CALIFORNIA TRIBAL GROUPS

Tribal Areas at Contact

0 (km) 150
0 (mi) 100

Tolowa
Karuk
Shasta
Modoc
Yurok
Konomihu
Achumawi
Northern Paiute
Chilula
Shasta
Hupa
New River
Okwanuchu
Bear River
Wiyot
Whilkut
Chimariko
Wintu
Atsugewi
Nongatl
Yana
Sinkyone
Lassik
Maidu
Mattole
Wailaki
Nomlaki
Kato
Konkow
Coast Yuki
Northern Yukian
Northeastern Pomo
Northern Pomo
Eastern Pomo
Southeastern Pomo
Nisenan
Central Pomo
Lake Miwok
Patwin
Southern Pomo
Kashaya
Wappo
Washo
Coast Miwok
Plains Miwok
Northern Sierra Miwok
Karkin
Central Sierra Miwok
Bay Miwok
Chochenyo
Ramaytush
Southern Sierra Miwok
Tamyen
Awaswas
Mono
Mutsun
Yokuts
Rumsen
Chalon
Esselen
Panamint
Salinan
Tübatulabal
Kawaiisu
Obispeño
Purisimeño
Interior Chumash
Barbareño
Kitanemuk
Chemehuevi
Ineseño
Tataviam
Serrano
Ventureño
Mojave
Barbareño
Island Chumash
Tongva
San Miguel
Santa Rosa
Santa Cruz
Anacapa
Maricopa
Cupeño
Cahuilla
Juaneño
Luiseño
Santa Barbara
Santa Catalina
San Nicolas
Island Tongva
San Clemente
Lake Cahuilla (Historic extent)
Quechan
Kumeyaay
Arizona
Nevada
Mexico
Tulare Lake (Historic extent)
PACIFIC OCEAN
Channel Islands

INDIGENOUS LANGUAGE FAMILIES

0 (km) 150
0 (mi) 100

Tribal Areas at Contact

Algic
- Wiyot
- Yurok

Athabaskan
- Bear River–Mattole
- Chetco–Tolowa
- Eel River
- Hupa
- Kato

Chumashan
- Barbareño
- Ineseño
- Interior Chumash
- Island Chumash
- Obispeño
- Purisimeño
- Ventureño

Hokan[1]
- Chimariko[2]
- Esselen[2]
- Karuk[2]
- Palaihnihan languages
- Pomoan languages
- Salinan[2]
- Shastan languages
- Washo[2]
- Yana[2]
- Yuman languages

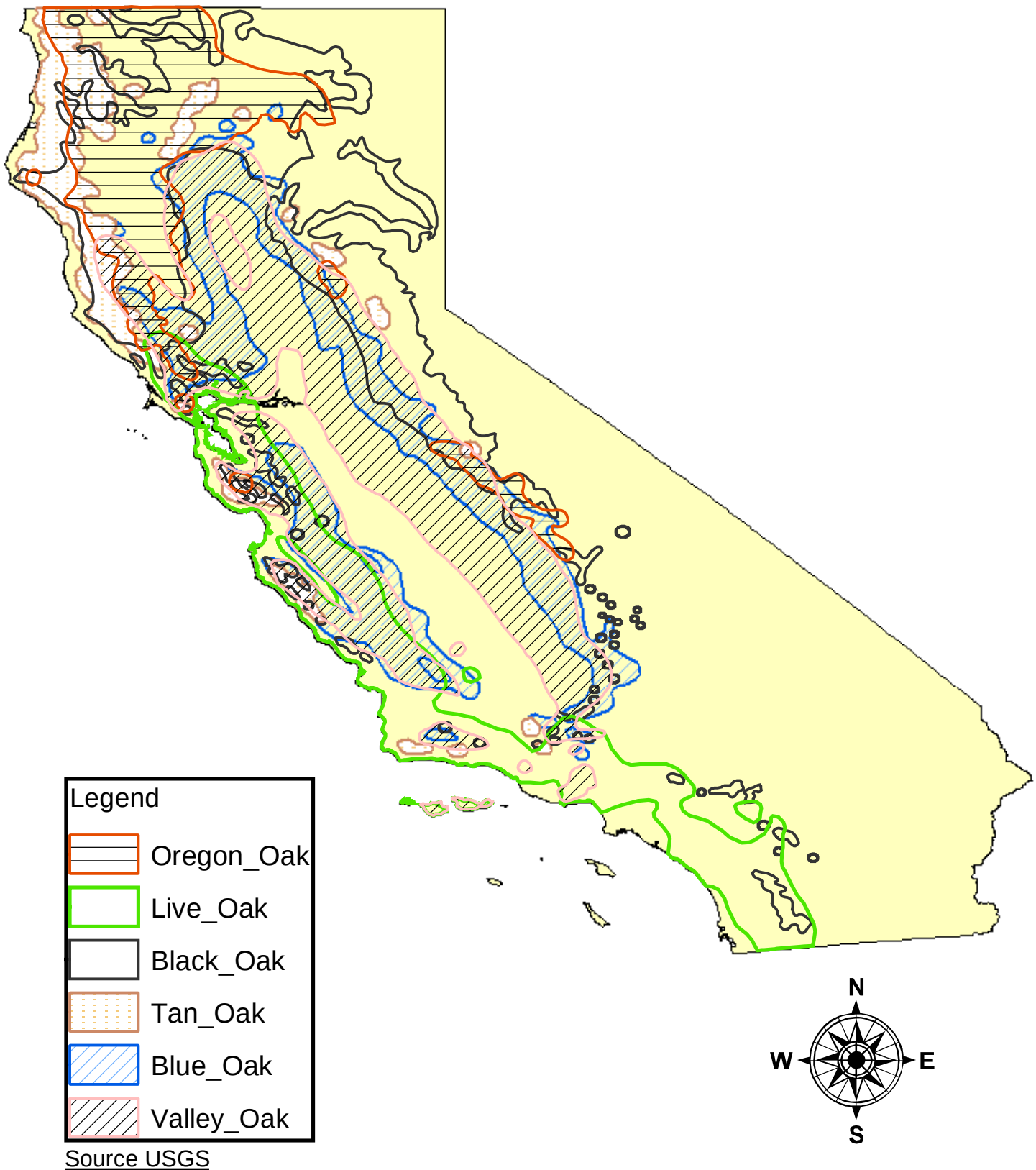
Penutian[1]
- Klamath–Modoc
- Maiduan languages
- Miwokan languages
- Ohlone languages
- Wintuan languages
- Yokutsan languages

Uto-Aztecan
- Numic languages
- Takic languages
- Tübatulabal

Yuki–Wappo
- Coast Yukian
- Northern Yukian
- Wappo

1. The existence of the hypothesized Hokan and Penutian language families is debated among specialists
2. Possible language isolate

California Oak Distribution



Source USGS

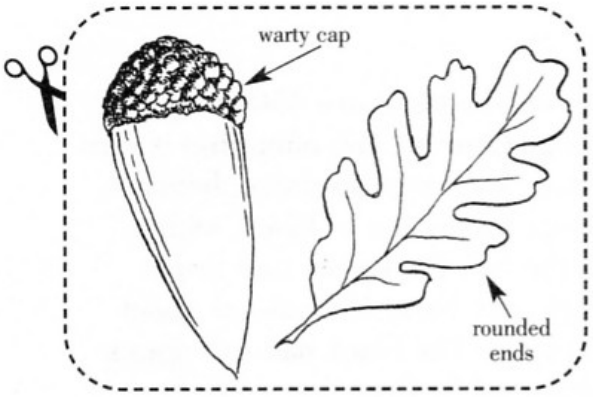
Learning to Recognize Oaks

1. Trace or make a rubbing of your oak leaf. Use a ruler to measure the length and width of your leaf. Add this information to your tracing or rubbing.

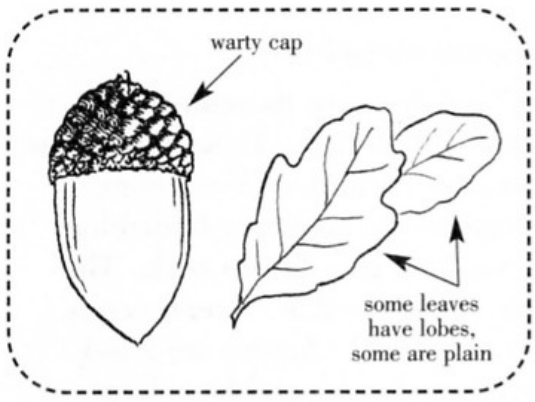
2. Make a list of words that describe how your leaf feels and smells.

3. Sketch your acorn. Be sure to include a drawing of its cap, if it has one. Measure the length of your acorn and include this information with your drawing.

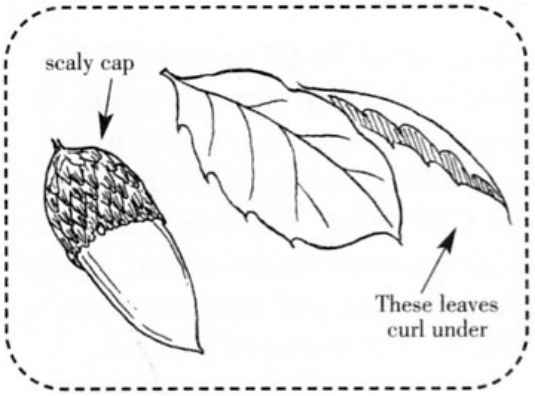
4. What kind of oak are you observing? List its scientific name and other information.



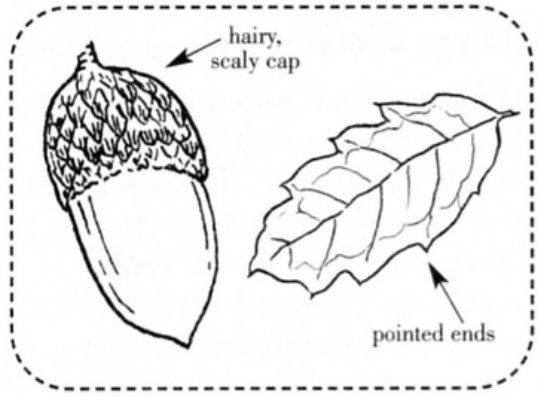
Valley Oak or Roble (*Quercas lobata*)
This is the tallest California oak tree, growing up to 36 meters (118 feet) in height with a spreading crown. It is a deciduous tree, which means it loses its leaves in the fall. You can find it from Shasta to Los Angeles Counties growing in deep, fertile soil near streams and rivers. It is often found near farms or in areas where agricultural activities were once located. Its leaves are 5-10 centimeters (2-4 inches) long with deep lobes. The acorn is very large, often 2.5-5 centimeters (1-2 inches) long.



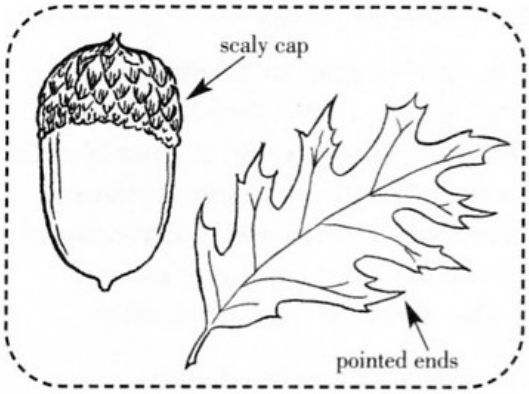
Blue Oak (*Quercus douglasii*)
This is a deciduous oak, which means it loses its leaves in the fall. Growing up to 15 meters (50 feet) tall, this oak is found in the foothills and nearby areas of the Central Valley from Shasta to Kern Counties. Blue oaks often grow with valley oaks and are only found in California. In the foothills, blue oaks grow in shallow soils on steep slopes and mingle with interior live oaks and gray pines. The bark of the blue oak is light gray or almost white. Leaves are a distinctive blue-gray color and measure from 2.5-5 centimeters (1-2 inches) long. Acorns take one year to mature and are small, about 1.5-2.5 centimeters (¾-1 inch) in length.



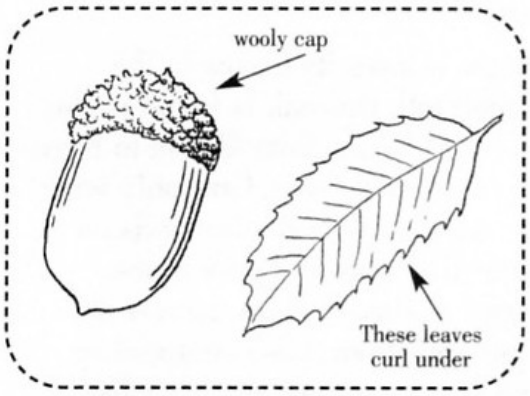
Coast Live Oak or Encina (*Quercus agrifolia*)
This is a large, evergreen oak that grows up to 30 meters (100 feet) tall. It is found from Mendocino County to northern Baja California (Mexico) in the coastal mountain ranges. The leaves look like holly and are leathery, about 2.5-7.5 centimeters (1-3 inches) long and curl under at the edges. Look for tufts of brown fuzz along the leaf veins. The acorns are small and slender with a cap that has thin and flattened shingle-like scales.



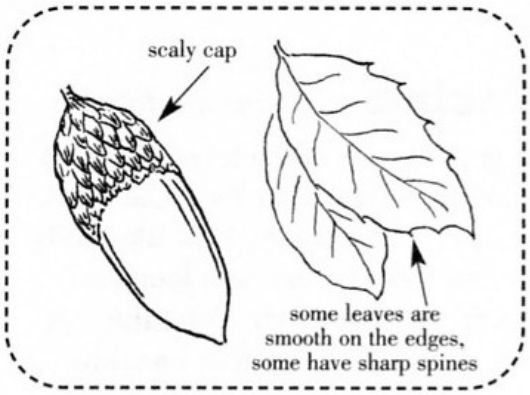
Engelmann or Mesa Oak (*Quercus engelmannii*) This is a very rare oak that is primarily found in San Diego County, but grows from northern Baja California (Mexico) to Pasadena in Los Angeles County. It is "late" deciduous which means that it loses its leaves each year, but usually not all at the same time. It grows up to 15 meters (50 feet) tall and has a rounded crown. The leaves are smooth, leathery, bluish and wavy on the edges. The acorns are oblong and between 1.5-5 centimeters (¾-2 inches) long.



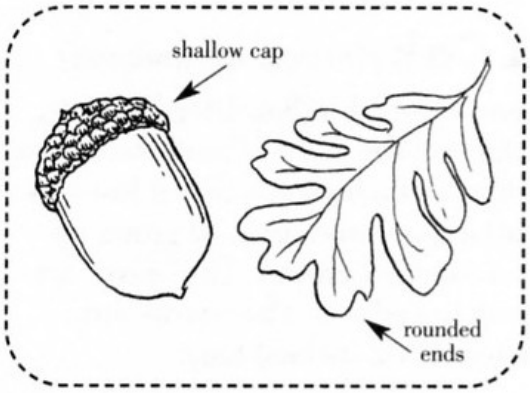
Black Oak (*Quercus kelloggii*)
This oak generally grows in higher elevations above 450 meters (1500 feet) from Oregon to San Diego County. You often find it with ponderosa pines and incense cedars. Its leaves are large, between 7.5-10 centimeters (3-4 inches) long, deeply cut or lobed, with a bristle on the tip of each lobe. In the fall, the leaves turn bright yellow. The trunk is stout with dark gray bark. Acorns are about 2.5-3.5 centimeters (1-½ inches) long. The black oak will sprout from its base if the top is cut or damaged by fire.



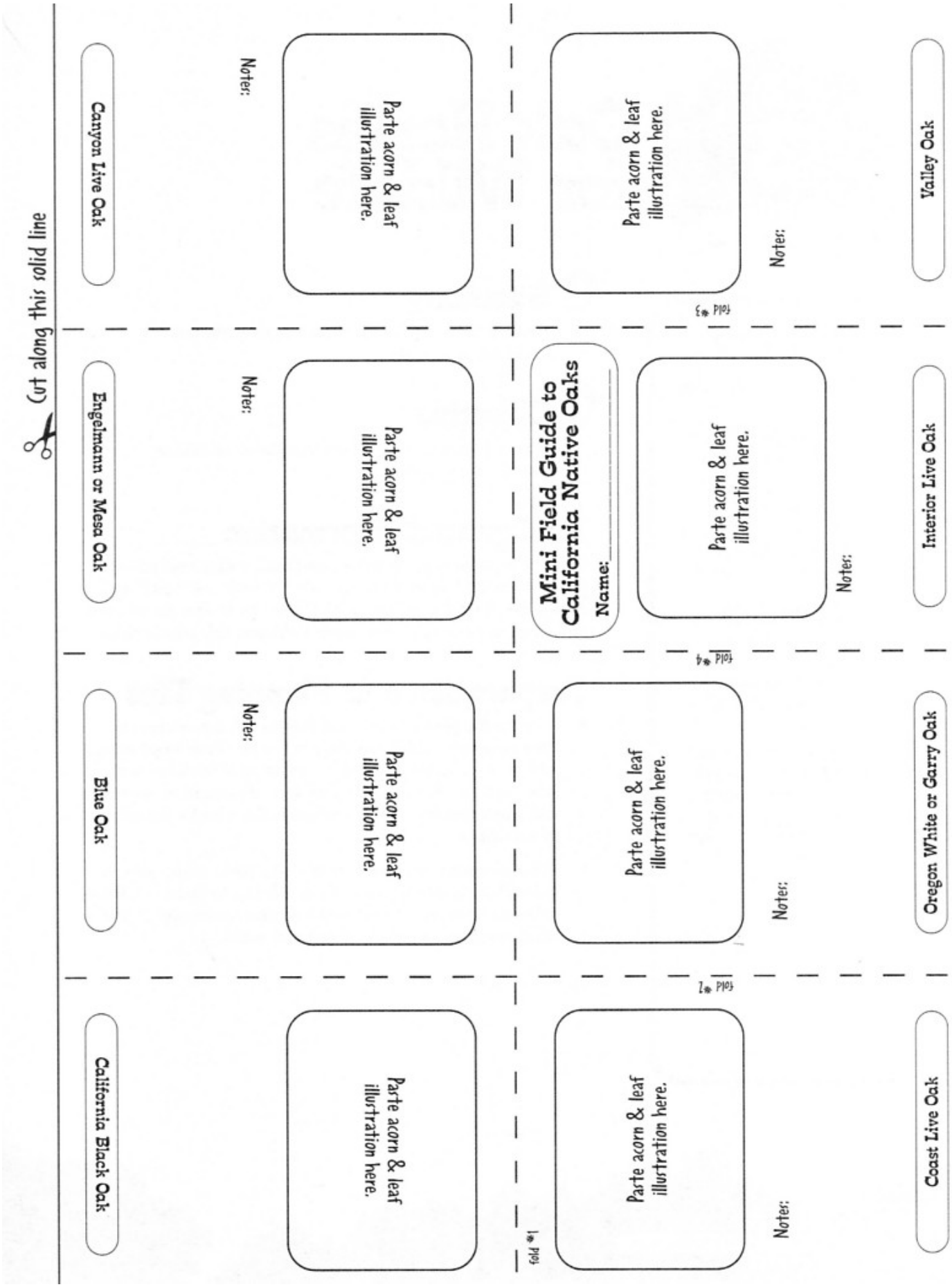
Canyon Live Oak (*Quercus chrysolepis*)
This oak is called the "golden cup" oak because its acorns have distinctive caps that are covered with yellow fuzz. These trees grow in sheltered canyons from northern Baja California (Mexico) to Oregon. The tree rarely forms a single trunk, generally branching several times near the ground. It has thin, gray-brown bark. The leaves are evergreen and holly-like. They are 2.5-10 centimeters (1-4 inches) long, and curl at the lower edges. Acorns are 2.5-4 centimeters (1-1½ inches) long, are egg-shaped, and have large golden cups.



Interior Live Oak (*Quercus wislizenii*)
This is a medium-sized evergreen tree, about 18-25 meters (55-85 feet) tall, with a short trunk that often is made up of many trunks. It grows in hilly areas and near creeks and streams. It is found in the North Coast Ranges, the dry valley and foothill woodlands of the Central Valley, and the dry parts of southern California. The leaves are flat, stiff, and shiny, and can be either spiny or smooth on the edges. Acorns are about 2-4 centimeters (¾-1½ inches) long and take two years to mature. This oak is sometimes confused with the coast live oak.



Oregon White or Garry Oak (*Quercus garryana*)
This is a large tree (up to 20 meters [60 feet]) tall with upward limbs and a compact crown. It also has a shrub form, called "Brewer's Oak," that is found in the Sierra Nevada mountains. The dark green, lobed leaves are 10-15 centimeters (4-6 inches) long. These trees are scattered throughout the Coast Ranges and the Sierra Nevada Mountains. Its acorns are 2.5 - 3 centimeters (about 1-1¼ inches) long and plump with shallow, warty cups that mature in one year.


Cut along this solid line
Canyon Live Oak
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Notes:
Engelmann or Mesa Oak
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Blue Oak
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California Black Oak
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fold #1
Mini Field Guide to California Native Oaks
Name:_____
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fold #4
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Notes:
Valley Oak
Interior Live Oak
Oregon White or Garry Oak
Coast Live Oak

How Native Californians Used & Cared for the Oak Community

Many Native California tribes lived within the oak community. The Miwok, Maidu, Wintu and Pomo lived in the foothills and depended on oak woodlands for food and other materials. They ground acorns into a meal that was an important part of their diet. They used oak wood for making tools, fish traps and arrows, and their shelters. They also used other plants growing in the oak community. They gathered seeds for food, herbs for medicines, and shrub materials for making baskets.

To learn about Native Californian life, historians have studied interviews with Native Californians themselves and diaries of Spanish explorers and missionaries. From these accounts, it is thought that the native people cared for the land in ways that favored some plants and animals. One thing they did each year was to burn grassy areas between the trees in oak woodlands to make hunting and gathering acorns easier. These fires also helped to kill diseases and pests in dried leaves and old acorns lying under the trees, making the oak community healthier.

Harvesting and Preparing Acorns

Acorns were as important to Native Californians as corn was to tribes in Central and South America or rice to Asian people. One family needed 500 pounds of acorns — or more — each year! The people did many things to protect the oak trees and to increase the acorn harvest.

Native Californians used acorns from nine of the California oaks: valley oak, Oregon oak, blue oak, scrub oak, canyon oak, interior live oak, coast live oak, California black oak and the tanoak. Since acorns were not always abundant from each species each year, the tribes had to know how to carefully harvest and store these edible nuts. They were careful not to take too many acorns. Most tribes also had strict rules about blessing the acorns before preparing or eating them. They held special ceremonies — dances, songs and prayer — to express thanks to the creator and to the spirit world for providing acorns.

Each fall the tribes dedicated themselves to gathering enough acorns to eat throughout the year. They would watch for changes in the seasons: Leaves falling and turning brown, wildlife gathering fruits and seeds, and changing weather. To compete with the birds, deer, bears, squirrels and gophers that also eat acorns, the native people learned to knock acorns off the trees with long poles before they were ready to drop. This way, they could gather the acorns before the other animals had a chance at them. They could also harvest acorns from their favorite trees all at one time. Another benefit of this method is that it caused old and dead branches to fall off of the trees, which helped rid the trees of diseases and pests, keeping them healthier.

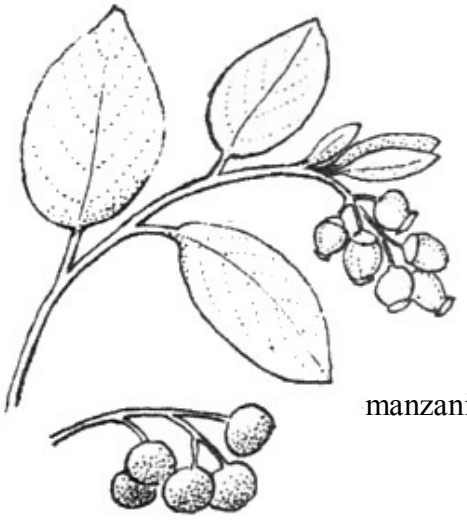
The people gathered the acorns into large cone-shaped burden baskets. They carried these on their backs held with a strap across the forehead, so that their hands were kept free to gather acorns. After collecting the acorns, the people dried them and stored them.

Women were in charge of preparing acorn meal — a long and tiring process of pounding, grinding, and sifting. The most difficult task was removing the bitter and poisonous tannic acid from the ground meal. This required washing the meal several times using special baskets. The people made bread and soups from the acorn meal. To make soup, they placed the meal and water in a watertight cooking basket. They then placed hot stones in the basket to heat up the soup. Berries, nuts, meat, insects, ashes, and clay found in the oak woodlands helped flavor the acorn meal soup.

Gathering Other Food and Materials from Oak Woodlands

In addition to acorns, Native Californians ate many other foods found in oak woodlands. In the springtime they collected fiddleheads from bracken ferns and the stems and leaves of clover, miner's lettuce, monkey flower, paintbrush, and the California poppy. They boiled, steamed, or ate raw these wild greens. In the summertime they gathered blackberries, thimbleberries, salmon berries, gooseberries, currants and elderberries. The people made these fruits into flour, cooked them into a sauce, or soaked them in water to make a sweet drink.

Shrubs found growing in the oak woodland also provided plenty of food. Manzanita and toyon have berries that Native Californians dried, ground into flour, then used to make bread or mush. They also made cider out of the berries from the manzanita (which means "little apple" in Spanish).



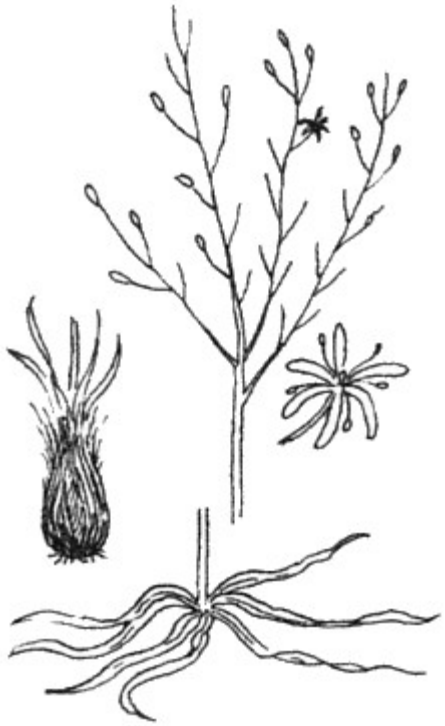
manzanita

Many of the colorful spring wildflowers of the oak woodland produce bulbs and tubers, which the Native Californians put to good use. They harvested the bulbs from wild onions, brodiaeas, mariposa lilies, and soap plants using digging sticks they made from long straight sticks. At harvest time, they celebrated with special songs and dances. Then they would harden the sticks by charring them in a fire, and then sharpen the end to a point. They used these sticks to dig and lift larger bulbs out of the soil. When smaller bulbs would fall off the bulb clump, the people would leave them for the next year's harvest.

California blackberry

Native Californians used soap plants in lots of different ways. This plant is common in oak woodlands, and has a large bulb covered with dark brown, hairy fibers. It is called soap plant, because the people used to crush the bulb and rub it with water, making a soapy shampoo for bathing. This bulb can also be eaten, and is very tasty if it is roasted for more than a day.

Native Californians used soap plant bulbs in catching fish. They would dam up a stream to trap the fish, and throw in uncooked soap plant bulbs. A toxic substance in the bulb would stun the fish, causing them to float to the surface. Then the people would collect them to eat. Native Californians also used soap plant fibers to make small brushes for sweeping up acorn meal. They used a gummy substance from the soap plant to glue together the fibers to make the brush. They also rubbed this glue on the body to cure stomach aches and cramps, and to heal wounds.



soap plant

Poison oak is a very common plant in the oak community. This plant grows under and near oak trees, and sometimes sends long stems up the trunk like a vine. Unlike the Spanish and Americans who came to California during the past 200 years, Native Californians did not get a rash after touching this plant. They used the stems for twine and to make baskets. They also used the juice from the stems, leaves and roots of poison oak to cure ringworm and warts.

We're Still Learning

Although there is lots of information about which plants Native Californians used for foods, medicines, fiber, and building materials, there is much less information about how they cared for and managed plant communities like the oak woodlands. This fascinating topic has recently caught the interest of ethno-botanists, scientists who study the use of plants by native people. Ethno-botanists are studying to learn more about how California's native people may have affected the plant communities we find here today.

Acorn Preparation Tools

soaproot brushes

mortar

looped stirrers

Pomo boiling stones, boiling basket, tongs, mush paddle

ACORN USE IN NATIVE CALIFORNIA: ARTIFACTS

1. ACORN DISPLAY *(Teaching Collection, Anthropology Museum)*

This exhibit contains six commonly used unshelled acorns from across California: Black Oak, Tanbark Oak, Oregon Oak, Valley Oak (White Oak), Blue Oak, California Live Oak). Acorns are the fruit of the oak tree, produced by the female flower. A hull similar to that of a walnut protects the seed inside. The acorn contains a rich store of fat, starch and protein, which will provide the sapling with enough nutrients for a good start at growth. As we learn more about acorns, we begin to understand their importance as a food source for Native Americans in California for thousands of years.

The first acorn in this display is Black Oak acorn, one of the most highly used varieties of acorn in California. The second acorn, the Tanbark acorn, although not from the same genus (*Quercus*) as other oaks, looks similar and was used by Native Americans as a valuable source of food. The remaining acorns in this display would have been used when the more desirable acorns like Black and Tan Oak acorn were unavailable. Acorns supply fat, protein, carbohydrate, vitamins A and C, and essential amino acids. They were a staple food for most California Indians.

Acorns have the following advantages: they are easy to collect and have high caloric return rates from work invested. They also have high nutritional content, being rich in fat and calories. Lastly, acorns can be stored for long periods. Furthermore, occur in many places across California.

Although there are many advantages, acorns do have some disadvantages. First, they are bitter, if not leached (a process we will later discuss in detail); second, even though acorns are easy to collect, they are not always reliable, as there are high and low cycles in annual productivity (although this can be mediated by species diversity or by not always using Black or Tan Oak acorns). Lastly, it takes a lot of energy to make food out of acorns. An example of this energy consumptive process is shown by the following figures: one person can likely shell about 5-10 kg per hour, pounding into meal takes about one hour per kg and leaching takes about 0.7 kg per hour. When looked at collectively, one can see that using acorns for food is a very time-consuming process; easy to collect and store, they are hard to prepare. *(Acorn display fabricated by Namat Hosseinion, Anthropology Department; Black and Valley Oak acorns courtesy of Pacific Western Traders, Folsom, CA.)*

2. MINIATURE BURDEN BASKET *(BAS 103, Anthropology Museum)*

Burden baskets are large, conical-shaped baskets used for gathering and carrying a variety of materials. In Native California, these ingeniously-shaped, beautifully-crafted, and highly utilitarian baskets made acorn-collecting a manageable task. While many Native American people used burden baskets to carry loads, their shape, size, color, design, and weave varied according to nation or tribe. Contemporary weavers continue these cultural traditions, while often adding artistic innovations of their own. Here we see a favorite Miwok/Paiute-styled burden basket from the early 1900s. Weavers often produced miniature versions of much

larger baskets; this one fits easily within the mobile classroom outreach trunk, yet still exhibits the classic characteristics of a much larger model. Burden baskets were traditionally carried by means of nets or straps (called tump-lines) that were placed across the forehead or chest, allowing the basket to rest easily against the back.

"There's a reason for the huckleberry-pail's shape. Huckleberries are soft, and so if the basket were cylindrical, the berries on the bottom would be crushed. If you look at the physics, the cone shape gives even distribution of the weight outwards, so the berries on the bottom don't get crushed."

—Pat Courtney Gold*

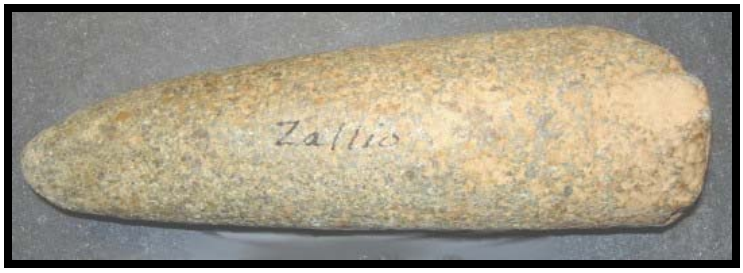
3. HOPPER *(BAS 145, Anthropology Museum)*

A basket hopper is a funnel-shaped basket that was placed atop the mortar to help contain the acorn meat as it was being pounded. This hopper is made from twined Redbud in a geometric pattern that is typical of Pomo basketry. Much has changed in Northern California over the course of the last century and a half, when the art and vitality of basket weaving was seriously jeopardized by the invasion of Native lands and societies. Today, basket weaving is being actively revitalized as a means of keeping ancestral traditions and forms of indigenous knowledge alive in Native California. We do not know the weaver of this basket, only that it was collected by Anthony Zallio, during the 1920s or 1930s, and donated by his descendants in 1951.

4. HOPPER MORTAR BASE *(Replica from the original: CA-TEH-269, Anthropology Museum)*

Mortars are sturdy vessels in which acorns are pulverized with a pestle. Hopper baskets are often placed on top of mortars to surround and help contain the acorn as it is being pounded and crushed. This mortar is a replica cast from the original, which weighs nearly 18 pounds. Found in 1969, in Mill Creek Canyon, Tehama County, it was probably made more than two thousand years ago and is thought to have been used by the Yahi people or their ancestors. Mortars were critical tools in a specialized system of acorn preparation that changed based upon location and availability of good stone material. In some areas, where slabs of granite were available, people created "bedrock mortars," and in other places, where large stone was hard to find, they made mortars from wood. The original version of this bowl mortar was made from granite, presumably found in a nearby river channel. *(Replica fabricated by Al Schwitalla, Anthropology Department.)*

5. PESTLE *(Drawer 93, Zallio Collection, Anthropology Museum)*



A pestle is a club-shaped implement that is used for pounding acorn (and other plant materials) in the mortar. The pestle seen here was collected by Anthony Zallio, in the early 1930s. We do not know exactly where it came from, other than the lower Sacramento Valley. This pestle is made of granite and is about the right size to fit with the granite mortar, showing the size relationship between stone pestle and bowl mortar. Pestles were made from a variety of materials, either wood or stone. The stone pestle displayed here has been carefully shaped and has a slightly flat, conical base, which indicates its use in a stone mortar. Native Americans have used pestles and mortars for thousands of years.

6. ACORN FLOUR *(Zallio Collection, Anthropology Museum*)

This jar of acorn flour is one of two samples ("ripe" and "green") acquired in the 1930s, by Anthony Zallio, a prolific collector and amateur archaeologist who taught at Sacramento Junior College (now Sacramento City College), during the 1920s and 1930s. While he maintained an extensive catalog of his collection, his standards for scientific excavation were primitive, even for his day. A label affixed to the jar lid reveals that Zallio obtained this flour from Captain Alex Blue, an ancestor of Billie Blue Elliston, a museum consultant and prominent member of the local Miwok and Maidu communities. The ripe sample comes from acorns procured and processed when fully grown; the green sample was produced from acorns that had not yet ripened. Both green and ripe acorns are used for food, but green acorn takes longer to process.

7. SOAP ROOT BRUSH *(Teaching Collection, Anthropology Museum)*

Soap plant grows in dry, open places throughout the Sacramento region. California Indians had many uses for this plant. The bulb was baked for food and the coarse fibers made into brushes that were used to scrape acorn meal back into the mortar during the pounding process. The crushed root bulb also produced a soapy lather that served as both a shampoo and as an aid in catching fish. Placed in low flowing streams, it would penetrate and clog the gills of fish so they could not breathe.

Crushed soap root bulbs could also be made into a glue-like substance used for fletching arrows, applying backings to bows, and making brush handles. The mashed soap root bulb has medicinal qualities that provided relief from sores, cramps, poison oak rash, and rheumatic aches and pains. In addition to the bulb, the very young shoots of the plant itself proved to be a very sweet food when cooked slowly in a pit oven. While still young, the fresh green leaves were occasionally eaten raw. Older leaves were used for wrapping acorn bread during baking. Juice from

the leaves was pricked into the skin for green tattoo markings. *(Photo courtesy of K. Casper-Denman.)*

8. LEACHING TANNIC ACID FROM ACORNS (WILD GRAPE LEAVES)

Removing tannic acid from the acorn was the third step of processing, after shelling and making flour. This involved placing the flour in a shallow leaching basin and pouring hot or cold water over it until all the tannins were removed.

Leaching basins were made by creating a hill of sand, scooping out the center, and then lining the shallow basin with leaves (from wild grapevines, if available) or pine needles. The acorn meal was placed on top of the leaf or pine needle filter. Water was then poured over the meal several times to flush out the tannins. Cold water was desired for leaching in order to keep the oil in the meal. However, cold water processing took more time, so some women preferred hot or warm water. Another method was to bury the shelled, but otherwise whole acorns in marshy ground, for several months, to let the damp soil slowly leach out the tannic acid.

9. CLAY COOKING ROCKS *(Zallio Archaeological Collection, Anthropology Department)*

These baked clay "rocks" come from the Zallio collection, housed at California State University, Sacramento. They were used in the cooking of acorn, once it had been pounded, leached, and sifted. Because Native Americans in northern California cooked in fiber baskets, cooking rocks or baked clay balls were heated in a fire, quickly rinsed-free of ash, and then transferred into baskets containing the acorn mush or—as the Miwok of Yosemite called it—*nuppa*.

Archaeologists have found pieces of baked clay at many sites in central California and have theorized that they were used in place of cooking stones, when stones were hard to find, as was the case in some parts of the Sacramento Valley These baked clay pieces were found in an unknown location in the lower Sacramento Valley. Many clay cooking balls were decorated by pressing baskets, sticks, or fingers into the clay while it was still wet; others are plain, like those contained in this kit.

10. BASKET *(BAS 84, Anthropology Museum)*

To cook acorn soup or mush, women mixed the meal with water in tightly woven baskets. They used hot stones from the fire to heat the mixture. Constant stirring was required lest the hot stones burn through the bottom of the baskets. Acorn meal could also be made into dough and cooked on hot rocks, or rolled into hard balls to carry on a journey. This basket was used not only as a serving dish, but also as a small cooking basket, as evidenced by

the heat marks left on the interior base of the basket. Cooking baskets were typically much larger in size. This item was donated to California State University, Sacramento by a private collector named Wilcox. It is associated with the Klamath River area of Northern California.

11. HOT ROCK REMOVER MADE FROM WILLOW *(Teaching Collection, Anthropology Museum)*

To remove the heated stones from cooking baskets filled with acorn mush, wooden loops (also called looped stirrers) were used. Hot stones were dropped into baskets using sticks that were bent and tied together with sinew or twine from various plant fibers to form loops. Loops were used to stir the acorn mush and to remove the cooler stones and replace them with hotter stones (or clay balls). This loop was made from native willow and synthetic sinew. The process involved stripping the bark and soaking the wood to give the willow more bend. As the desired shape is attained, sinew (synthetic or natural) is wrapped to hold the willow's shape until it dries. *(Replica fabricated by Namat Hosseinion, Anthropology Department.)*

12. POMO ACORN PREPARATION VIDEO *(Teaching Collection, Anthropology Museum))*

This black and white, nine-minute film shows traditional acorn preparation through all phases of collecting, shelling, pounding, leaching and cooking. Produced in the 1960s, it lacks sound, but provides a vivid depiction of the labor-intensive process necessary for making a staple Pomo Indian meal from acorn.

13. ACORN TOPS *(Teaching Collection, Anthropology Museum)*

These acorn tops were made at the Maidu Interpretive Center in Roseville, California, and are typical of those commonly played with by Native Californian children. They offer just one example, to which both school children and teachers can easily relate, of the many ways that acorn use in Native California extends outside the realms of cooking and eating.

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Acorn Preparation

Essie Parrish (Kashaya Pomo) cracking and shelling acorns, Sonoma Co.; 1960

From centuries of experence, California Indian women learned how to gather the very best acorns from oak trees.

Newly picked acorns are too soft to cook with. After being collected in baskets, the acorns had to be dried. Fresh acorns were usually stored for one year before they were used.

Once the acorns dried, their shells were cracked open in order to reach the nutmeat. Acorn shells could be opened with small **hammer stones** and **stone anvils**. The shells were then removed by hand.

Winnowing

Once all the acorns were cracked open it was time for winnowing. Like peanuts, acorns have a thin skin around them that needs to be removed. The acorns were put into a scoop shaped basket and rubbed by hand until the skins loosened. Then they were tossed into the air and their lightweight skins blew away in the breeze. The heavy acorns dropped back into the basket.

winnowing basket and pine nuts

Essie Parrish (Kashaya Pomo) pounding acorn with a milling stone, Sonoma Co.; 1960

Acorn Pounding

California Indian women used two types of tools to pound acorns. These tools are called **mortars** and **pestles** and **milling stones**. Acorn pounding was hard work. Women often spent an entire day pounding acorns into **meal**. Women sang songs and made time for talking, teasing, and laughing while pounding acorns to make the chore fun.

Essie Parrish (Kashaya Pomo) sifting acorn, Sonoma Co.; 1960

Acorn Sifting

After the acorn meal was pounded, it was then carefully **sifted** into a fine flour. A few handfuls of meal were put in the sifting basket and the basket was shaken carefully. The fine meal stuck to the basket and the heavier pieces rose to the surface. The larger pieces were put into another basket and the fine flour was swept into a third basket with a **soaproot brush.** The larger pieces were then pounded again with the next batch of acorns.

Essie Parish (Kashaya Pomo) leaching acorn meal, shore of Gualala River, Mendocino Co.; 1961

Leaching

Acorns contain a poison called **tannic acid**. Once all the acorns were pounded into meal, the poison was removed in order to make them safe to eat. First, women scooped out a large **basin** in the ground. Next, they spread the acorn meal out in the basin and placed branches over it. Then, they poured water through the branches into the basin. Once the acorn meal no longer tasted bitter, the soaking could stop. After the acorn meal drained, it was scooped out of the hole by hand. This is called leaching. Now the meal was ready to be cooked.

Essie Parish (Kashaya Pomo) boiling acorn meal, shore of Gualala River, Mendocino Co.; 1960

Boiling

Water and acorn meal were mixed together and boiled into a thin soup or thicker mush. There were two ways that California Indian women boiled food. One way was to boil the mush in a clay or stone pot over a fire. The other way to boil food was by **stone boiling**. Boiling baskets were often coated with a thin layer of acorn **gruel**. The gruel was like a glue that coated the basket so that no water would leak from it. Hot rocks the size of tennis balls were heated by fire. Then, they were put into baskets filled with water and acorn meal.

The stones were stirred in the baskets gently and slowly with a **wooden paddle** or **looped stirrer**. When the mixture began to boil it was cooked. The stones were then removed from the basket with wooden tongs. The mush that dried onto the rocks was a special treat that children liked to peel off and eat. These pieces were called "acorn chips."

Essie Parrish (Kashaya Pomo) cooking acorn bread on hot rocks, Kashaya Rancheria, Sonoma Co.; 1960

Acorns


This is a grove of Tan Oak trees.

Notice the color of the Tan Oak tree bark.

Look closely at the leaves.

Notice how the edges have sharp little points. The leaves are 2 ½ to 5 inches long. They are green above and grayish green underneath.

This Tan Oak acorn is still growing on the tree. Notice how rough it's cap is.

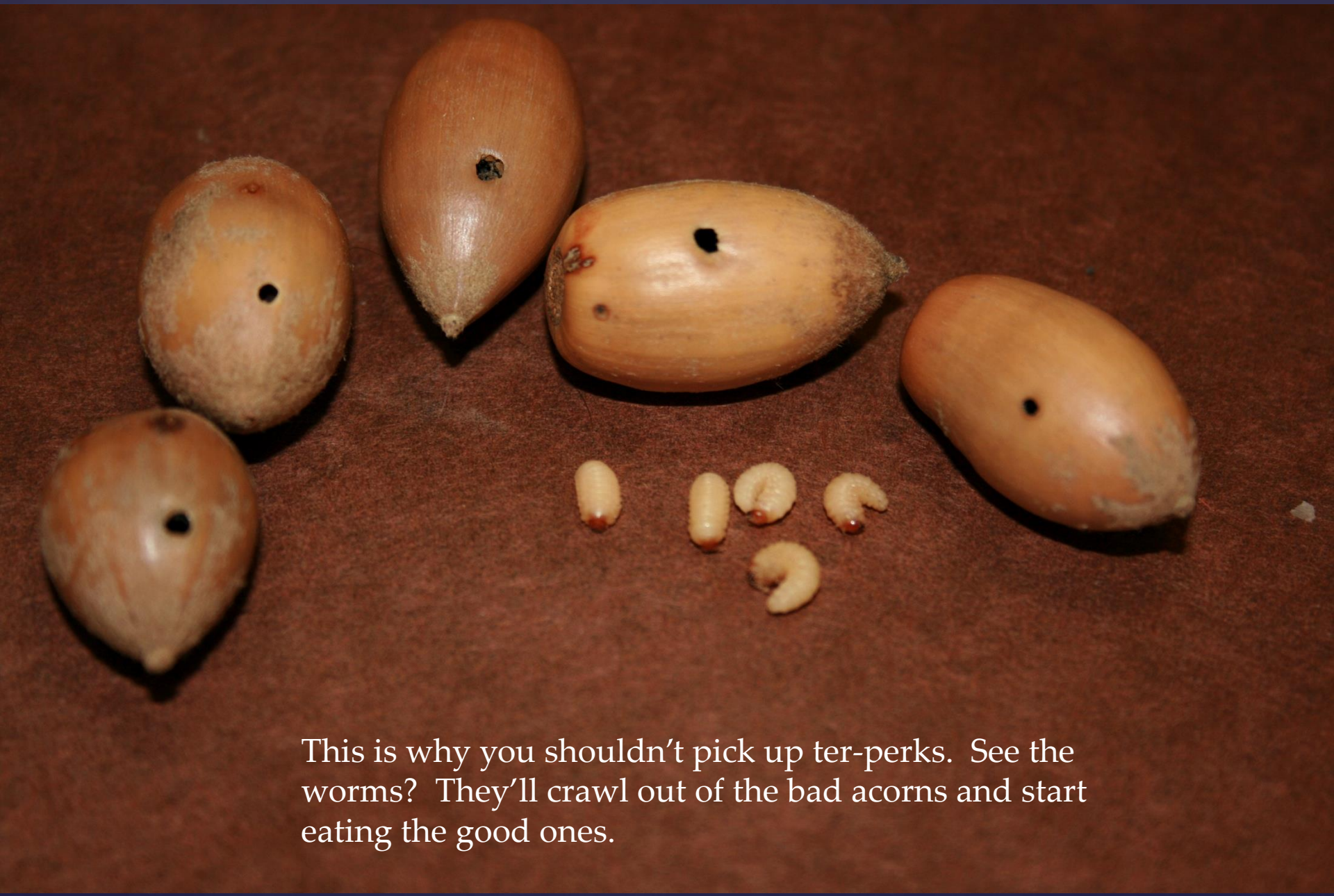
These are newly fallen acorns.

We gather the newly fallen acorns in the fall.


See how light this acorn is on the end? These are the good ones.

We have to be careful which acorns we pick up. We don't want to pick up old acorns, or ones with worm holes in them.


You don't want to pick up ones that look like this. They're old and yucky!



This is why you shouldn't pick up ter-perks. See the worms? They'll crawl out of the bad acorns and start eating the good ones.


This acorn still has on its cap.

The traditional way to gather is to use a burden basket, but you can use whatever's handy.

- The important thing to remember is that when the leaves fall off the trees onto the ground, the acorns are falling too, and it's time to gather.

After the acorns are gathered they need to be put in a nice warm place to dry so they won't get moldy.

Once they're dried they can be cracked.

Be sure to separate the acorn meat from the skins.

These acorns are all good, and ready to be ground into acorn flour.

Many people use a hand grinder to grind the acorns into a fine flour.

These are some of the tools used traditionally. The pounding rock is called a pestle, and the basket is called a hopper.

The hopper is set on top of a flat stone, or mortar. It keeps the cracked acorns and flour from scattering as it is pounded.

The acorn flour is now ready to be leached.

Leaching, removes the bitter tanic acid from the acorns.

We use an open weave basket and a porous cloth like muslin, or cheese cloth to leach the acorns. You can use a store bought basket if you don't have one made the traditional way with hazel sticks.

Water is added to the acorn flour, soaking it up completely.

The acorn flour is covered with about ½ inch of water, and then left under a slowly dripping faucet. Be sure the acorns are covered with water during the entire leaching process.

Soak the acorns until they are no longer bitter to the taste. This could be anywhere from three hours to overnight.

Then gather up the edges of the cloth and squeeze the excess water out.

Now, it ‘s ready to be made into soup.

Claudette shows us the way her grandmother taught her.

Traditionally we use cooking rocks and a basket made of hazel sticks and spruce roots to make acorn soup.

The rocks are put into a fire until they get red hot.

They're taken out of the fire and put into the cooking basket of acorn meal mixed with water.
This will bring it to an instant boil.
Stir the mixture continuously, so the basket doesn't burn.

Traditionally, men used a a carved elkhorn spoon, while women used a mussell shell to eat.

These eating bowls are woven so tight they will hold water.

TAKING THINGS A STEP FURTHER

Writing Activity

Write a short story about a feast you are going to prepare. What are you going to celebrate at this feast? Describe the foods you will serve and how to prepare them. Write about what you will cook in your earth oven and describe how you will cook your acorn mush.

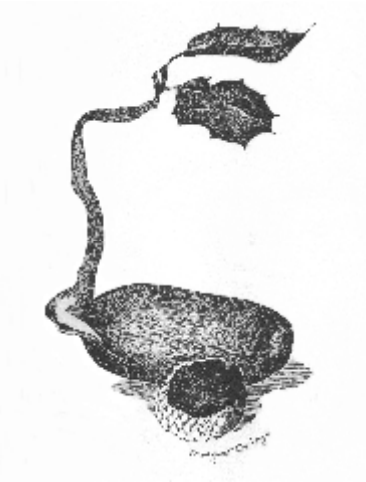
* Will you make acorn bread for the feast?
* What else will you prepare for people to eat?
* Will you hunt game or catch fish?
* What types of sea creatures or land animals will you catch and how will you catch them?

Draw a picture of the feast to go along with your story.

How to Collect, Store, and Plant Acorns

A Bulletin of the California Oak Foundation

Oak habitats in California, particularly those along streams and rivers, and those containing valley and Engelmann oaks, have been greatly reduced over the past forty years. Additionally, three species of native oaks, the valley, blue, and Engelmann, are reportedly regenerating poorly in portions of the state. Because of this habitat loss and poor natural regeneration, many Californians are concerned about the long-term fate of these species.



Concern for California's native oak heritage has generated tremendous statewide interest in planting oaks. Planting efforts can assist Mother Nature in establishing sufficient young seedlings to replace trees that die or are removed, and may ensure that the magnificent native oaks, which have graced our valleys and hillsides for thousands of years, will be around for the enjoyment of future generations.

Collecting Acorns

Acorns can be collected either directly from the trees or from the ground beneath. The healthiest acorns, however, are generally those picked from the trees because those that fall to the ground often dry out and are damaged – especially if they lay exposed for more than a few days during hot and dry weather. If you do collect acorns from the ground, leave behind those that are very small, cracked, or feel light and hollow. Acorns collected directly from the trees can be handpicked or knocked to the ground using long poles or pieces of plastic pipe. It is easy to pick them up if tarps are placed under the trees first.

The best time to collect acorns is in the early fall, when they are just starting to turn from green to brown, and when some are starting to fall. It is probably too early to collect them if they are all dark green and it is difficult to remove their caps (the cup covering the rounded end). In this case, wait a few weeks and check them again.

Acorn Sources

Many of those concerned about California's natural environment, including foresters, conservation biologists, ecologists and horticulturists, believe that using local seed is best for maintaining the integrity of local oak populations. Because local populations may have evolved certain genetic traits that favor survival at a particular site, acorns of the same species but from different locations may be genetically very different. By planting only local acorns, you maximize chances for survival and minimize damaging the local stock by introducing poorly-adapted genes.

Ideally, acorns should be collected on the intended planting site or as close to the site as possible. In considering site similarity, match the soil, slope, exposure to the sun, and elevation whenever possible. If acorns from different sites are collected, bag them separately, with species, date, and location noted. In all handling, keep these collections separate.

Storing Acorns

Before storing acorns, take off their caps. If the acorn is ripe, the cap should come off easily when twisted. After removing the caps, rinse the acorns in cool to lukewarm water to which some bleach has been added (about ½ cup per gallon) as a disinfectant to reduce mold. Remove any acorns that float or have holes, cracks, or other problems, then lay the rest out on towels, newspapers, or other absorbent material to air dry. Pack into zip-lock bags labeling each bag for species, date and location. Since acorns are alive and respirating, they generate heat. If too many acorns are stored together, they can heat up even in a refrigerator. Therefore, avoid storing more than three cups of acorns in one container. Using small to medium zip-lock bags will correctly limit the number of acorns stored together.

After acorns are placed in plastic bags, they should be kept refrigerated until they are planted. Cold storage reduces metabolic activity and the depletion of stored reserves. A recent study also indicated that one month of cold storage also promotes faster and more complete germination. Acorns cannot be stored successfully, however, for more than a few months and should be planted in the growing season following collection. Store as cold as possible, but keep temperatures above freezing. Check acorns occasionally for molds. If molds do develop, take the acorns out and rinse them, then put them back in the refrigerator.

Another problem that can develop in cold storage is premature germination. Blue oak acorns are especially prone to this. The white tips emerging from the pointed end of the acorn are actually the beginnings of the new root system. Once these roots have grown for a few weeks, they can start to rot. Therefore, if you see the acorns starting to germinate, it is best to plant them as soon as possible.

Planting Acorns

Acorns can be planted from early November, after the first rains have soaked the soil, until early March. Acorns planted late in the season – March, or even February in dry years – will need to be irrigated. Another reason to plant acorns early is that the sooner they are planted after one month of storage in the refrigerator, the sooner they start to grow. Early planting maximizes root development before the arrival of dry weather, and also reduces the risk associated with premature germination.

Plant the acorns about one inch below the soil surface. Dig a hole using a hand trowel, hoe, or shovel. It is best to dig the hold several inches deeper than the acorn will be planted, then partially refill the hole with loose soil and tamp firm. This gives the new root a chance to get a good start in soft soil that is easy to penetrate. To further encourage rapid root and seedling development, use an auger to dig an even deeper hole, then refill and tamp the soil.

If the acorns have germinated, try not to break the root tip, and position in such a way that the root is pointing down. If the root is three inches or longer, its tip can be pruned back to two or three inches; usually the root will branch and regrow from this point. It is easier to trim the root than to plant a tangled root. Ungerminated acorns can be placed on their side in the hole and covered with soil.

The site where you choose to plant the acorns may be critical to the survival of the resulting seedlings. Choose a sunny spot that has loose, well-drained soil and is fairly free of weeds. Also, avoid areas where there are numerous gopher holes or evidence of ground squirrel activity. If you do feel that the acorns may be threatened by rodents such as squirrels or mice, plant them a little deeper – say, two to three inches below the surface. The deeper the acorns are planted, the harder it is for these animals to dig them up. However, if they are planted too deep, they may exhaust themselves before reaching the surface.

The number of acorns to plant in a given area will depend on how many trees you eventually want to grow there. Unfortunately, it is very difficult to predict how many seedlings – let alone trees – will be produced from acorns planted, since this depends on a variety of uncertain factors including weather, animals, and competing vegetation. When deciding how many acorns to plant, consider spacing the acorns in a naturalistic manner, rather than orchard style, using the pattern of surrounding naturally-occurring oaks as a template. Also look at the types of oak trees growing nearby. Is there only one species or are there two or more? Does one species occur in the draws and another on drier sites? Your careful observations will help you select both safe sites for the acorns and a more natural mix of species. If the naturally-occurring trees have an average spacing of twelve to fifteen feet, in a clumped arrangement, plant your acorns every six to ten feet, also in a clumped arrangement. Not all the acorns are going to survive, and sixty to seventy percent survival with protection and irrigation is considered good.

Acorn and Seedling Care and Protection

The amount of care and protection you choose to provide acorns and seedlings will depend on your individual situation. If you are interested in establishing only a few trees around your home, you may be willing to invest the time in watering, weeding, and protecting individual plants. If you want to plant many acres, such care of each seedling is impossible. Below are some steps you can take to help improve your chances for successful seedling establishment.

Weeding and Mulching

An important factor that often limits growth and survival of young seedlings is dry soil. Competing vegetation often uses up so much water from the soil that little is left for oak seedlings. It is therefore recommended that a circle two feet in radius around planting spots be "scalped" or scraped to remove other vegetation. Placing some type of mulch, such as hay, bark chips, rice hulls, or black plastic around the seedling will help conserve moisture and eliminate competing vegetation. Some mulches, like hay, may introduce weed seed and add to eventual problems. Black plastic, on the other hand, needs to be anchored, usually with wire pins.

Irrigating

Irrigation is not always necessary, especially with acorns that were planted in the fall. However, two or three deep waterings (three to four gallons per seedling) during each of the first several

summers following planting or during prolonged periods of hot, dry weather, can enhance seedling growth and survival. Remember that California's oaks are well adapted to dry conditions and after the first several years should be able to withstand dry summer conditions. Even if a seedling appears to die during drought, it may put out new shoots the following year.

Protecting seedlings

Since acorns are an important food source for a tremendous variety of animals, there is always a risk that the acorns you plant will be dug up and eaten. Also, as the seedlings start to grow in the spring, there is a chance that the tender young shoots will be eaten by livestock, rabbits, grasshoppers, or other animals. In general, above-ground protection of some kind is necessary and will reduce the risks of injury to both acorns and seedlings. Following are descriptions of three devices that offer protection to acorns and seedlings.

1) Use an 18 x 18-inch piece of aluminum screen formed into a five-inch diameter cylinder and stapled to a wooden stake. Fold the cylinder closed at the top. Drive it into the ground so that the screen cage covers the spot where the acorn is planted. This cage will keep out rodents, insects, and deer.

2) This cage consists of a screen cylinder like the one pictured below, placed around a one-quart yogurt or cottage cheese container that is open at both ends. Place the container in the soil so that the top is at the soil surface. This protective cage will not only prevent stem damage, but will keep out burrowing animals such as gophers who often damage roots.

3) This cage is a cylinder made of quarter-inch hardware cloth. One cylinder can be placed above ground and another below ground if rodents are a problem. Although expensive, these cages can be built before going into the field and do not require staking.

Young oaks can grow fairly fast if the site is favorable and there is good weed control. If you have used cages, check them to prevent young shoots from getting "choked" in the wire. If possible, replace small cages with larger mesh hog-wire (three inches in diameter and four feet tall) or chicken-wire cylinders to protect the young oaks from deer or rabbit browsing. Once the trees are about four or five feet tall, they are on their own!

Steps for Growing Oak Seedlings

- Collect acorns in the fall
- Store acorns for one month in a sealed plastic bag in the refrigerator
- Lay acorns on their sides and plant one-inch deep in the soil
- Keep the area around planting spots free of weeds
- If possible, water several times during the summer, and use screen cages to protect young seedlings from animals.

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BASKETS IN NATIVE CALIFORNIA

California Indian basketry has long been recognized as some of the world's finest. Baskets from Native California can be seen in countless museum collections and exhibitions where they are conserved and appreciated both as historical artifacts and as fine art. However, basketry in Native California goes beyond art; basket-making is a cultural tradition linking Native cultures of today with their past. Organizations such as the California Indian Basketweavers Association (CIBA) help to support the growing number of contemporary Native weavers who continue the tradition of creating utilitarian, ceremonial, and commercial basketry.

I. Native California Basketry

Traditionally, baskets have been made for utilitarian, religious, and commercial purposes. Throughout history, utilitarian baskets have been used for activities such as harvesting and preparing foods. Open-twined weaves are used for fishing and trapping while tighter, close-twined weaves are used for storing, cooking, and serving food and drink. Large, tightly woven, wide-rimmed burden baskets have been used with open-weave handled seed beaters to harvest seeds. Among Native Californians, baskets have also been used as clothing in the form of ceremonial caps, work caps, and even baby cradles. Basketry has been used in ceremonial events, often as special containers or as ceremonial caps. Generally, these baskets are more elaborate than their utilitarian counterparts, offering more decoration in color, pattern, and ornamentation, with shell or feather adornment being the most common. Sometimes ceremonial baskets are also given as gifts.

Beyond the exchange of ceremonial baskets as gifts, commercial basket weaving was practiced--even before Anglo-American contact. Ceremonial and other special baskets were the primary type of goods sold to others. Less accomplished weavers might seek to purchase special baskets from a better weaver. Since ceremonial baskets were used again and again, this pre-contact market was not very large; however, following contact with non-Native settlers, Native California basketweavers began to produce an increasing number of baskets for sale. Missionaries sometimes used or traded baskets. For instance, it is believed that the Russian mercantile colony at Fort Ross traded baskets with the Kashaya Pomo in the early 1800s. Another example of early non-Native basket use can be seen in Chinese cooks' use of Native-made baskets in their kitchens during the Gold Rush.

Learning the weaving process, from the harvesting and preparation of materials to the techniques of weaving and coiling, is an important cultural tradition passed down from one generation to another. In the past, it was usually a household/family practice. Female children grew up learning basketry skills and, as adults, were able to meet the needs of their households. (As previously noted, if the weaver demonstrated great skill, baskets may even have been sold commercially.) Now, Native Californians teach basketry outside their own communities; but the weaving tradition continues to be tied directly to the lands and resources used to produce basketry, and to the continuity of knowledge and skills that Native families and communities maintain.

In addition to the notable skills of weaving, creating baskets involves extensive knowledge of materials and their preparation. This knowledge includes land

management strategies focused on maintaining plant materials used in basket making. Such strategies include seasonal burning to control growth, disease, and weeds. Regular harvesting of root materials maintains a loose, aerated soil promoting healthy growth. While these land management practices were more common before contact with non-Native settlers, they are still used today.

Some basket materials used for weaving, coiling, and dying include willow, maidenhair fern, maple, alder, cedar, hazelnut, mistletoe, pine, chokecherry, brackenfern, oak, bulrush, wild grape, redbud, sedge, bear grass, and white grasses. Foundation materials come from the more woody parts of plants while twining materials come from a variety of carefully processed plant parts, particularly roots. Plants with natural color contrasts or dyed plants are often used for decoration.

III. Colonization and Disenfranchisement

In the short span of years between the Gold Rush and the Depression, Native Californians lost rights and access to their lands and were systematically deprived of the ability to practice their cultural traditions. More often than not, colonization policies resulted in relocating native peoples to lands that could not support their material needs. Reduction of access to resources hindered the ability of Native basketweavers to continue the traditional ways of life that supported basketry.

Assimilation efforts during colonization included the removal of Native children from their families and their subsequent enrollment in boarding schools where their cultural traditions were replaced with Euro-American models and worldviews. The disciplined, mandatory use of English, rather than Native languages, was one of the many ways in which assimilation was accomplished. Another means of assimilation came in the teaching of Euro-American crafts rather than Native skills.

At the same time assimilation was underway, colonizing Americans grew increasingly interested in the basketweaving of Native California. Traditional baskets were seen as artistic commodities and a "vanishing" art form, making them "exotic" and highly collectable. This interest allowed Native Californian women to earn money at a time when few jobs were available to Native Californians. Basket-collecting also resulted in the preservation of numerous baskets; however, purely utilitarian examples are under-represented in such collections.

IV. Revitalization of Cultural Tradition

The struggle to keep Native Californian basketweaving traditions alive gained more support late in the 20th century through the efforts of a number of key Native Californians. Mabel McKay, Essie Parrish, Marie Potts, Florence Harrie, and Kathy Wallace are just a handful of the Native Californians who have been involved in this movement. Through the revival of basketry, other Native traditions have also been renewed. For example, Native women can wear ceremonial caps to religious gatherings because both the basketry and religious practices have been maintained and revived.

While Native Californian basketry has experienced a revival, many issues still threaten its practice. One such issue is access to basket making materials. California Native American tribes have been able to retain very little of their original lands and, therefore, must rely on state and federal policy regarding access to resources in order to obtain weaving materials. U.S. Forest Service policy of pesticide spraying for vegetation

control is another issue threatening Native Californian basketry. The use of pesticides can result in health problems for basketweavers since many weaving materials are prepared by using one's mouth. These are only a couple of the issues facing modern Native basketweavers in their ongoing efforts to preserve the cultural traditions and skills of basketry. Organizations such as the California Indian Basketweavers Association, or CIBA, provide a good source of news regarding contemporary Native Californian concerns. You may visit their homepage at www.ciba.org.

Shapes and Uses of

California Indian Basketry

Note: The sizes of the baskets illustrated here are proportional to one another.

Plant Food Gathering and Transport

Gift/Storage Basket. The gift/storage basket is presented as a gift and is used for transporting goods or plant foods. Typical size: ht. 30"; dia. across mouth: 25".

Gift/Storage Basket. Ht. 30"; Dia. 25".

Seedbeater. Using the seedbeater, edible wild seeds were harvested by knocking seeds off the plant and into the burden basket. Typical length: 20".

Seedbeater. Length 20"

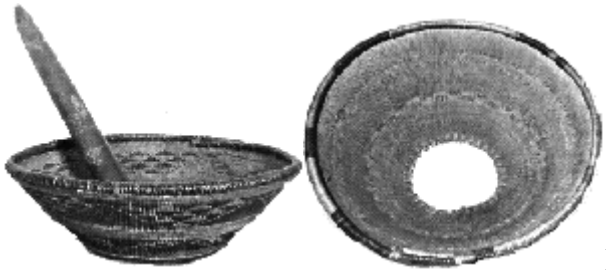
Acorn and Seed Meal Winnowing, "Sifting" Baskets, and Trays. "Sifting," winnowing baskets, and trays are round or triangular. The baskets are deep while the trays are shallow or flat. Close-twined round or triangular "sifters" were used to separate fine, fully-ground acorn meal from the coarser meal which required additional pounding. Seeds were also sifted with these basketry implements. The fine meal was separated by a side-to-side shaking action. Both closed- and open-weave baskets and trays were used for winnowing. Typical dia.: 20".

Deep Sifting Basket. Dia. 20".

Openwork Winnowing Basket. Dia. 20"

Triangular Basket. Length 20".

Mortar and Pestle. Acorns were the staple food source of the California Indians. These nuts were pounded into meal on stone mortars. The funnel-shaped mortar baskets, with a hole at the bottom, were used to concentrate the meal in the bottom of the basket onto the mortar rock. This prevented the meal from flying off the mortar during pounding. Typical dia. across the top: 14".



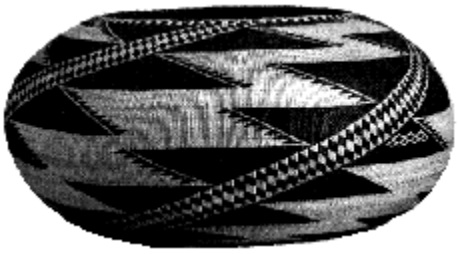
Mortar Basket. Dia. 14".

Mortar Basket and Pestle. Dia. 14".

Storage and Food Serving Baskets

Large Storage Baskets. Large twined storage baskets for acorns and other non-perishable foods often have sides incurving toward the top. In north central California the baskets are round or globular in shape. In the northwestern area of the state the large storage baskets are typically taller with a larger opening. Fancy or highly decorated gift baskets were used for storing different items. Typical dia. across largest area: 30".

Large Gift/Storage Basket from North Central California. Dia. 30".

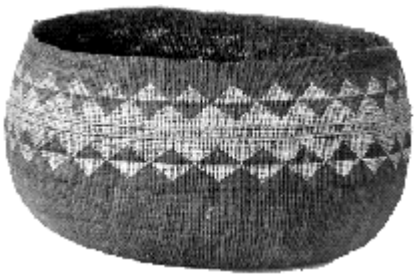


Large Storage Basket from Northwestern California. Dia. 30".

Food Serving Tray. Dia. 20".

Food Preparation and Serving Baskets

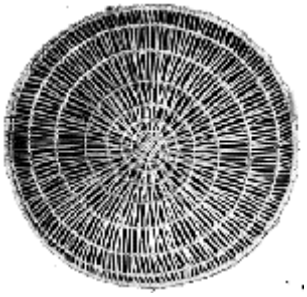
Cooking Baskets. Cooking baskets have flared, straight or slightly incurved sides. Red-hot rocks are repeatedly dropped into the basket until the acorn soup or mush is cooked. The large (24" or more) cooking baskets have flaring sides to make it easier to remove the cooled rocks. These large baskets would probably have been used to cook for the extended-family households typical in pre-contact times. Today feasts for community gatherings are prepared in the baskets. Small cooking baskets (12" or smaller) may have a slightly incurved profile but are more open (so that rocks can be removed) than the storage basket with strongly incurved sides.



Large Cooking Basket. Dia. 24".

Large Cooking Basket. Dia. 24"

Food Serving Platters. In many parts of northern California, openwork twined platters were used to serve roasted fish or meat. Typical dia.: 12-15".



Food Platter. Dia. 15".

Food Serving Baskets. Small coiled or twined gift baskets with flaring sides were used for individual servings of acorn soup or mush, and for dipping and pouring water. Typical dia. across mouth: 3" to 6".

Small Serving Basket. Dia. 6".

Specialized Baskets

Shell money and other valuables were often stored in small, necked gift baskets whose shapes are reminiscent of pottery. Typical dia.: 7".

Shell Basket. Dia. 7".

Lidded "Trinket" Baskets were a post-contact innovation in northwestern California. They were made primarily for sale to European collectors. Typical dia.: 6".

Basketry Tobacco Pouches were also made in northwestern California. Typical dia.: 3".

Gambling Trays, shallow, round woven basketry were used by women while playing gambling games. Typical dia.: 20".

Tobacco Pouch. Dia. 6".

Gambling Tray. Dia. 20".

Lidded Trinket Basket. Dia. 6".

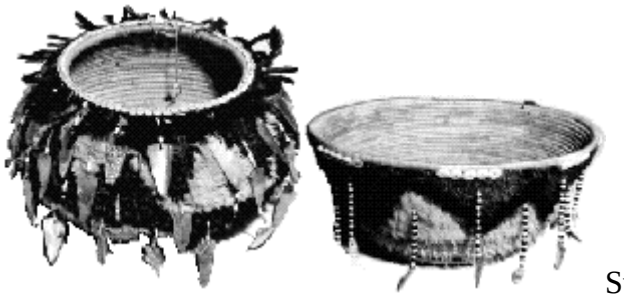
Fancy Gift Baskets

Elliptical or Boat-Shaped Baskets. These baskets had various uses. Small ones (typically 5" long) were often used to store valuables. Shaman and native doctor's paraphernalia were stored in medium-sized baskets (typically 14" long). The very large elliptical baskets (typically 30" or more in length) were used to store dance equipment and regalia.

Elliptical Basket. Length 5-30".

Treasured Gift Baskets. The Pomo tribes are famous for their elaborately decorated coiled-baskets used as gifts to store small valuables. Such "treasure" baskets were (and are) more valuable than the items stored in them. The baskets are decorated with beads or feathers. Sometimes they are completely covered with red woodpecker feathers ("sun" baskets), or with a combination of brightly colored feathers. The feathers were tightly stitched into the basket weave. Such valuable baskets were presented as gifts to friends as well as for wedding gifts. They are also used as sacrifical item when a person who owned the basket dies. These elaborate baskets are also made for sale to collectors. Typical dia.: 7".

Feather Basket. Dia. 7".



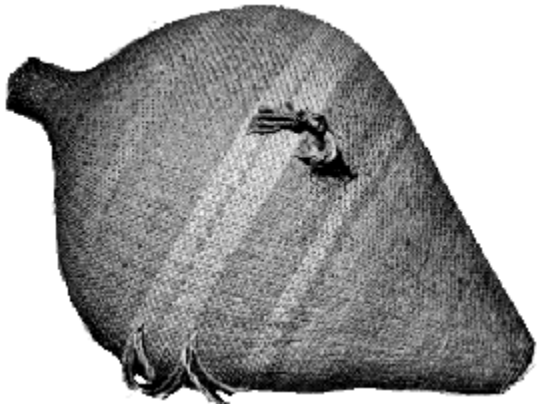
Sun Basket. Dia. 7".

Miniature Baskets displayed the basketweaver's skill. They were given as a gift or sold, and sometimes were used in doctoring ceremonies. Typical dia.: 1/4" - 2".

Miniature Basket. Dia. 1/4" - 2" .

Other Specialized Basket Types

Water Bottle. A water-proof twined weave was used for these baskets from the central area of eastern California. Typical dia.: 10".



Basketry Water Bottle. Dia. 10".

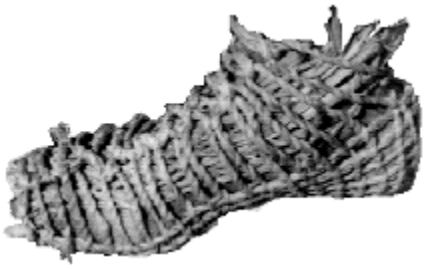
Basketry Cradle. Basketry cradles were used by all northern California tribes. The baby was fastened into the cradle which was carried on the mother's back. Typical length is 30" although a variety of sizes were made to correspond to the age of the infant.

Basketry Cradle. Length 30".

Basketry Cap. Basketry caps were worn in the northwest and areas of eastern California. Plain, everyday caps were worn by both men and women. Fancy dress-up caps of the finest quality twined weave are still made and worn by the women today. Typical dia.: 8".

Basketry Cap. Dia. 8".

Basketry Moccasins. Some tribes also used basketry techniques to weave foot-gear or moccasins out of tule rushes or other plant materials.

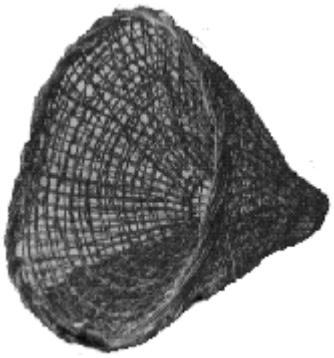


Basketry moccasins. Length 10".

Traps

Birds and fish were the principal animals caught with traps. In California, salmon and certain other migratory fish were second only to acorns as a food staple. Basketry traps were made in three main forms. A "plunge" trap was used to scoop up fish. "Invaginated" traps had a narrow, funnel-shaped opening leading the fish into a second chamber from which they were unable to exit. A third trap type is long and funnel-shaped. Upon entering the trap, the woodpecker, quail or certain fish became wedged into the small

end. The size, structure, and weave of each trap varied according to the specific animal. Three types of traps are illustrated: the Pomo invaginated fish-trap, typical dia. at the mouth: 18"; the Atsugewi basketry fish-trap, typical dia. at the mouth: 12"; and the Pomo woodpecker trap, typical dia. at the mouth: 4".



Invaginated Fish Trap. Dia. 18".

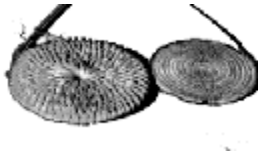
Fish Trap. Dia. 12".

Woodpecker Trap. Dia. 4".

Basket Weaving Methods

A basket was worked, and formed of grasses, twigs and fibers into a piece of artistic design--sometimes only to be admired for its artistry, but usually created to serve a further purpose. Baskets were made to serve all the container needs of the early California peoples who had no pottery. Not merely handwoven, they were filled with meaningful designs, symbols, even stories, following tribal tradition. Beyond tradition, weavers exercised artistic freedom leaving their individual marks. Three types of basket weaving is illustrated below.

Coiling. A flexible rod, or cluster of 3 rods, is coiled and continuously bound to the preceding level. This method produces a strong but quite stiff basket or tray.



Coiling.

Simple Open-Work Twining is used for traps and some winnowing trays. As in cloth weaving, a horizontal weft goes under and over the vertical warp. Two or three pieces of horizontal weft material may also be twisted around each other.

 Simple Open-Work Twining.

Tightly Woven Twining. This weave is used for cooking baskets, caps, water bottles, and for other items where waterproofing is required, or where flexibility is essential. The weaving includes a variety of complex and difficult techniques and designs.

Tightly Woven Twining

Source: http://www.mip.berkeley.edu/cilc/basket.html

Background Information – Basketry

There are many different techniques for making baskets. The three most common ones are twining, coiling and plaiting.

1) TWINING is two or more flexible weft elements that engage one or more rigid warp elements, interlacing with the warps or being twisted between them The warp is the passive element and normally vertical; the weft is the active part in this technique and usually horizontal. The active element is very fine and weakest across the twining elements. As a result, splitting and breaking occurs between the passive, vertical elements. This technique is used primarily for making mats, bags and sandals.

2) COILING is the technique where a warp foundation is wound in a circular pattern and the weft (usually one strand instead of two or more) is sewn over the foundation to link each successive row. The foundation is more sturdy and stiff and gives the object its shape while the active element is rather fine. Therefore, it is logical that the weakest part of a coiled basket is between the foundation's rows where splitting or breaking can easily occur. As a foundation, people use willow sticks, bark, grass, roots and shoots. It is often easier to produce a variety of shapes with twining than with coiling.

3) PLAITING involves sets of elements interwoven at a 90º angle.

A basket's shape does not necessarily dictate a certain weaving technique. No matter which technique is used, the process is very labor-intensive: single basket can take several months or even a year

-quote from Julia Parker, Pomo: "You follow the rules and just relax, let those pieces of fiber in that basket just dance in your hands…"

Material:

-Bracken Fern: when buried in mud or left to soak in a rusty tin can, the color will become shades of dark brown and black

-Sedge Roots: formed the yellow-white background

-once the material has been harvested, it is left to age, so that it will remain straight

-sedge roots are split with fingers, knives or teeth and stored in coils

-before starting to weave, the materials are soaked in water to soften them; then the weaver gives them a final trimming

-Willow: usually the foundation of all coiled baskets

-Bulrush: one of the two Pomo traditional pattern color plants: buried in wet ashes to dye black

-Redbud: traditional Pomo source for red-colored designs

Color:

-in Miwok tradition only one color has been used per basket (either black from Bracken Fern Root or red from Split Redbud Twigs), but this was modified by Lucy Telles (Julia Perker learned the art of basketry weaving from Lucy Telles who is her husband's grandmother) who began to use two colors

-much knowledge goes into choosing color and selecting the materials for it, as Julia Parker, a Pomo basket weaver states: "Even vibrant color is a sign of carefully chosen materials. The color of redbud is different depending on where it grows. The sticks growing on the south side of the river are darker than those growing on the north. One of

the rules I was taught is that you wait for it to rain and wash all the dust off the bushes, and then you can really see the colors."

Design:

-Lucy Telles large design had often stylized pictorial elements arranged in overall symmetric patterns, giving the whole basket a unified design

-There is no established pattern for different types of basketry; the entire design of the basket has to be formed inside the weaver's mind before beginning weaving

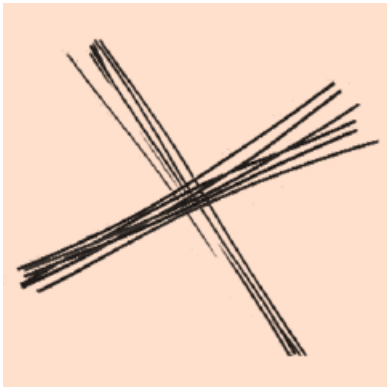
Decoration:

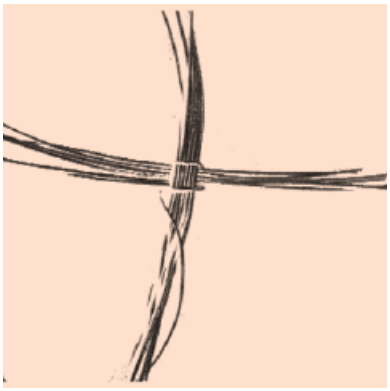
-variation of technique

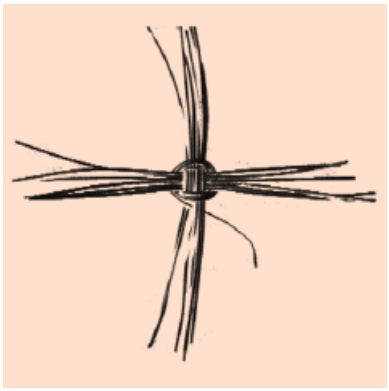
-appendages like feathers, shells, tassels and beads

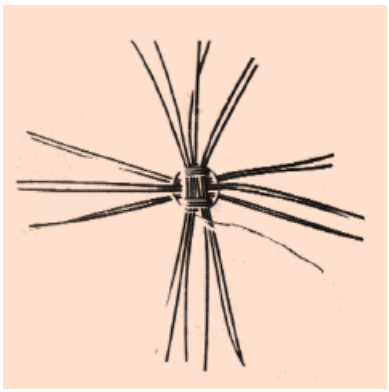
-use of different colors by dying materials

Make a Round Reed Basket









Step 1

Arrange two groups of six "weaver" spokes as shown, with the horizontal group on top of the vertical group.

The spokes must be placed as flat as possible.

Step 2

Place a long, flexible weaver at upper left, behind the horizontal group.

Wrap it over the top group of spokes, under the bottom group, and continue clockwise, binding the two groups into a single piece.

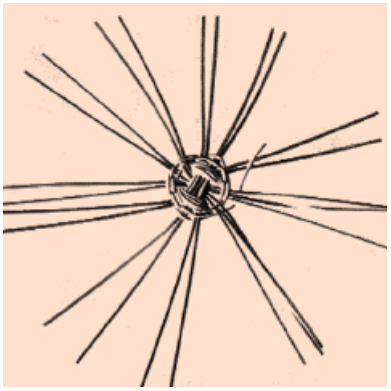
Step 3

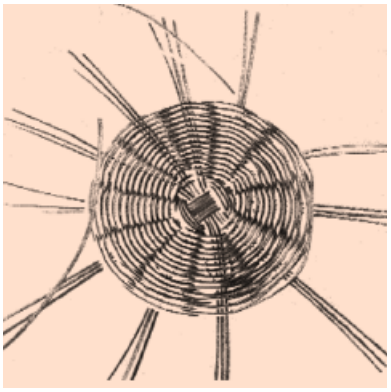
Begin weaving by bringing the weaver over three and under three spokes in the first group. Keep the weaving tight so the spokes don't bunch up!

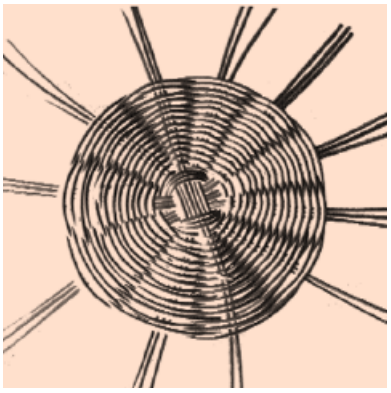
Step 4

Bring the weaver over two, under two, and over two spokes in the next section. As you continue clockwise, keep this pattern of twos. Only two sections will have three spokes; all others will have two spokes. While weaving, pull the groups of spokes apart, creating an asterisk shape. This will make the weaving easier as the basket takes shape.

Make a Round Reed Basket







Step 5

To keep the rows close together, pull the weaver down across the center after each stroke. This will help to keep the weaving tight.

Step 6

When the weaver runs out, pinch a new weaver 3/8" from its end and insert the bent part into the woven rows near the edge of the basket.

Continue weaving the same pattern.

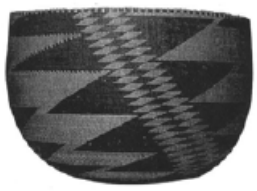
Step 7

End your weaving when about 1" of the spokes remain. (If you get too close to the end, it may unravel!). Tuck in the end of your weaver and place a dab of glue on each of the spokes where the weaver ended. This will keep the weaver from unraveling when the spokes are trimmed to shape. The basket can be shaped into a bowl or left flat by applying the appropriate pressure on the weaving.

What Is This Basket Used For?

Draw a line from the basket to its modern equivalent.

1



2

3

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A

B

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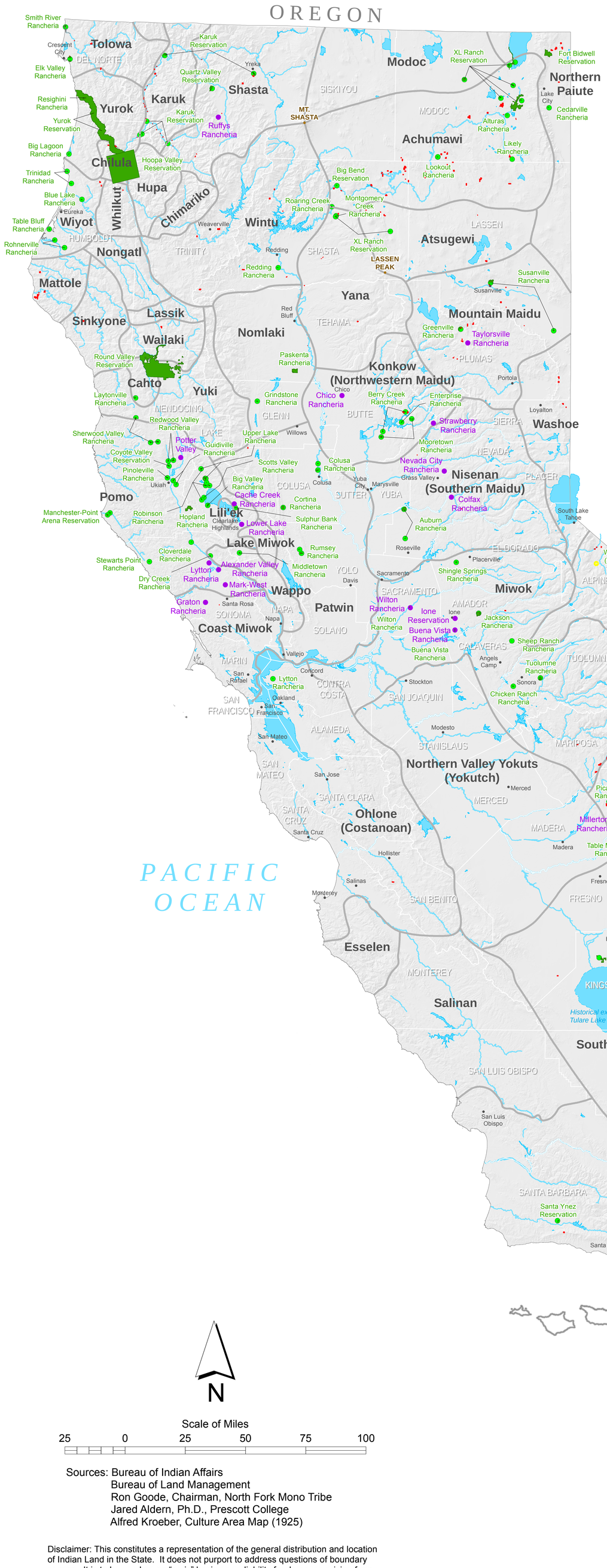
California Indian Tribal Homelands and Trust Land Map*



Legend

- California Tribal/Cultural Areas
- Indian land currently held in Trust by the United States Government.
- Historical location of Indian land which was once held in Trust for a Terminated Tribe and/ or the location of a landless Federally Recognized Tribe.
- Indian land currently held in Trust by the United States Government but resides in the Nevada or Arizona Jurisdiction.
- Indian land currently held in Trust by the United States Government and known as a Public Domain Allotment.
- Highlights smaller Reservation and Rancheria areas.

N

Scale of Miles

25 0 25 50 75 100

Sources: Bureau of Indian Affairs
Bureau of Land Management
Ron Goode, Chairman, North Fork Mono Tribe
Jared Aldern, Ph.D., Prescott College
Alfred Kroeber, Culture Area Map (1925)

Disclaimer: This constitutes a representation of the general distribution and location of Indian Land in the State. It does not purport to address questions of boundary or area. It is to be used on an "as-is" basis as no liability for damages arising from errors or omissions is assumed. This map of Tribal Homelands is based on available ethnographic and historical data, and the tribal or cultural areas shown are comprised of multiple, independent social and political groups. This map is a work in progress that consists of the identification of boundaries, cultural areas, tribal identities, and tribal lands.

*version 4 for digital versions of this map, see: www.landlessons.org or www.iltf.org

Map prepared by: California Department of Water Resources, South Central Region Office

Date Saved: 2/8/2013

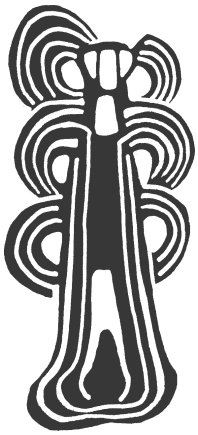
UNIVERSAL HOUSE

Traditional houses and lives of California tribal groups were often patterned after the concept of a "universal house" — the earth and sky shelter the living. California Indians were provident planners. They built with the sun, wind, and earth; with seasonal cycles and native materials; with practical skills and common sense; creating a modest but elegant architecture, sustaining and sustainable.

What is ENERGY?

California Indians accepted that many different forces, spiritual to physical, were at work in the world. But rather than deny or attempt to resist these forces, they acknowledged them, learned from actual experience, and then applied the lessons to their lives in practical and graceful ways.

Today, we often fail to notice whether or how something is working, until it's not. So too, we tend to take energy for granted. We use all we want whenever we want — until we can't. When it ceases or runs out, when we can't afford it, when something breaks or isn't working, only then do we recognize its importance.



In essence, energy is the capacity to do work — the passage of energy from one body to another enables things to move, grow or otherwise interact.

All life requires energy. And yet, it is a difficult concept to explain, for while it has practical, predictable and daily applications in our lives, it is also an inconstant and abstract quantity — constantly changing form.

Whether as uncontrollable hurricanes and earthquakes, or as habitually commonplace as light and locomotion, energy is a critically important part of our world — causing, affecting, and enabling every aspect of our lives.

Energy makes the universe go and grow. It's sunlight — the difference between day and night. It's the electric light. It's factories and fruit trees. It's thunder and lightning and it's HBO. It's planes, trains and freeways, and it's the whole world spinning in space. You know energy exists because you can see it, hear it and feel it — for light, heat, sound and motion are all forms of energy.

Some sources of energy are naturally renewable and virtually inexhaustible (such as solar and wind power) while other sources are nonrenewable (such as fossil fuels like oil, coal and natural gas) and cannot be replaced.

Traditionally, California Indians understood both the benefits and the responsibilities that arise from our relationship with the ecosystem and its resources. They also understood the fundamental role that sun, wind and renewable resources play in heating, cooling and lighting our homes.

OVERVIEW

SHELTER

EARTHEN

Tradition Indian builders, in what is now called California, made the earth itself their home, using it to build and enclose various house forms. They could do so because the ground (the land surface of the earth) maintains a relatively constant temperature barrier between outside temperatures and inside conditions, regulating the temperature of interior spaces.

The Luiseno tribe constructed thick-walled mud-covered sweathouses or temescals, which used a central fire pit to effectively trap the heat. The Mohave oriented their winter houses with the building's backs blocking fierce north winds. These earth shelters remained warm in winter and cool in summer, whether covered with soil or built either wholly or partially below ground.

A common substance with an uncommon capacity to shelter, earth was a practical and invaluable material in every region of California — from low sand-covered shelters of the Colorado River tribes, to stone-capped redwood sweathouses of the northwest; to pit houses of the Central Valley and foothills; to cavernous dance houses and ceremonial chambers, fifty feet across, with fires as their centers and large holes overhead "for the smoke and sparks to fly out."

OVERVIEW

SHELTER

EARTHEN

In all regions of California, the earth was excavated by tribal builders and used in combination with local materials (wood, stone, fiber) to create various kinds of shelter — round, rectangular, and subterranean or semi-subterranean (partially below ground).

OVERVIEW

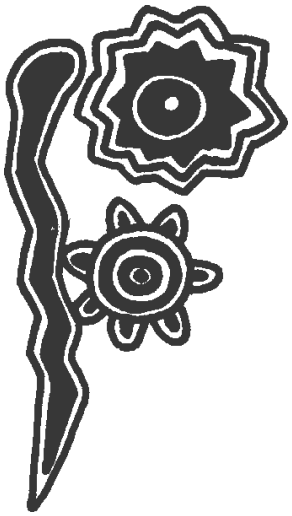
SHELTER

PLANK

When native people first appeared on the whale gray coast of what is now Northwest California, the world floated on water, grizzly bears danced beneath redwood trees and rivers ran thick with salmon.

Local tribes using redwood, cedar, hazel, earth and river rocks constructed distinctive gabled plank houses. They combined the wood with earth. Rocks were used to edge the rectangular buildings, to pave adjoining outdoor areas and to cap the subterranean (underground) sweathouses.

More than formal ornament, however, the thermal mass of the rocks, and of the earth itself, acted as solar collectors. By day, they absorbed the heat of the sun. When the sun had passed and the ir had cooled, this heat was transferred to the house. Skillfully adapting local materials and solar energy to their needs, the Yurok, Karuk, Hupa, and others crafted energy-efficient shelters that were elegant and comfortable places for human beings to live.



OVERVIEW

SHELTER

PLANK

In Northwestern California, low gabled houses were built over rectangular earthen pits. Thick broad planks of redwood or cedar were set on end to line firepits and form house walls. Wooden rafters supported pitched, plank roofs. River rocks and grapevines secured the structures. House walls were often set back from the edge of the pit, leaving an earthen "shelf" on which people were warmed by the rising heat from the firepit.

OVERVIEW

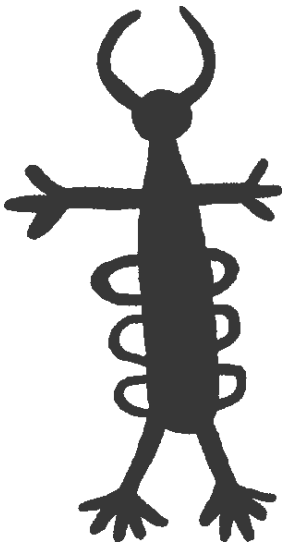
SHELTER

SAPLING & THATCH

Many native tribes in California's desert and coastal regions erected domed houses of bent sapling or tule framework. Natural fiber shelters, covered with brush or thatch (grass or tule reed) and curved like the vault of the sky, shielded their builders from cold, wet, wind, and sun.

In summer, the same materials were used to create shade with a sun shelter. These open-air arbors and lean-to shelters furnished shade and comfort during the hottest hours of the day and year, blocking the light and heat of the "traveling fire in the sky."

Traditional Indian builders adapted resourcefully to California's warm and arid regions, making and remaking households defined by religion and traditions, wood and grass, earth and sky. The Paiutes' brush-covered shelters made efficient use of the scarce resources on the high desert. Both Yokuts and Pomo erected covered arbors and oblong houses large and long enough to shelter whole villages. The Maidu built summer shelters facing east to temper the intense heat of the late afternoon sun. The Chumash placed the entrance to their sapling and sea-grass houses on the south side for solar gain.



OVERVIEW

SHELTER

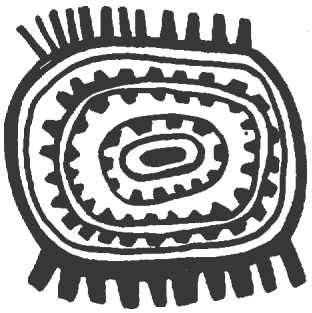
SAPLING & THATCH

Traditional Indian builders in California's valleys, marshes, deserts, and coastal areas made fiber shelters of sapling or tule frames covered with brush or thatch (reeds, grasses). Built above ground or over earthen pits, sapling frames were often bent to dome or oval shapes and secured with fiber. In summer, the same materials were used to build flat-topped arbors or lean-to shelters.

SHELTER

CONICAL BARK SLAB

California Indians oriented, or positioned, their traditional houses in relation to the sun. They understood the sun's movement through a day and a year — its cyclical, seasonal passages across the sky. They made its constancy and energy work for them. Houses were placed to admit the welcome warmth of the low winter sun as well as to block chill winds. In summer, orientation was reversed, limiting exposure to hot afternoon sun and admitting fresh air.



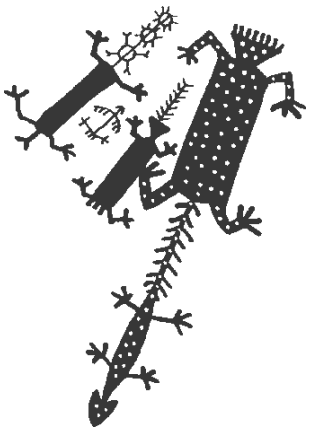
The Sierra Miwok sited bark slab houses on sunlit leeward slopes, above cold ravines but below windswept ridges. In the mountains, the eastern side of the cone for both the Maidu and the Miwok houses is angled sharply to prevent snow accumulation.

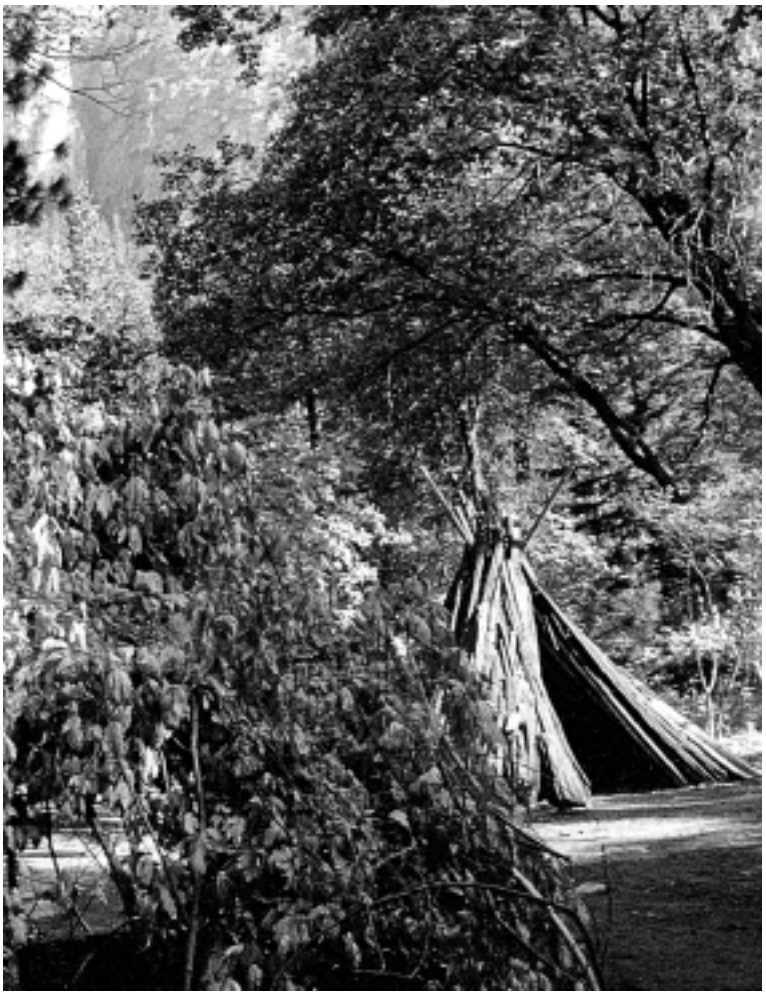
The placement of buildings in relation to the sun, wind, and landscape affects daily and seasonal heat gain and loss. A house that is properly oriented and insulated can be heated or cooled by natural, sustainable means. Orientation is common sense. It's a lesson as old as the sun and coyote, but as new and as certain as tomorrow's sunrise.

SHELTER

CONICAL BARK SLAB

Conical bark slab houses were built by California's coastal and mountain tribes. In cold, damp or foggy areas, large slabs of redwood and cedar (or other conifers) were arranged on end in a conical shape. The thick, bark slabs were either freestanding or supported by a cone-shaped sapling frame. Earth was banked against the base. The Miwok referred to their conical bark houses as kotea, "a place where real people live."





SHELTER

• Houses are but one kind of shelter, or home, in which to live. People live in houses, trailers, apartments, cars, rooms, boats, etc. Ask students to name as many different kinds of shelter as they can. Have them create a collage of homes from magazines — different kinds, different times, different cultures. Select several of these and ask students to suggest what materials they are made of, what forms of energy are required to construct and "operate" them. Ask them to imagine what it might be like to live in them.

• Ask students to imagine what it might be like to live in different types of traditional California Indian houses: a redwood/cedar plank house in the forests of the northwest, an earthen house in the central foothills or deserts, a conical bark slab house in a mountain meadow, and a sapling frame house with a grass/thatch cover in treeless grasslands on the coast.

• Organize students into groups. Have each group research one type of traditional California Indian house (see above). Ask them to describe the housing type and identify the tribes that erected this form of shelter and what they called it. Have them describe the habitat in which it would most likely be found. How did the habitat affect the designs of the house and the selection of materials used in construction? What materials were used and how were they obtained?

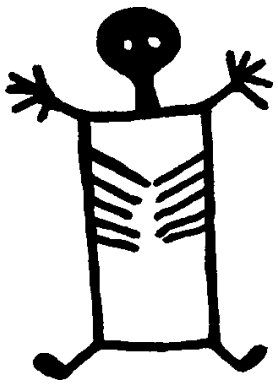
• Energy is required to build, heat, cool and light a home. But energy is also needed to produce and transport the building materials. California Indians reduced the need to transport or produce materials by using locally available resources in their natural state. Materials available on or near the building site might include, for example, reeds and grasses in marshy areas or tree bark in forested areas. Ask them to cite other examples. Have them consider the kinds of energy required to produce the materials, to transport them, and to construct each type of traditional house.

• Ask students to decide what type of traditional California Indian house would be best to build in their neighborhood, considering locally available natural materials and climatic conditions.

• Compare this to construction of a contemporary house. Which house, traditional or contemporary, uses the greatest amount of energy in the production and transportation of materials, in construction and in "operation?" Why? Which house uses the greatest amount of non-renewable resources? Why?

• Ask students to think of their neighborhood (or the neighborhood outside the classroom) as a source of "local" materials Challenge them to design a small house using any locally available materials, renewable or not, attractive or not, conventional or not (encourage them to try an unconventional approach). Ask them to consider energy conservation in their design.

• How do houses let us live comfortably in many different environments? How do houses reflect the values of a community or culture? How does energy use reflect the values of a community or culture?



28 Story Architects: Reflection on an Integrated Project

by Erin Riley

Figure 28.1: Story architects at work.

Sarah Holzschuh's senior English class, New York State of Mind, at Greenwich Academy in Greenwich, Connecticut, worked in the Engineering and Design Lab on a two-week interdisciplinary project bringing together the concepts explored in literature and translating these ideas into the visual language of architecture. Students selected one of six texts they had studied throughout the year, and over the course of several class periods worked to construct a building model based on the themes, character trajectories, or the experience of reading the work they'd chosen (fig. 28.1). Inspiration for the collaboration came from a project between Creative Writing and Architecture graduate students at Columbia University.[1]

Lesson sequence

Day 1: Design challenge and exploration of materials
Before being introduced to the Story Architect project, students were given a one-day design challenge to create a carport for a toy car (fig. 28.2). This activity was specifically designed to get the students thinking about scale and the nature of the materials they were using from both an engineering and aesthetic perspective. This challenge also offered them time for exploration and reflection within the group. The solutions were varied, and the students were inspired by the wide range of visual and structural possibilities with cardboard, tape, and translucent materials.

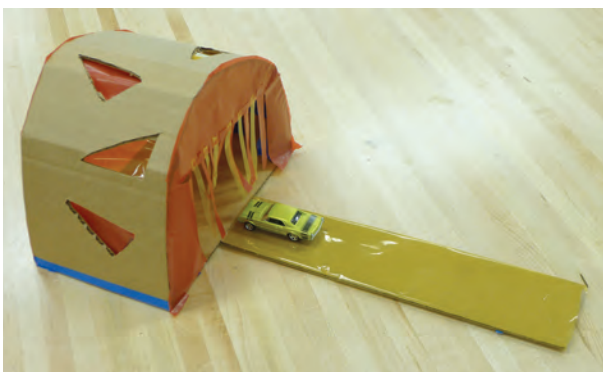


Figure 28.2: Carport design challenge.

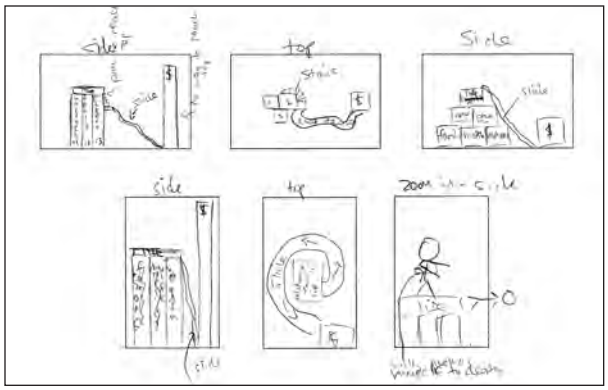


Figure 28.3: Planning sketches.

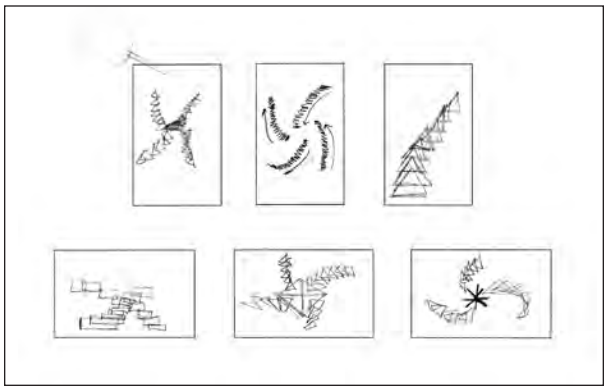


Figure 28.4: Thumbnails.

Day 2: Book selection and thumbnails

After being introduced to the Story Architects concept, students took time for written exploration, reflecting on a series of questions designed to get them thinking about literary concepts in structural terms. The students then created a series of thumbnails, quickly sketching visual ideas from the book they had chosen (figs. 28.3 and 28.4). Many students moved on to a more detailed thumbnail in preparation for building.

Days 3–5: Building

Each class had three days to build their structures. Guidelines were loose; they were given an 8 × 8 inch laser-cut platform to build the structure and could expand the air space to fit within a 10 × 10 envelope. Their only other limitation was a designated collection of building materials, including cardboard, wooden dowels, and transparent and translucent paper (figs. 28.5). The class was familiar with the materials, having used them in their one-day carport challenge.

City Planning

Students put forth proposals for how to organize the structures for the final exhibition. They ultimately decided on a grouping of structures into "neighborhoods" organized by book. Negative space pockets were engraved on the ShopBot to create the foundations for each building. The students built their structures on 8 × 8 platforms that fit into the foundations for the gallery installation (fig. 28.6).

Student Reflections

After the installation, student writer/architects explained their process and design choices. Here's one:

> At its core Colum McCann's *Let the Great World Spin* is a book about hope. While the immediately apparent themes in the novel seem to be hardship, loss, filth, and destitution, there are continually moments in which the characters find happiness and light in the midst of all the darkness. My architectural piece is an attempt to emphasize the importance and centrality of the characters' search for something beautiful in their lives.

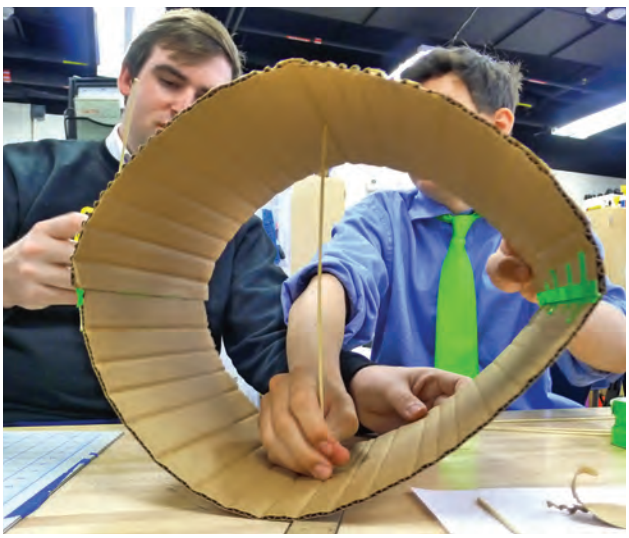


Figure 28.5: Building stories.

Figure 28.6: City structures installed in the Luchsender Gallery.

At the base of the structure, there are many short buildings of various heights, seemingly oppressed by three taller buildings in the center. Some of the small buildings are broken, missing large pieces from their sides, whereas some are even collapsing onto each other. None of these buildings have roofs for coverage and protection. These structures are symbolic of the difficult situations that many of the characters find themselves in during the novel.

The most important part of the piece, however, is the beams that connect these buildings to each other, as well as to the increasingly taller buildings in the center. These beams symbolize the ability of anyone to move away from the darkness and find moments of joy or happiness in their lives. The rising beams represent the characters' ability to "rise" up from their situation and find beauty in their lives, if even for a short time. The beams also reflect Phillipe Petit's tightrope walk between the Twin Towers, which is a recurrent theme in the novel. I think that Petit's tightrope walk is so central to this book because most of the characters find themselves in horrible situations that they cannot control, whereas Petit places himself in a dangerous situation by choice and ultimately makes something beautiful out of it instead of focusing on the danger or potential outcome of his endeavors.

The three taller buildings in the center of the piece represent the happiness and light that the characters can find in their lives if they simply look for it. The area higher up is less crowded, and the buildings are covered by roofs, which represents a safer and more protected place. In this piece my goal was to create a structure that would reflect the hope in this novel and focus on the search for occasional happiness instead of oppression by constant sadness. (Katie S.)

Reflection

After the first experience with this project, Sarah Holzschuh and I continued to develop and improve Story Architects. Our goal is to enrich students' experience as learners. We hope that their understanding of literature is enhanced by the opportunity to express ideas through making and designing an artifact that has personal meaning to them. Built into this experience were design and structural challenges that students solved with limited resources and time (fig. 28.7).

Figure 28.7: The Story Architects project continues to develop.

The project itself is an ongoing prototype, and the collaboration we have forged is the start of what we hope will continue to grow with our students. This group was particularly interesting to study. Not only was it the students' final year at Greenwich Academy, but this class contained some of the original members from the inaugural year of the Middle School FLL Robotics team. Since then, STEAM education and curricular integration of "making," engineering, and design into every girl's experience at the school has gained institutional support. Throughout the course of their education, all of the students will continue to get a rich experience with the visual arts, woodworking, computer programming, physical computing, electronics, 2D- and 3D-digital design and fabrication, and the engineering design process. This project will undoubtedly evolve as students will be able to draw upon more tools and experiences in the Engineering and Design Lab in their time at Greenwich Academy.

Story Architects 2.0

Sarah and I collaborated on a second version of Story Architects the following semester. The concept of mapping was introduced, and a large-scale map was printed and installed in the gallery. Students identified a location for their structure using map pins and string (fig. 28.8). Material choices expanded with the second iteration of the project, and a wider variety of design ideas was evident (figs. 28.9 and 28.10).

Note

1. opinionator.blogs.nytimes.com/2013/08/03/writers-as-architects

Figure 28.8: Mapping structures.

Figure 28.9: Additional material choices.

Figure 28.10: Wider variety of story structures design.

Source: Heizer, R. F. and M. A. Whipple (editors). 1971. *The California Indians. A Source Book*. Berkeley et al.: University of California Press.

Dentalium

DENTALIUM SHELLS WERE *MONEY* TO AMERICAN INDIANS

Dentalium shells are small tubular mollusks that look like little elephant tusks. There are over 300 species of dentalium, but the species most used by American Indians as money were Dentalium (Antalis) Pretiosum which are found along the northwest coast of North America.

Dentalium shells have been used ornamentally as beads, money and symbols of wealth for thousands of years and many varieties can be found around the world. Today Asia supplies most of the dentalium shells used in bead work. The Asian dentalium is more fragile than the type used by American Indians. Dentalium Pretiosum or Indian Money Tusk has a smooth finish with horizontal ridges and are a strong shell less likely to chip or break.

The American Indians of the Pacific Northwest initiated the use of dentalium as a standard of monetary exchange and a sign of wealth. These shells are most attributed to the tribes of Northern California (Hupa, Tolowas, Yurok, Wiyot, Karuk, Wintu) because their societies had a high cultural value on wealth. However, they got most of their dentalium shells from more Northern Indians (as far away as Vancouver).

The tribes of Northern California used dentalium shells as a monetary tool for exchange of goods and services. (purchase their homes, clothing, boats, weapons and food etc) Generally the most prized dentalium shell was a large on two and one half inches long or longer. A small boat cost one strand of dentalium shells (a strand was about the length of a man's arm). The Indians strung the shells on fiber thread (iris) and stored them in Elk horn "purses". The more wealthy men decorated their ceremonial clothing with both large and small dentalium shells.

But it wasn't just Indians of the pacific coast that used dentalium shells as money – the practice spread as far as the Dakota's. In fact, the Plains tribes wanted these shells for currency also. The demand in that area was so strong that traders imported the Atlantic species (Dentalium entale stimpsoni) from New England and from Europe (Dentalium Vulgare).

Today most bead work is done with the more plentiful Asian variety of dentalium shell and interestingly a two and one half inch to three inch dentalium shell is still valued at about one dollar each!

Both the Kumeyaay and Cahuilla cremated the dead during the Late Period (May 1974; True 1970). Beads were frequently associated with the cremated remains, which often were placed in pottery urns (Gamble and Zepeda 2002; King 1995). One of the most important ceremonies among the Cahuilla was the *núkil*, the annual mourning ceremony. Both the Cahuilla and the Kumeyaay practiced a clothes-burning ceremony after the death of an individual. Among the Kumeyaay, all of the belongings of the dead were burned to insure that the spirit did not return for them (Davis 1921:95–97; Heye 1919:14–16; Luomala 1978:603).

Shell beads and ornaments in the San Diego region served as ornamentation that undoubtedly signaled one's rank in society. They also were a form of currency, at least among the Cahuilla (Bean 1978:582), and figured prominently in ceremonies, especially mortuary rituals (Gamble and Zepeda 2002; King 1995). Eastern Kumeyaay or Kamia women reportedly wore clamshell beads or "blue beads" made from Gulf of California species, and men wore strings of small, white clamshell discs or shells in their nasal septums (Gifford 1931:37). Gifford (1931:37) also noted that clamshell beads were traded to the Kamia by the Cocopa.

Among the Cahuilla, the clan chief of each ceremonial group kept several strands of shell beads, usually in association with the clan's sacred bundle (Strong 1929:94–96). One class of shell money was called *witcu* by the Palm Springs Cahuilla. A string of *witcu* was measured from a person's forehead to the ground, then multiplied by four, and was worth 50 cents. One of these was given by the clan chief to each invited clan leader at the end of an image-burning ceremony. This ceremony usually occurred about a year after death. A similar string was returned by each clan head when their clan had a ceremony; as a result, *witcu* were involved in a perpetual series of exchanges. There was also another type of shell money that was called *napanaa* by the Palm Springs Cahuilla. These strings of beads were measured by wrapping the string around the wrist and fingers, and they were sent by all leaders to a clan chief after a death in the clan (Strong 1929: 95); they were worth 20 cents. Alejo Potencio told William Duncan Strong that the beads were traded to the Cahuilla by the Serrano, who received them from the Gabrieleño (Tongva) of San Fernando Mission. In his accounts, the use and distribution of shell beads took place in the context of ceremonies (Strong 1929:94–96).

THE SAN DIEGO COLLECTIONS: THE SAMPLE

Many of the beads described in this paper are from collections curated by California State Parks, while others come from collections in the Collections Management Program at San Diego State University. Some of the collections were donated to State Parks by avocationals and have limited provenience information. Site descriptions vary, because more information is known about some sites and collections than others. In this section, we provide a brief description of each site or accession involving the bead assemblages, organized according to their general regional provenience. The collections that have known provenience information are mapped in Figure 1. The authors, with the help of Scott Justus, Kara Johnson, and other students from San Diego State University (SDSU), analyzed over 2,000 shell beads, shell ornaments, and glass beads.

San Diego Sites West of Cuyamaca Rancho State Park and Anza Borrego

CA-SDI-5216, Woodward. The Woodward site is situated near the coast just east of Escondido and the San Elijo Lagoon (Fig. 1), near a seasonal drainage, and at an elevation of about 100 feet above sea level (Gamble 2008). The site rests on land oriented between two Mexican land grants of the early 1840s; this includes Rancho Las Encinitas and Rancho San Dieguito (now Rancho Santa Fe). The site was first investigated in 1966 and then later in the 1970s. No human remains were identified at the site during the excavations; however, after the faunal remains were examined in 2003, nine calcined bones were discovered, eight of which were human and one probably human. Twenty-four worked shell artifacts were recovered from the Woodward site. An unworked *Olivella biplicata* shell was also found. In addition to the shell beads in Table 1, one *Olivella* sp. oblique spire-removed bead is in this collection, as well as two *Laevicardium elatum* shells, an *Aequipecten circularis* shell, and a cowry shell (*Cypraea spadica*), all of which were possibly worked.

CA-SDI-4638, Bancroft Ranch. The Bancroft Ranch site is situated near Spring Valley, California at an

prehistoric village of *Ystagua* (Carrico and Day 1981:90; Eidsness *et al.* 1979:96). This type of obsidian is found near the Salton Sea; therefore, its presence on the coast indicates an exchange network between the Kumeyaay and the Cahuilla near the Salton Sea. Chert and Palomar Brown ceramic sherds from the Luiseño territory were also recovered from the village of Ystagua, indicating trade with the Luiseño to the north (Eidsness *et al.* 1979:96).

Most of the trading among tribes occurred through a barter system, although there is one account that describes food being traded for shell beads which were used as a form of monetary exchange (Shipek 1982:299). Another report mentions that the Kumeyaay used *Olivella* shell beads as a mainstay in their widespread trade and barter system (Carrico and Day 1981:75). Shell beads may have been used as a form of money in these cases, but this is not made clear in the ethnographic accounts.

In contrast, it has been clearly documented that the Chumash used *Olivella* shell beads as a form of money in their exchange system (Arnold 1987, 1991, 1992; Arnold and Munns 1994; King 1976, 1978, 1990a). The Chumash had an intricate trade network that involved three different environmental regions: island, mainland, and inland. Each region had its own resources that were exploited at different seasons and traded for profit and/or desired items. Trading supplemented each region's resources (King 1976).

Chumash exchange with groups outside their area is also well documented in the ethnographic and ethnohistoric records. The mainland Chumash sent wooden vessels inlaid with *Haliotis* shell to the Kitanemuk (Davis 1961:28). The Chumash imported red ochre and soft blankets from the Mohave (King 1976:305). They also exported steatite vessels to the Salinans, and shell beads and "unspecified goods" to the Mohave. The Chumash imported fish, obsidian, steatite beads, salt, seed, herbs, and vegetables from the Southern Valley Yokuts and piñon nuts from the Tubatulabal. Chumash shell beads, *Olivella* shell, and other shells were traded to these same groups (Davis 1961:28). One ethnographic account states that shell beads were taken from the Chumash to the Gabrieleño, and then to the Cahuilla in the Palm Springs area (Strong 1929:95-96).

The archaeological record demonstrates that Chumash shell beads were traded throughout southern California and some surrounding areas. Spire-removed beads from the Chumash have been found in the Great Basin that date to the Early period (6000-7000 years B.P.), indicating exchange 4500-6000 B.C./6500-8000 B.P. (Bennyhoff and Hughes 1987:156-160; King 1990a:107). In the Southwest, *O. biplicata* disc (saucer) beads dating to the end of the Middle period (A.D. 900-1150/1100-850 B.P.) have been recovered from the northern Anazasi area and the Great Basin (King 1990a:150). In San Diego County, at least two sites have evidence of exchange with the Chumash prior to the historic period (King 1990a:110; McDonald 1992). Los Angeles, Orange, San Bernardino, and Riverside counties also have produced Early, Middle, and Late-period shell beads similar to those from the Chumash area (King 1990a:111, 122, 129). Finally, in central California, *O. biplicata* spire-lopped beads have been recovered that are possibly contemporary with Middle-period Phase 1 (800-1400 B.C./2800-3400 B.P.) (King 1990a:119). Clearly, Chumash shell beads had a wide distribution among numerous Indian tribes.

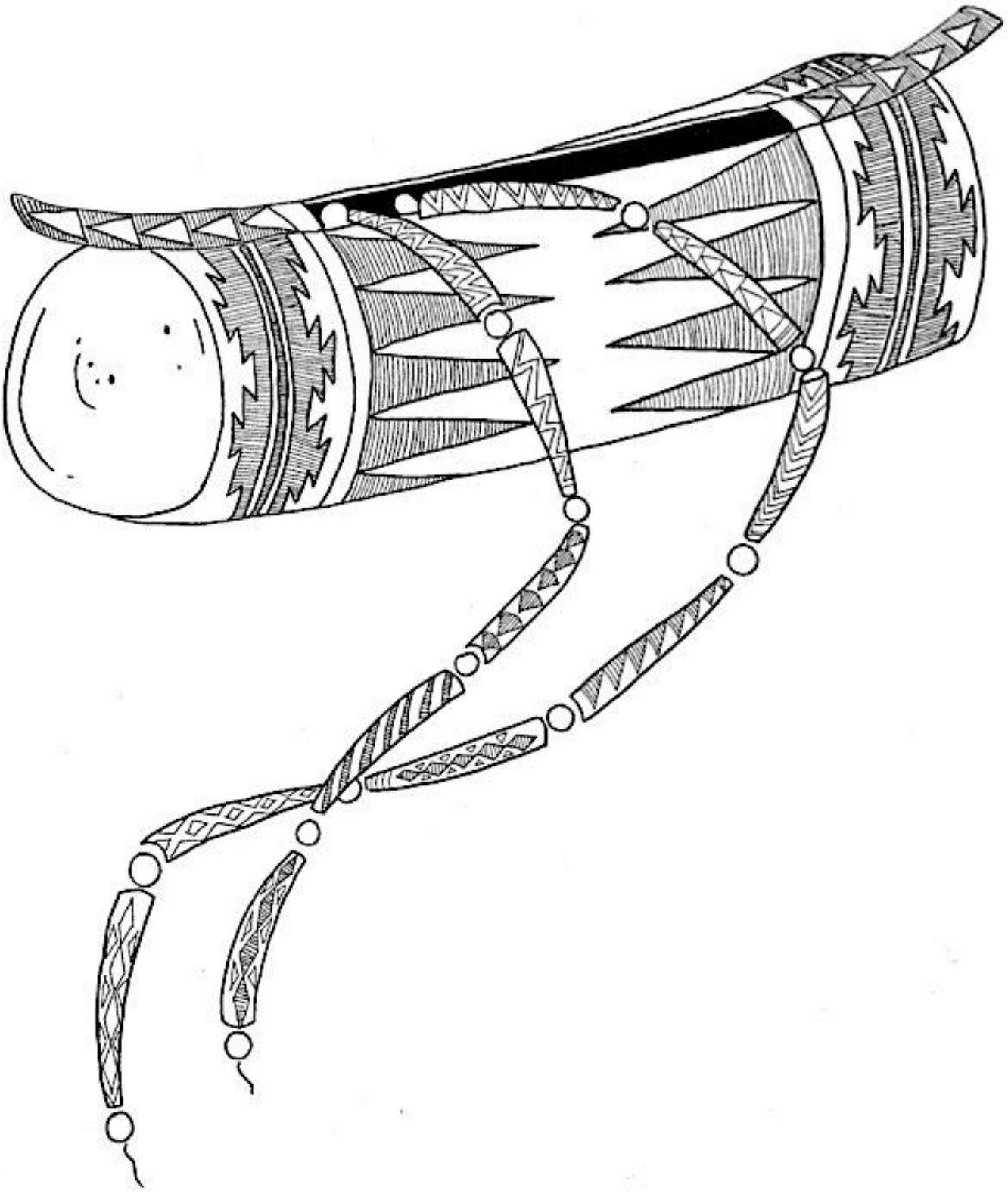
SHELL BEADS

Next, I will take a closer look at shell beads and shell bead manufacturing. *O. biplicata* shell was the most commonly used material for beads in California throughout all periods (King 1990a:103). These beads are one of many forms that are temporally diagnostic in King's (1990a) bead typology for southern California, which is based on the premise that bead diameters, hole sizes, and thicknesses are indicative of a particular time period.

O. biplicata rough disc beads are made from the wall of the shell. They appeared after A.D. 1776, when wall disc beads had diameters larger than 4.0 mm and less smooth ground edges. After 1782, the perforations of *Olivella* rough disc beads became smaller, because stone drills were being rapidly replaced by iron needles. By 1816, the outside diameter of the rough disc beads is between 5.0 and 6.2 mm (King 1990a:179-181). With the passing of time, bead edges and diameters become more variable. As discussed above, the different diameters and hole sizes are indicative of a particular time.

Bead Manufacturing

Shell bead manufacturing requires an abundance of shell in addition to tools such as drills. Small stone drills were used to make the perforation until iron needles were introduced by the Spaniards in 1782 (Gibson 1995:4). Massive amounts of shell detritus, stone drills or broken drill bits, and bead blanks are evidence of shell bead manufacturing. Results from a study of Late-period (A.D. 1300-1782) bead manufacturing sites from the Chumash area show that for every finished bead there were seven bead blanks,



Ceremonial Dress

A Woman's Brush Dance Regalia