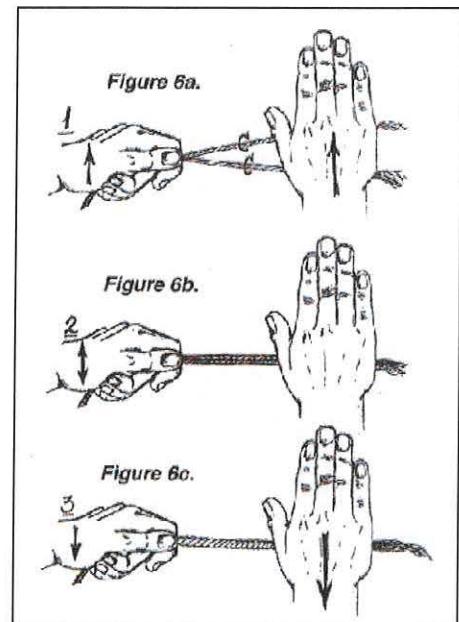


(4) Counter-rotating, one form of finger-twisting, involves each hand applying a clockwise (S) twist into a ply, while passing the right ply over, and the left ply under (counter-clockwise or Z-plying). In Figure 3a, your left hand twists ply A clockwise, while your right hand does the same with ply B. At the same time, you pass ply B over and behind your left thumb and lock it in place with your remaining fingers, as in Figure 3b. You then take A in your right hand and B in your left and repeat, over and over and over again.

(5) When you reach the end of the string, you can place beads or pendants on your cordage before tying the ends into a knot.

### Thigh Rolling Method (Advanced)

When making mass quantities of cordage, it is much faster and easier on the hands to use the leg (thigh) rolling method. The principle is the same, S-twist, Z-ply, but the twist is applied by rolling on the leg, rather than twisting between the thumb and finger. You can continue to work without getting cramps in your hand muscles, and you can (with practice) work faster (about ten feet per hour). The critical element in making this method work is having the right surface on which to roll. Traditionally the bare left thigh is used. If you do not want to expose your skin, or if your legs are hairy, you can use pants, but these should be tight around your leg, so they won't bunch up as you roll, and they should have a rough enough surface to give traction. Keeping them damp is also critical. This method is illustrated in Figure 6a-c.



## **CORDAGE: Making Rope and String by Hand**

### ***Theme***

Cordage was a "keystone" technology that was used by native peoples to make the necessary objects for everyday life and culture: hunting tools, shelter, clothing, entertainment.

### ***Background***

The making of cordage – rope and string – underpins California native technology: snares, sandals, bows, fish lines, nets, pole house frames and tule boats are only a few of the tools that were completed with some form of twisted plant fiber or sinew cordage. Some peoples used rawhide or the hide of sea lions, but perhaps most useful to California Indians were the cords made of vegetable fibers such as dogbane, nettles, cattails, iris, willow and cedar. Plant materials do not loosen or expand when wet and are found virtually everywhere.

Each material has specific requirements for extracting and preparing the fibers, but there are only two basic ways for using the fibers to make a cord: braiding (or plaiting) and twining, which is the twisting of plant fibers into cord. Braiding was usually done with flat, split materials such as cattail or flattened straw. Twining is done with the *bast* fibers found in the "inner bark" or skin of a plant. The bast, found in the phloem, must be separated from the xylem or woody core in a process called retting. Important plants used for twining cordage in California include dogbane, milkweed, willow and stinging nettle.

### ***Activity: Introduction***

**Show** students the piece of dogbane cordage and ask,

**SAY:** What is this that I am holding?

*Students will answer string, rope, twine.*

**SAY:** The word for this is CORDAGE. What do you think it is made of?

*Elicit answers and discuss:*

**SAY:** It is made of fibers from a local plant. Native peoples all over the world have been making cordage from local plant fibers for thousands of years. Today, we continue to use plant fibers to make rope and string.

**SAY:** What is cordage used for? Let's see how many uses we can come up with.

*Elicit answers.*

**SAY:** Cordage was an extremely important technology that was used by native peoples in California to make the necessary objects for everyday life and culture: hunting tools, shelter, clothing, entertainment.

**Show** the bow strung with cordage. Allow students to hold it gently.

**Show** activity cards. As you show each picture, ask two questions:

1. What is this?
2. Can you find the cordage? Or How does this object use cordage?

### **Activity: Making Cordage**

**SAY:** Each material has specific requirements for extracting and preparing the fibers, but there are only two basic ways for using the fibers to make a cord: braiding (or plaiting) and twining, which is the twisting of plant fibers into cord. Braiding was usually done with flat, split materials such as cattail or flattened straw. Twining is done with the *bast* fibers found in the "inner bark" or skin of a plant. The bast, found in the phloem, must be separated from the xylem or woody core in a process called retting.

**Show** students the laminated photo of bast in flax cross section.

**Show** students tule and dogbane.

**SAY:** It takes great skill to effectively separate the bast fibers. Today we are going to practice the twining technique of cordage-making by using string that has already been processed for us. Cordage is made strong by twining or twisting thinner fibers together.

- Students decide what they want to make: bracelet, necklace, cord for pin and ring game, etc.
- Adult distributes string and then models the steps of the technique:

#### **Instructions for Simple Cordage Making**

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(3) The kink should rotate on its own in a counterclockwise direction (Fig. 1a & b). Twist until two or three rotations occur (Fig. 2a & b). This is the start of a two ply cord. At this time you can attach the end to something solid (like a table or log) and begin twisting and counter-rotating. Use a push pin through the loop that you formed in the previous step.

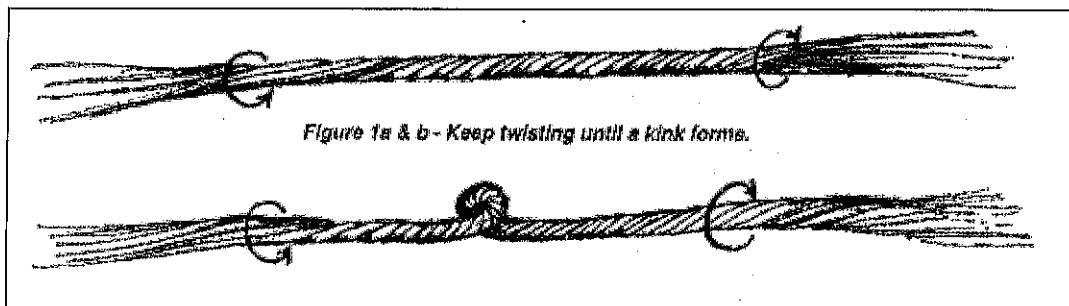
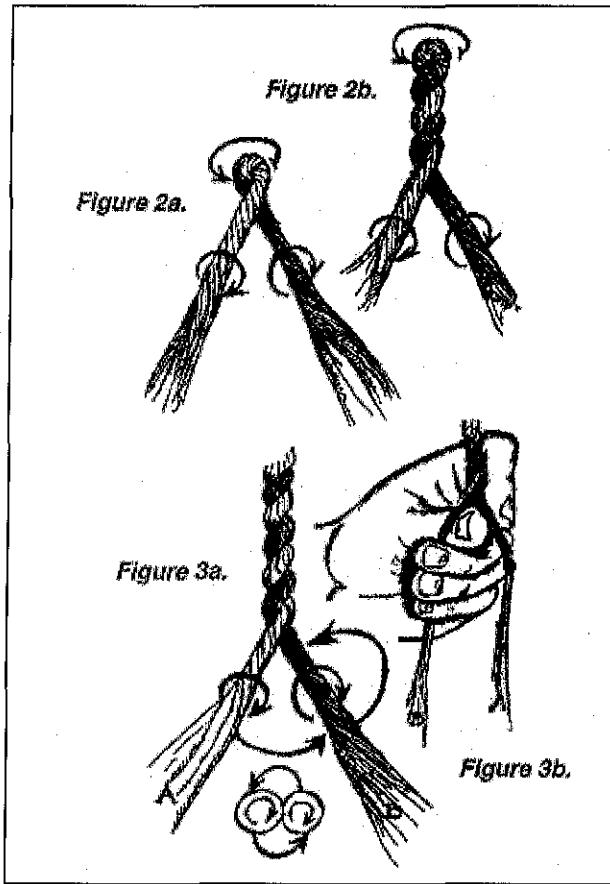


Figure 1a & b - Keep twisting until a kink forms.

(4) Counter-rotating, one form of finger-twisting, involves each hand applying a clockwise (S) twist into a ply, while passing the right ply over, and the left ply under (counter-clockwise or Z-plying). In Figure 3a, your left hand twists ply A clockwise, while your right hand does the same with ply B. At the same time, you pass ply B over and behind your left thumb and lock it in place with your remaining fingers, as in Figure 3b. You then take A in your right hand and B in your left and repeat, over and over and over again.



## Cordage Photo Cards

### 1. Bird Snares

1a. The sketch on the left shows a flicker and a spring-action snare. PIGEONS, JAYS, AND RED-SHAFTED FLICKERS were caught in a noose trap baited with an acorn placed between four vertical sticks. A fifth stick, serving as a trigger, had the noose attached to it. The end of the trigger stick was placed on the acorn. When the bird pecked at the acorn the trigger was dislodged, the trap sprung, and the bird hung by the spring pole. A single hunter could set as many as two hundred snares in a day. He visited them frequently and might secure a basketful of birds during the day. It was necessary to remove all ensnared birds before night, as the coyotes would eat them and destroy the traps.

1b. The sketch on the right shows a quail snare made of human hair. These traps were usually placed near a spring in an opening in the brush that the birds would naturally pass through. The bird "found itself caught by head, wing, or foot and worried itself to death in its endeavor to gain freedom".

### 2. Duck Trap

Two poles were set up in the shallow, still water near the shore of a lake or stream where the ducks were wont to feed. Between them was stretched a net about six feet wide and forty or more feet long. The edges were weighted slightly and to the middle of the upper edge was attached a long cord which ran to the hiding place of the watcher in the neighboring tule or tall grass. Acorns were used as bait, since these sink to the bottom. At first a duck or two might discover the bait and commence feeding. This attracted others and soon a large flock was swimming and diving for the bait. When a sufficient number were in the proper position, the watcher gave a careful, strong pull on the line. This caused the net to fall flat on the water. The first impulse of the ducks was to fly away rather than to dive. Immediately they tried to rise they became entangled in the meshes and the watcher easily caught them.

### 3. Duck Decoys

Native peoples all across North America have been creating duck decoys for thousands of years. Floating duck decoys are an essential hunting tool to lure birds to within reach of the bow and arrow, spear, net or rifle. In 1924, miners harvesting bat guano uncovered a cache of tule reed duck decoys over 2,000 years old in Lovelock Cave in Nevada (shown in photo). In 1995, the tule duck decoy was declared the state artifact of Nevada.

4. Dance Skirt or Cloak

This Sierra Miwok garment, worn only during ceremonial dances, is made of great horned owl and hawk feathers, with pendant and double bone whistle that is attached to netting made of cordage.

5. Sandals

Sandals made of cordage were found all over California. The construction materials varied, depending on what plants were locally available.

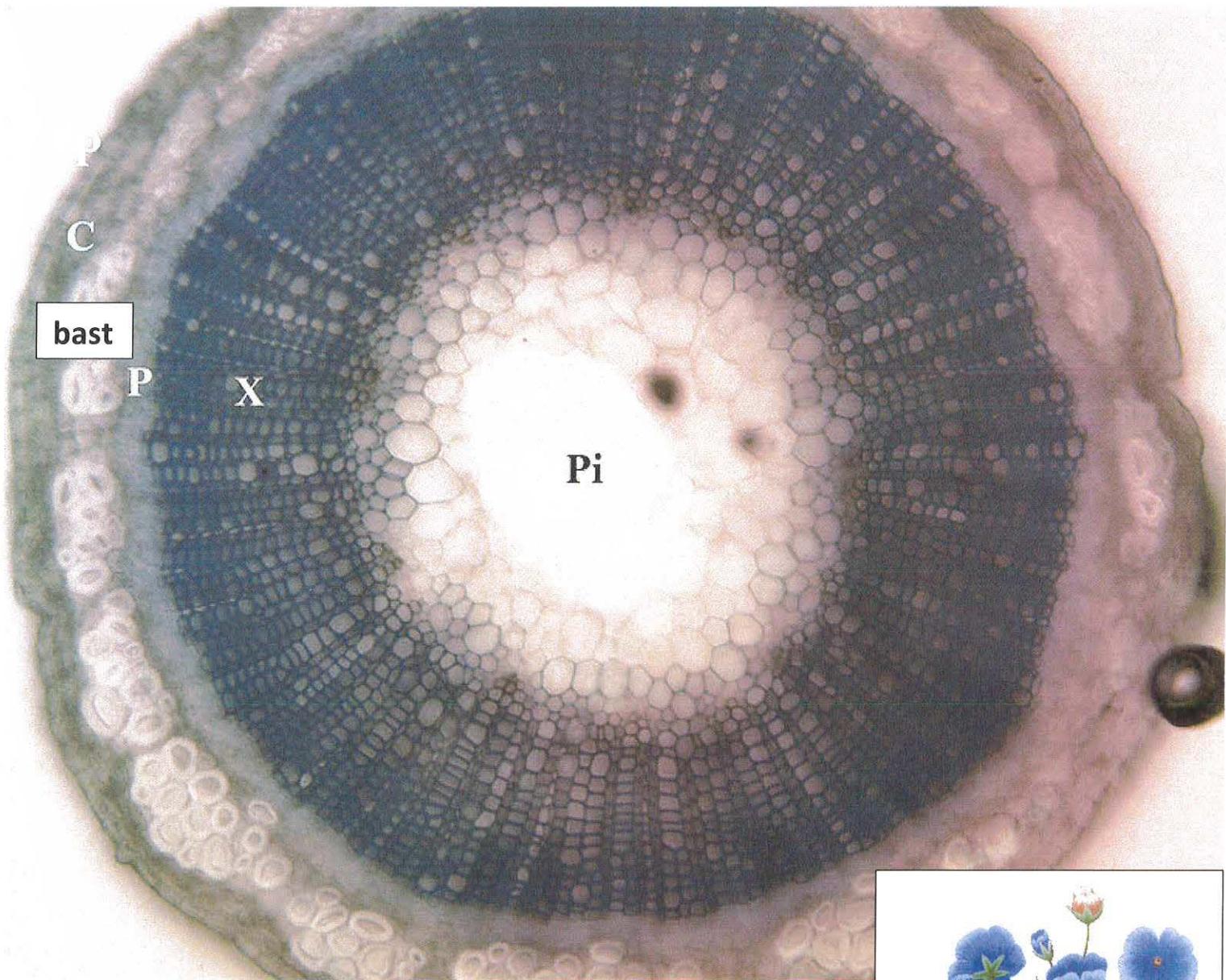
5a. Sandals made from tule by the Modoc of N.E. California.

5b. Sandals made from yucca by the Cahuilla of inland Southern California.

6. Sling and Clay Balls

The Pomo people of the Clear Lake region historically used a slingshot for hunting ducks and marsh hens. This sling is made of tule and dogbane, also called "Indian hemp". The basket holding the clay balls is also made of tule.

# Bast Fibers: Flax Stem Cross Section



Ep = epidermis

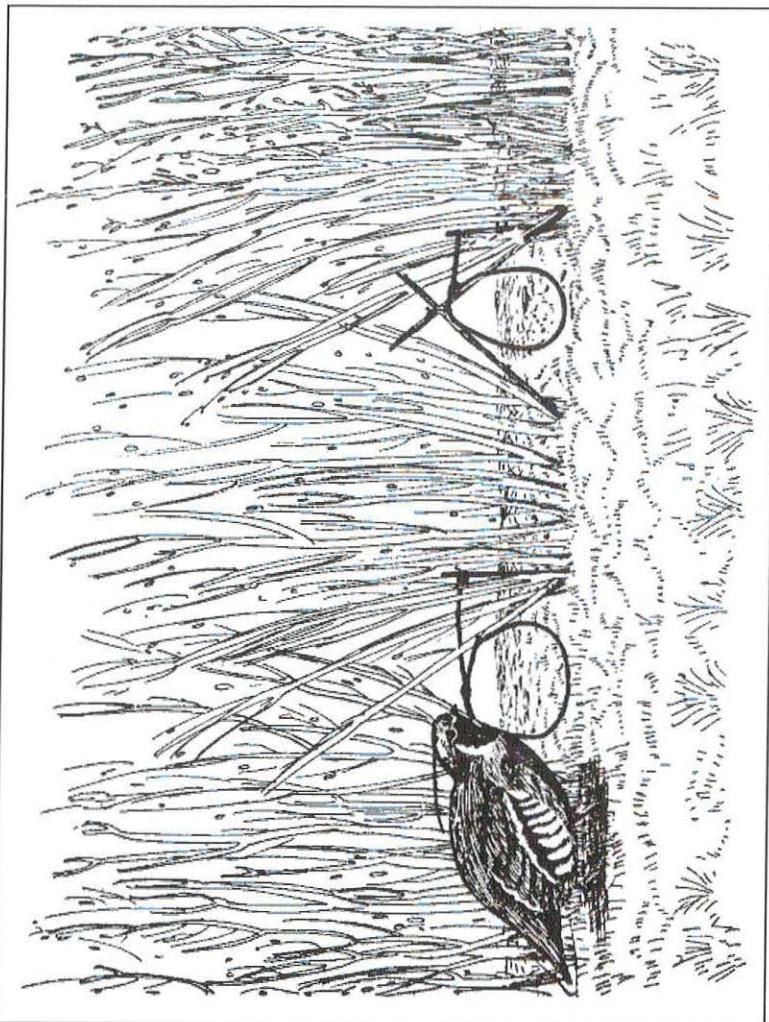
C = cortex

P = phloem

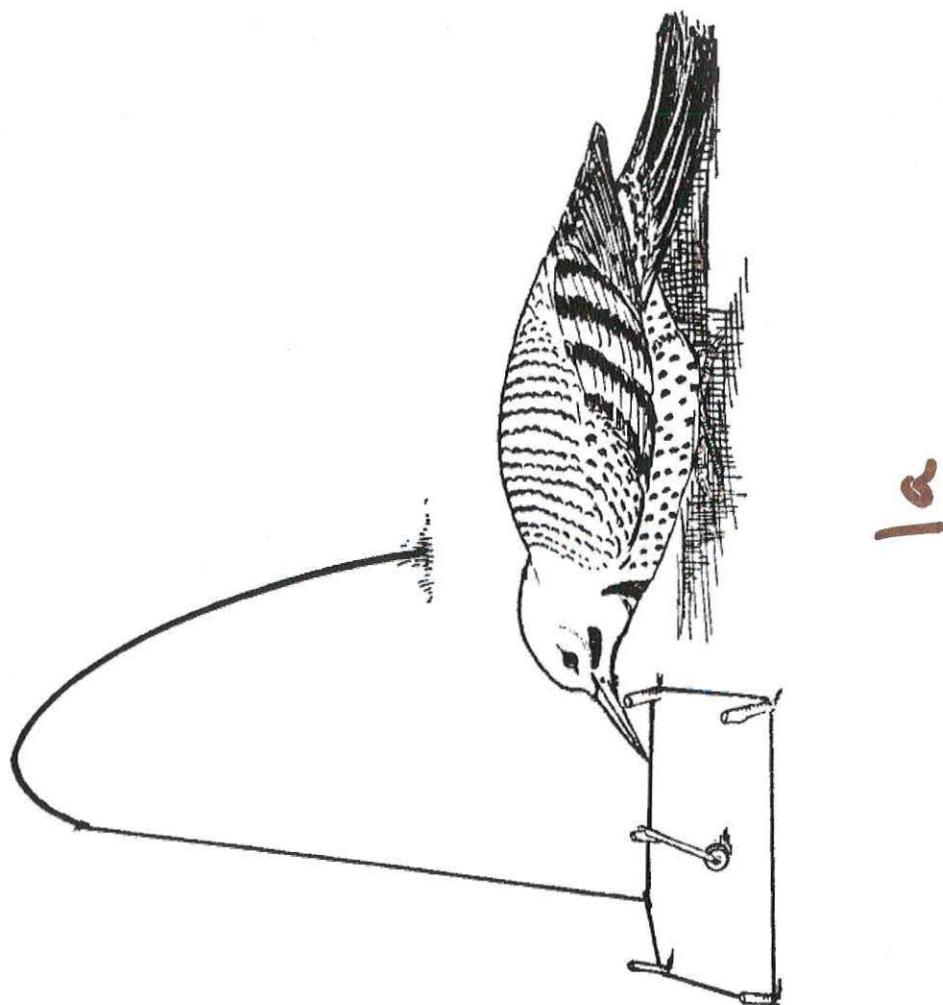
X = xylem

Pi = pith

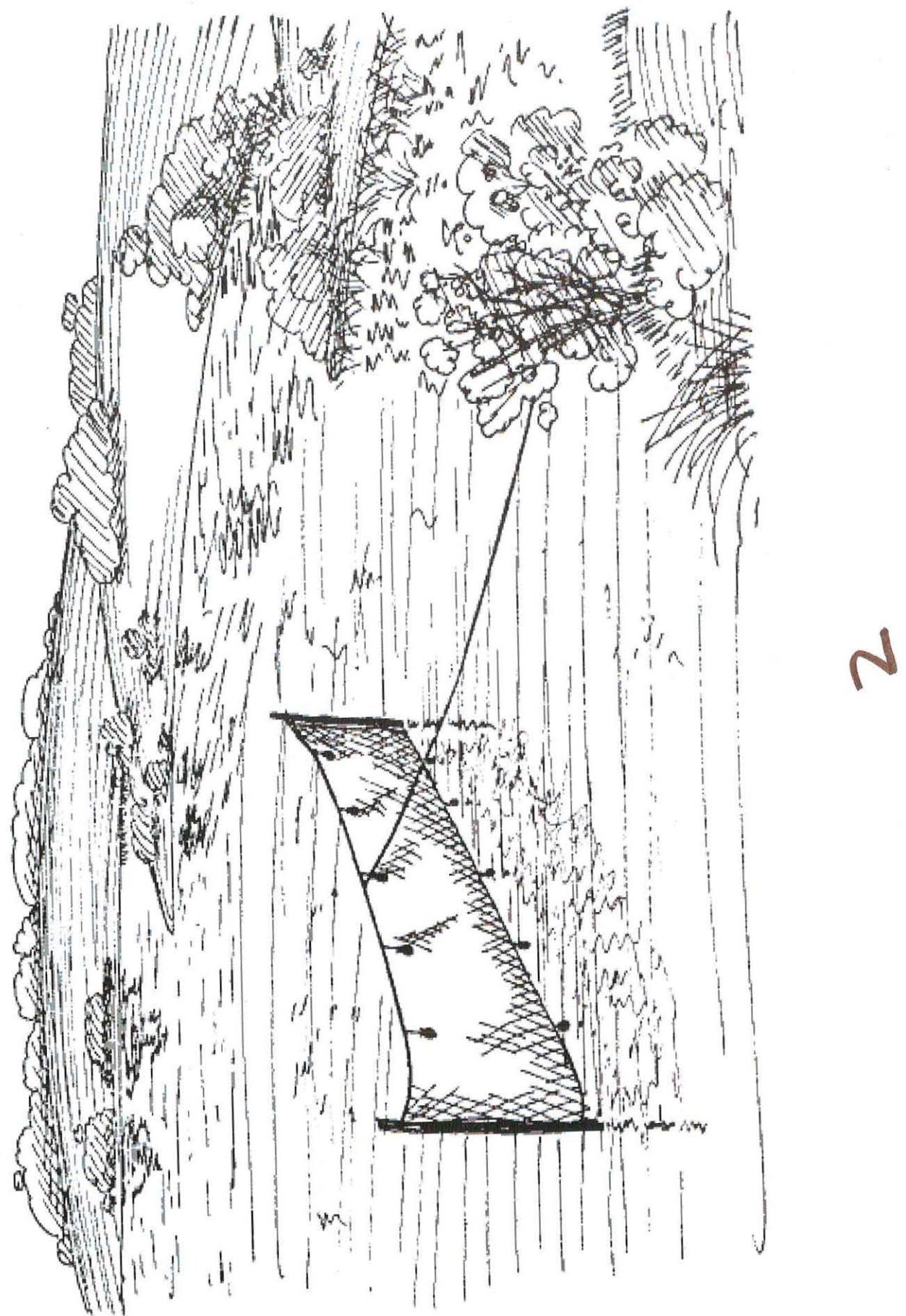




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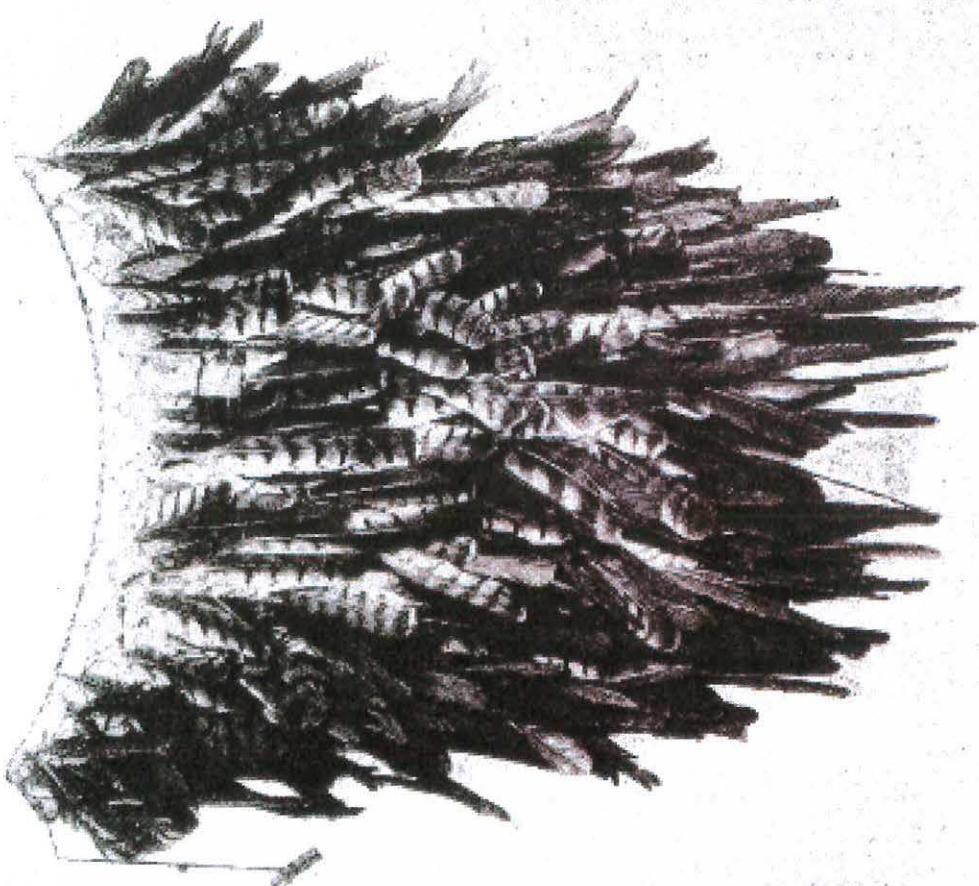
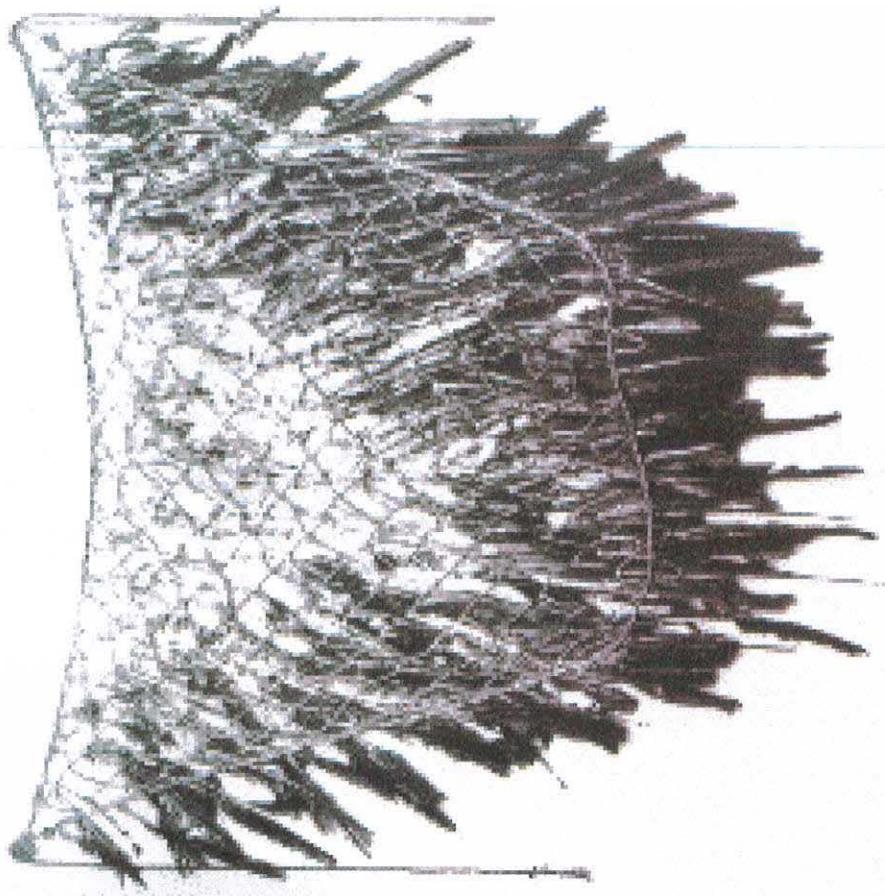


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3



4



5a



5b



6

## Miwok Skill Center: Miwok Kitchen

**Theme:** The traditional Coast Miwok “kitchen” was not actually that different from our modern kitchens: it was a place to express creativity, socialize, develop lifelong skills and make tasty food.

### **Introduction**

Gather the group to the side of the tarp, away from the stones, so you can have their attention while you introduce the activity for about 10 minutes.

**SAY:** Welcome to the Miwok kitchen! Does this look like your kitchen at home – what is different?

*Students will likely say that there are no appliances, furniture or familiar foods and it's outside.*

**SAY:** Yes, obviously this kitchen looks different, but you’re going to find that it’s quite similar. We do have some equipment (mortas and pestle; hammerstones and shelling rocks) – what we might consider our “appliances” – and some dishes (baskets and bowls) and some food even if it doesn’t look like the stuff you buy at the store. Also, you’ll see that this Miwok kitchen is a place to learn, show off your cooking talents and socialize with your friends – not that different from a modern kitchen!

**SAY:** Now that we are all Coast Miwoks, where are we going to get our food?

*Students will most likely say that we go hunting or fishing or gathering berries. They may say gather acorns.*

**SAY:** It is important that our diet is balanced – so we will eat all of those things. It is also important that our food supply is steady and contains enough calories to keep us healthy and strong. For many native peoples in California, this staple food – a food that formed the foundation of their diet - was ACORNS. Acorns are the seeds of oak trees and they are very nutritious. They are high in protein, fat and complex carbohydrates.

**SAY:** Acorns are still cooked by Indian people today, although not usually as a staple or everyday food. They cook acorns for a special occasion, like a holiday or a festival. Food is a really important way for us to remain connected to our heritage. What are some foods of your heritage?

*Give a personal example and elicit answers.*

**SAY:** Now that you know you need some acorns, where do you go to get them?

*Students will say into the forest, or to oak trees. (There are oak trees surrounding the beach area.)*

**SAY:** Who gathers the acorns? Men shake the trees and women and sometimes children gather the acorns. Gathering acorns was the only part of the preparation and cooking of acorns that kids were allowed to do. This was what they learned:

- Where to find acorns
- Who owned what trees (trees were considered property and were passed down from mother to daughter)
- How to identify good acorns

**ACTIVITY 1:** Pass around the basket with mix of acorns (from container marked "Activity 1") and ask students to identify the bad ones. Ask them why they think these are bad. The bad ones will

- have insect holes where larvae have bored into them
- may be really small or misshapen
- have black spots
- Be green or a funny color (green ones are not ripe)
- Be light in weight

**SAY:** The older women can also help you learn to identify the different species of oak trees. The acorns all taste different.

**ACTIVITY 2:** Pass around the basket with a mix of acorns (from container marked "Activity 2") and ask students to tell you how many different kinds of acorns are present. Ask students how they know: (There are three different species: valley oak, coast live oak and tanoak.)

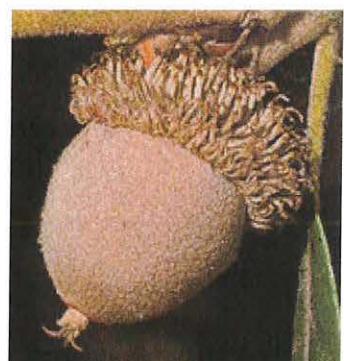
- Cap shape and texture; Size; Color and texture of acorn



Valley Oak: warty cap



Coast Live Oak: scaly cap



Tanoak: fringed cap

**SAY:** What do you do after you have gathered acorns? This is actually a trick question, because you, as kids, wouldn't be doing anything next but observing. Most likely you are playing!

The process for preparing and cooking acorns is very involved and requires great skill. Because acorns contain chemicals called tannins, there are extra steps to making sure all of the tannins have been removed.

Today, we are not going to try to process acorns. Instead, we have some other "seeds" that are much easier to use. **SHOW** the almond and ask if anyone knows what it is. Almonds are actually native to the Middle East – Iran and Iraq for example – but today California is the single largest producer of almonds (grown in Kern County in the Central Valley).

### **ACTIVITY 3: SHELLING AND POUNDING**

**DIVIDE** the group so that every person/ pair goes to a shelling rock. Explain that traditionally, every woman had her own mortar and sometimes even her own oak tree that was passed down through families. Everyone will start by pounding at least five almonds and then they will take turns at the mortar, spending about 3-4 minutes pounding the nuts. The adult leader will demonstrate this shelling technique and then will demonstrate the pounding technique at the mortar. (Remember that you are not actually "grinding" the nuts, but are pounding them. Lift the pestle with both hands and allow it to drop, attempting to establish a rhythm. You never want to hear rock hitting rock – add more starter meal or nuts in this case.)

**SHELLING:** The object is to hit the rock with the hammerstone so that the nut shell breaks, but not the nut. This will produce less waste and nut shell fragments which may be difficult to remove fully. The leader demonstrates the technique and then students practice. Students place the nut meat into the bowls and the shells into the empty baskets that are placed between the shelling rocks. The brushes can be used to help keep the rocks cleared of shell fragments as you shell. (**It is important that care is taken to ensure a mess isn't made and nuts are not wasted!! Remember, your family depends on this food.**) Instruct each student to break about 5 nuts that they will pound at the mortar. As students wait their turn to go to the mortar, they are welcome to shell more nuts that they can eat then or place in one of the Tupperware containers for later.

**POUNDING:** Invite students to come up to the mortar one at a time. Each person will bring up five nuts they have shelled. Place some "starter" almond meal in the mortar – about an  $\frac{1}{2}$ -1 inch deep. Lift the pestle and allow it to drop. Do this a few times, trying to establish a rhythm. The object is to *pound* – NOT GRIND. You also never want to hear rock on rock. There should always be enough nuts to pad the pestle. When a student finishes pounding their almonds into a meal, s/he uses the wooden spoon to remove the meal and place it in the communal Tupperware container. This meal can be taken back to school to be used for a recipe or used that night to make Tomales Bay Champurrado (a thick hot chocolate). See recipe on next page.

## CLEAN-UP:

- Scoop out all the nut meal from the mortar and place into the Tupperware container. Use brush to clean out mortar.
- Use whisk brooms to whisk off rock surfaces.
- Place all shelled nuts that weren't pounded into the other Tupperware container.
- Place all shells into a single bowl/tray and dump into garbage can.

### Recipe: Tomales Bay Champurrado

*Ingredients:*

1 Serving	16 Servings
½ cup milk	½ gallon milk
½ cup water	½ gallon water
1 avg. size California bay leaf (4" long, 1" wide)	16 avg. size California bay leaf (4" long, 1" wide)
1 tbsp unsweetened cocoa powder	1 cup unsweetened cocoa powder
1 ½ tsp sugar	½ cup sugar
3 tbsp almond meal	3 cups almond meal

*Cooking Instructions:*

1. Add water and milk to saucepot and heat until steaming.
2. Add California bay leaf (*Umbellularia californica*) and heat for 10 minutes.
3. Remove bay leaf; add cocoa and sugar and whisk to mix
4. Add almond meal and continue to heat and stir for 5 minutes
5. Remove from heat and allow to sit for 5 minutes
6. Serve in a cup with a spoon and enjoy.



California bay trees (*Umbellularia californica*) are found throughout the SF Bay Area. California bay traditionally had a variety of ceremonial, culinary and medicinal uses for native peoples, and continues to be one of state's most important and delightful native plants. It is found in oak woodlands, mixed evergreen forest, redwood forest and chaparral below 1600 meters. When its leaves are crushed, they release a strong peppery, menthol-like odor. It is about 4 times as strong as Mediterranean bay leaf.

## Miwok Skill Center: Pump Drills

**Theme:** Coast Miwok culture is constantly evolving; they have and continue to readily adopt new technologies such as the pump drill.

### **Introduction**

Gather the group to the side of the tarp, away from the pump drills, so you can have their attention while you introduce the activity for about 5 minutes.

**SAY:** Did you know that Coast Miwok people living hundreds of years ago had MONEY? What would they have used money for?

*Students will likely say trading for or buying things they wanted.*

**SAY:** Coast Miwok people used money to buy obsidian from Pomo and Wappo people who lived northeast in modern Sonoma and Mendocino counties (closest source of obsidian to Marin). They also used money to pay people in their own tribe for songs and prayers – medicine – or to learn a skill or settle a debt.

What do you think the money was made of? (HINT: You find it everywhere here at Indian Beach.)

Shells! The Coast Miwok were renowned for their beautifully crafted beads made from Washington clam shells that many tribes in California used as money.

- SHOW PHOTO of CLAM (#1) and pass around clam shell.

People who wore long strands of clamshell beads were wealthy, like this young Pomo woman.

- SHOW PHOTO of POMO GIRL (#2)

**SAY:** Local people including the Pomo whose ancestral land of a little north of here also used clam shell beads along with other shell beads to make beautiful jewelry.

SHOW PHOTO of JEWELRY (#2)

**SAY:** How do you think the Coast Miwok made these shells into beads?

Elicit student answers

**SAY:** They would sand the shells down to shape them and then they would drill a hole into them. For thousands of years the drilling was done by hand.

- SHOW PHOTO of HAND DRILL (#3)

Ask students to rub their hands together in the motion they would use for a hand drill for about 30 seconds and then ask them if this was hard or easy. Could they keep this up for a long time?

**SAY:** When European colonists began to settle North America, they brought new drilling technology called the pump drill. The pump drill was developed in ancient Rome. What do you think native people did when they saw this new tool? Did they turn away from it because it was foreign or new? No – they quickly adopted it! Native people today value their traditional ways, but they also embrace new ways of living that may make their lives easier, economical or just plain fun.

Today we are going to practice this technology called the pump drill by making a few beads. You can use these beads to make some jewelry if you like. Demonstrate how to use a pump drill.

- **ACTIVITY:** Ask every student to spend 5-10 minutes finding TWO nice flat shells / shell pieces to make into beads. They need to be careful not to bring back occupied snail shells! Please emphasize that this is a special privilege to be able to collect shells, since this is normally not allowed. Because they are here with ELP, they are able to collect TWO shells – they should take their time finding a couple they like!

Students then can make some beads with their own gathered shells as well as a couple beads with the striped clam shells and any abalone bits that are big enough.

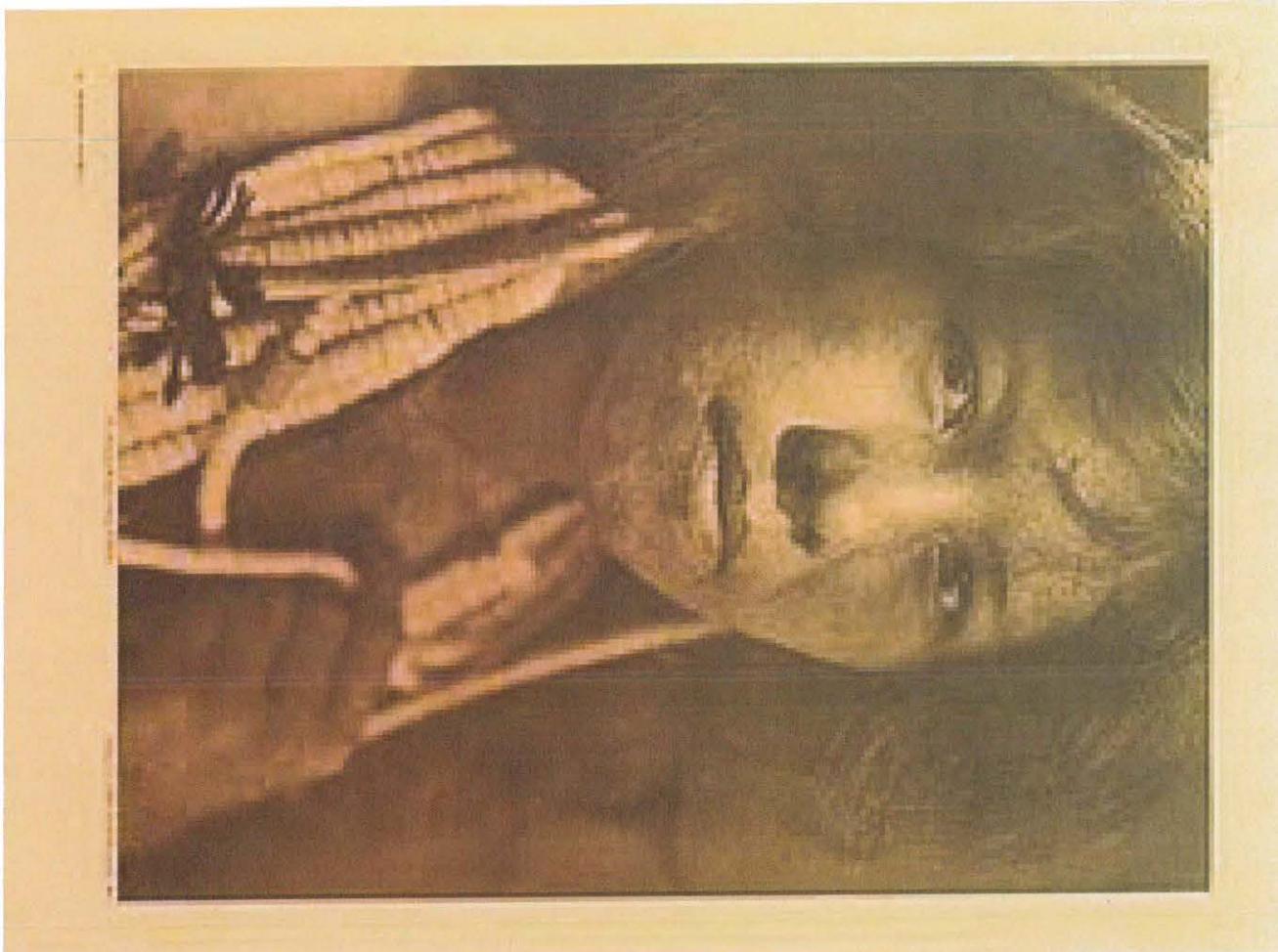


Photo: Cal Academy of Science



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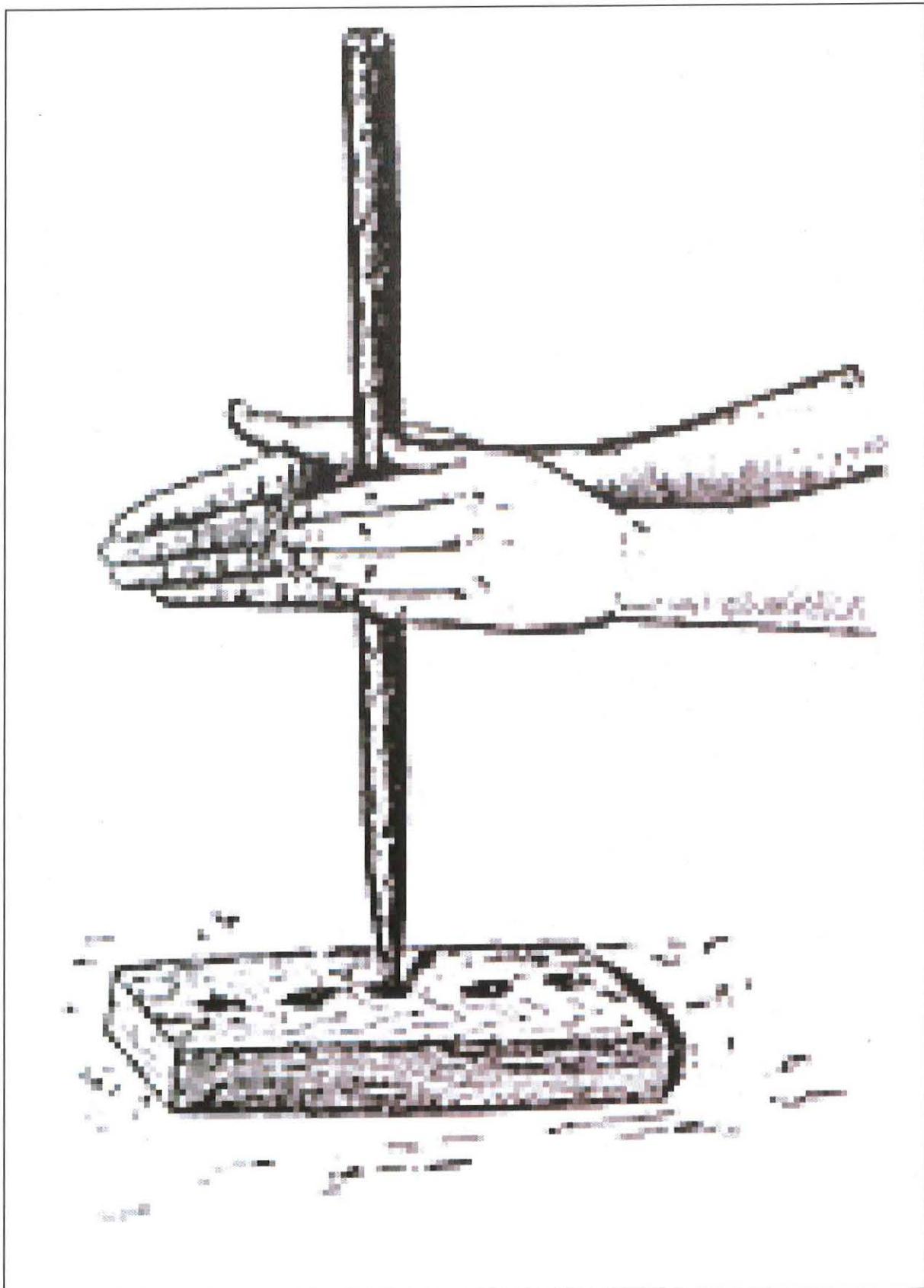


Pomo ear sticks with glass and abalone beads

②

Clam shell and abalone necklace





③



Ohlone girl

## Traditional Native Dress for ELP at Tomales Bay

Wearing a costume is an important component of historical role-play activities. Researching, creating and wearing an outfit of culturally appropriate dress facilitates imagination, empathy and learning. For this reason, ELP participants are strongly encouraged to create costumes for their overnight experience at Tomales Bay State Park.

### **Challenge the Plains Indian Stereotype**

When most non-native people think of traditional Indian dress, they picture clothing that was worn by Plains Indian tribes: beaded buckskin dresses, leather moccasins, and feathered headdresses. This was not the traditional clothing of native peoples living in the San Francisco Bay Area for practical as well as esoteric reasons. The materials used by Plains tribes such as the Cheyenne or the Sioux were not historically available to local people and were not appropriate to our climate. Furthermore, the material culture of a people – including clothing, tools and toys – is a unique expression of that people's world view. Learning about clothing is learning about a culture's values, economy and relationship to the environment.



Crazy Horse, Oglala Sioux

The cultural diversity amongst indigenous peoples in North America is vast and rich; it is educators' responsibility to challenge the dominant Plains Indian stereotype promoted in popular American media and lore. Researching the distinct dress of specific tribes will engender greater appreciation for the complexities and beauty of native California peoples.

### **Avoid Ceremonial Dress**

Another common point of confusion concerning native dress is that ceremonial clothing or adornment was every day wear for all tribal members. For example, feathered headdresses are considered "restricted items" because they are only worn by people (usually men) who have earned the right to wear them through acts of heroism or leadership. Similarly, Miwok headbands made of flicker feathers as shown below (right) are only worn during ceremonial dances and thus should never be appropriated use outside of their intended context. Diligent research will reveal other restricted adornment such as black and red body paint that is only worn

during particular Coast Miwok ceremonies

(below  
left).



Coast Miwok Ceremonial Dress, 19<sup>th</sup> cent.



Coast Miwok dancer, Kule Loklo



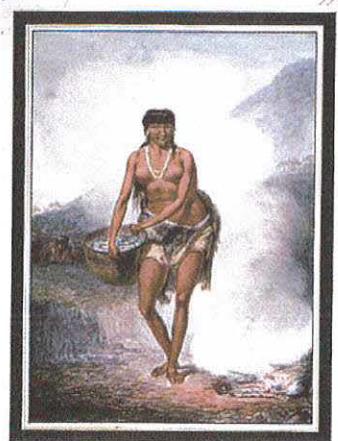
Ohlone sisters

### Suggested Dress

While it is important to be accurate in designing a traditional native costume, this poses certain challenges for the classroom teacher. Most native peoples of the SF Bay Area historically wore minimal clothing – men wore loincloths and women wore tule skirts and no shirts unless the weather was cold in which case animal skin capes were used.

The solution to this dilemma of finding a costume that is both historically accurate and appropriate to our modern expectations may be found by observing the contemporary ceremonial and cultural

clothing worn by native peoples. As seen in the photo on the left, a tule reed and buckskin skirt pairs well with a simple cotton shirt in an earth tone. An animal skin cape and jewelry made of abalone shell and clam are also used.



Coast Miwok woman, 19th cent.

### Girl's Costume

A store-bought grass skirt approximates the tule skirt. An earth-toned t-shirt and cape made of faux fur completes the costume. A beaded belt may be created. A necklace is made on the ELP overnight at Tomales Bay.

### Boys Costume

Boys should wear earth-toned create beaded belts, faux fur overnight at Tomales Bay. A used over pants or shorts.

shirt and pants. They may also cape and a necklace made on the "buckskin" loincloth could be



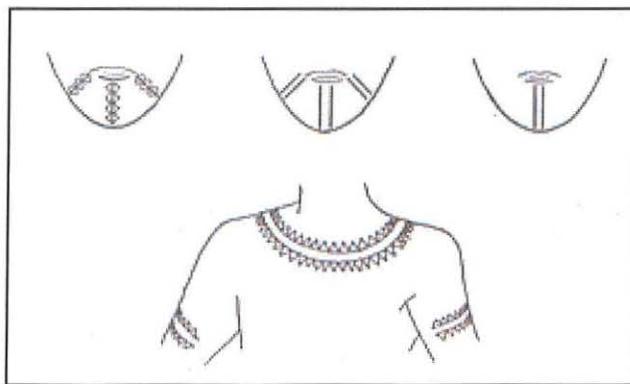
Traditional Bay Miwok dress



## Tattoos

Many native people of California, especially women, traditionally wore tattoos. Some, including Yurok educator Margo Robbins (left), continue this tradition. Most women all wear a widespread style of tattoo known as the "111" tattoo. The sketch below shows two of the many variations of 111 tattoos as well as a man's necklace tattoo of the Nomlaki people.

Margo Robbins

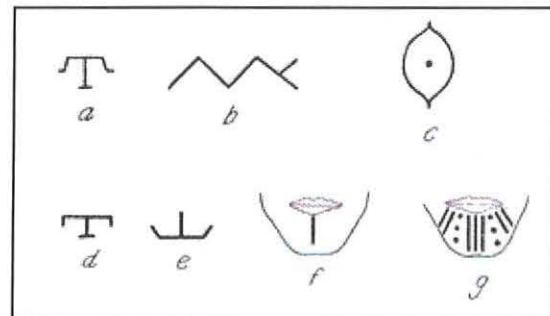


Nomlaki women's facial tattoos and men's necklace tattoo.

Although tattoos worn by men is less common, there is a tradition of facial and body tattoos, as seen in the sketch on the left.

According to ethnologist Stephen Powers who worked with several Central and Northern California tribes in the 1870s, the purpose of tattooing was to identify a person's clan or tribal membership. Tattoos have also been worn as adornment (much as they are all over the world).

Please see the outstanding article on native California tattooing rites, meanings and variations at [http://www.vanishingtattoo.com/california\\_tattooed\\_tribes.htm](http://www.vanishingtattoo.com/california_tattooed_tribes.htm).



Havasupai tattoos.

a-e: center of men's forehead; f-g: women's chin



Agnes Baker Pilgrim, Takelma Elder

