

"Obsidian Spirits Just Speak Once"—California Indians in a Geothermal Land

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Keywords: Obsidian, Indians, California

ABSTRACT

Over millennia, California Indians mined, quarried, and worked obsidian; traded the precious geothermal glass near and far; and incorporated it into their mythologies. California Indians were the state's first geothermal developers.

1. INTRODUCTION, CALIFORNIA INDIANS

Pomo Indian basketry language for *ka teá katip'*, obsidian chips.

All California Indians knew about obsidian, using it for arrow points and chipped tools, though not exclusively (Heizer,1944,303). Indians valued the volcanic glass for edges worked sharper than surgical blades and found obsidian to be a rare commodity—even in an area as large as today's California, full of geothermal features like volcanoes and volcanic rocks, hot springs, fumaroles, mud volcanoes, and steam- and hot-water geothermal reservoirs.

In fact the Indians were California's first geothermal developers and entrepreneurs and obsidian is the first product of geothermal heat to be widely worked and sold in the state. Today this fundamental historical fact is overlooked, at least in California, probably in the United States, and maybe in the world. Certainly other geothermal rocks were used by Indians, like basalt and pumice, and today we all know how geothermally heated water and steam have come to be collected and used commercially around the globe. But about 13,000 years ago when Indians entered today's California, the history of wide-scale geothermal development began in the state—with obsidian, a rock of unparalleled imaginative hold, usefulness, and entrepreneurial potential that shook the Indian world. Here is its story.

How many Indians lived in California's boundaries? By 1770 about 133,000, and by 1910 about 16,350 (Kroeber,1925,883). The Indians were part of 103 tribes—ethnic groups, not political units—and most California Indians lived in little tribelet societies of a few hundred members with a bare minimum of political organization (Fig. 1) (Heizer and Elsasser,1980,3). The Indians spoke 21 mutually unintelligible languages. Several North American Indian language stocks had California speakers, but the Yukian language family is the only one found exclusively in the state (Heizer and Whipple,1971,346).

California Indians looked like other American Indians but varied physically, as well: the California Mohave were among the tallest in North America and the Yuki the shortest (Heizer and Elsasser,1980,7). The tribes held different worldviews. For example, some focused on acquiring and holding wealth from rare, natural objects like

large, chipped obsidian blades, black or red (Heizer and Elsasser,1980,208).

A Yurok tale tells of Kingfisher collecting a bride price as he traveled the world in a valuable obsidian boat. Perhaps the obsidian reflects the trip's importance and all the fires and the charred animals the fiery origin and black color of the obsidian. In any event, here is what happened.

One day, "Sea Otter woman was dancing at *Omenoku* [a town in northern California], learning to become a doctor. Kingfisher was to marry her, but the bride price was so large that he was traveling all around the world to collect the amount." Meanwhile at home, Seal and Sea Lion were in the *Omenoku* sweathouse singing, "Kingfisher is going all around the world to collect his bride price. I hope he dies."

"Suddenly Kingfisher's boat, made of obsidian, landed. He heard them, was angry, and in revenge set the sweathouse on fire. Seal and Sea Lion had their arms burned off short and that is why they have flippers and why Sea Lion is black on the shoulders. Sea Otter woman was burned a little and that is why her arms are short. She rushed into the river and swam out to sea." (Heizer and Elsasser,1980,216)

2. WHY OBSIDIAN?

Kingfisher knew obsidian was special. In his boat, obsidian moves beyond the practical realm into the imaginary. At first obsidian was mined and quarried, traded, and worked for survival: its lethally sharp stone points chipped for war and hunting weapons, and for knife blades to cut meat. Then prized decorative and ceremonial objects were created and other uses and beliefs developed. I found four obsidian creation stories for California. Which one to include is a problem: the most introspective, the unique one, the complicated one, or the saddest? Here is my favorite.

3. HOW GLASS MOUNTAIN WAS CREATED

Jo Bender from Upper Sacramento told this Wintu story about Glass Mountain, a large obsidian deposit in northern California (Du Bois and Demetracopoulou,1931,305-6).

Jo said that one day some people went together to hunt deer and set snares on the runway at a place called Blood Gap. Adder had real obsidian arrowheads but the others, not knowing about obsidian, used whatever they could find. Whenever a deer was caught in a snare, Adder shot an arrow into it and quickly ran to pull it out before others saw the obsidian tip. Adder killed so many deer "the blood began running down both sides of the gap into the creeks," giving Blood Gap its name. The rest, who killed few deer, became jealous of his success over three or four days.

Finally they told fast runners, Humming Bird and Fox, to watch Adder and race to the deer before him. They did, but a man called *Puimeminbes* was closer, got there first, and pulled out the obsidian point. Adder, when he got to the

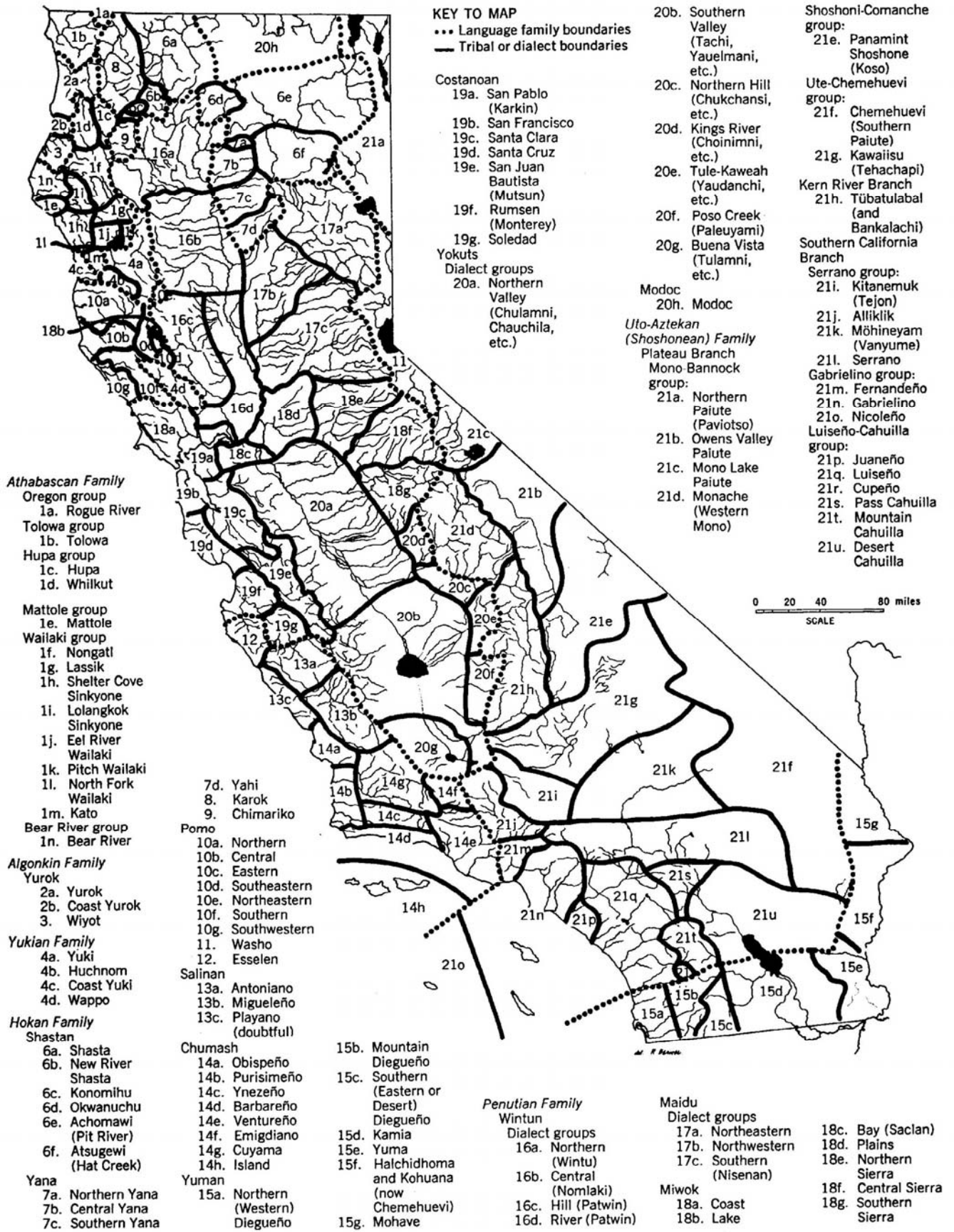
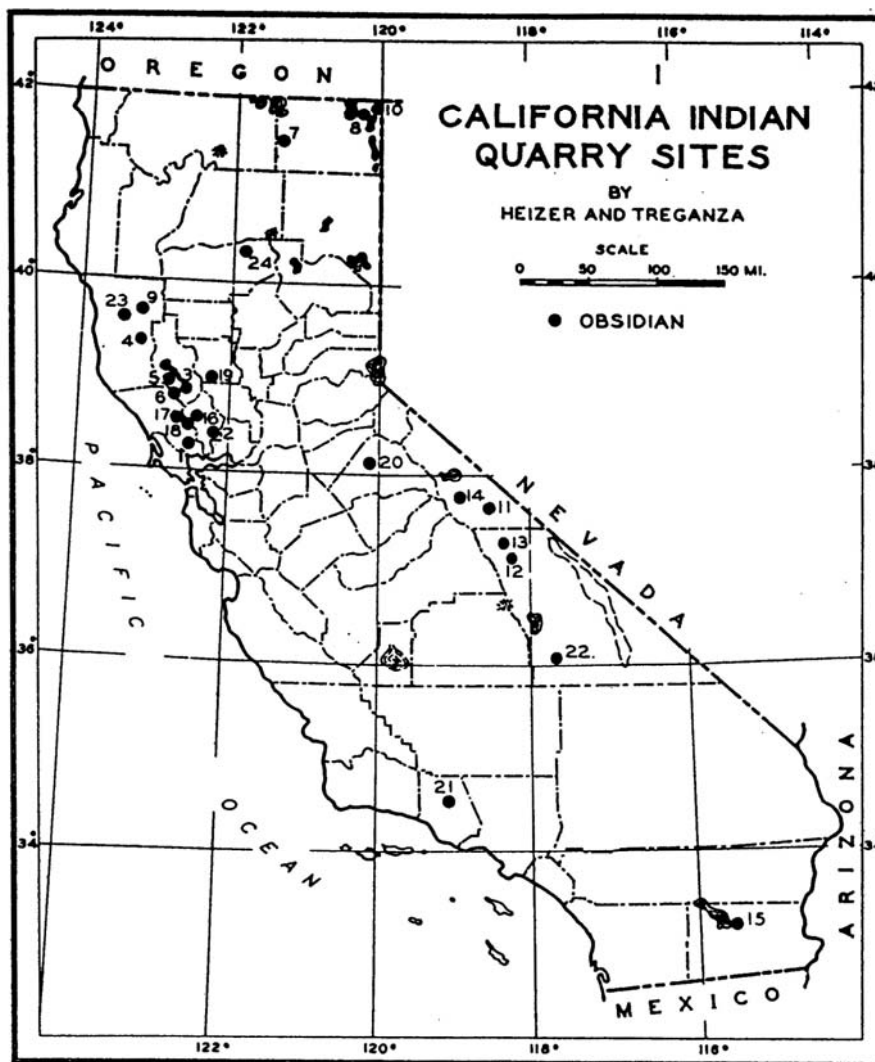


Figure 1. California Indian tribes, groups, language families, and dialects in 1770. Map adapted by Heizer and Whipple from Kroeber, 1925. Reprinted with permission from *The California Indians, A Source*

Book, compiled and edited by R. F. Heizer and M. A. Whipple, second edition, published by the University of California Press, Berkeley, Los Angeles, London.



OBSIDIAN

1. Near Anadel on the Southern Pacific Railroad about 7 miles southeast of Santa Rosa, Sonoma County.
2. East side of Napa River, near St. Helena, Napa County.
3. Big Borax Lake, Lake County.
4. Ridge between Eel and Russian Rivers, Mendocino County.
5. Cole Creek, Lake County.
6. Mount Konocti, Lake County.
7. Glass Mountain, Modoc County.
8. Sugar Hill, Modoc County.
9. Williams Valley, Mendocino County.
10. South end of Cowhead Lake, Modoc County.
11. Glass Mountain between Bishop and Mono Lake, Mono County.
12. Fish Springs, Inyo County.
13. North of Big Pine near Bishop, Inyo County.
14. Bertrand Ranch, 60 miles northwest of Benton, Mono County.
15. Obsidian Butte on southeast shore of Salton Sea, Imperial County.
16. Head of Napa Valley, Napa County.
17. Upper Sonoma Valley, Napa County.
18. Wheatland, Yuba County.
19. Cortina, Colusa County.
20. Mount Kilili near Tuolumne, Tuolumne County.
21. Near Fillmore, Ventura County.
22. Coso Hot Springs at south end of Coso Mountains, Inyo County.
23. Black Rock, Mendocino County.
24. Deer Creek, Tehama County.

Figure 2. California Indian obsidian quarry sites (Heizer and Treganza, 1944).

deer, knew his obsidian had been stolen and vowed revenge. Everyone knew Adder would set the world on fire and get ready to leave.

Meanwhile *Puimeminbes* ran up Sandhill Crane Mountain, where he found Sandhill Crane and Ground Squirrel, who was ready to run away with the obsidian, which by now had grown very large. Sandhill Crane told Ground Squirrel to leave right away because the fire had started. He said he'd stay on the mountain watching the fire and call to Ground Squirrel telling him how near had become. He said, "When you hear my voice getting dim you'll know that you are far enough away."

Thus Ground Squirrel started north. Passing Mount Shasta he still could hear Sandhill Crane talking about the fire. At last when Sandhill Crane's voice was almost too faint to hear, Ground Squirrel dropped his load.

"That is where Glass Mountain is today. That is why Ground Squirrel has a black mark on his back. The obsidian got hot and scorched him. The people left behind were caught in the fire right above their camp and the rocks at *Wakpom* are those old-time people."

4. WHAT & WHERE IS OBSIDIAN?

Obsidian, a glassy volcanic rock, forms when a relatively pure, crystal-free, granitic magma flows to the surface and solidifies before minerals crystallize. Most obsidian is black or gray, but it can be reddish brown—a rare color prized by California Indians.

The map in figure 2 notes 24 obsidian sites used by California Indians. The major ones are Glass Mountain (*see* Ground Squirrel, above), Sugar Hill, Big Borax Lake, Obsidian Butte, and St. Helena (Heizer and Treganza, 1944, 315). The following descriptions of locations are also from Heizer and Treganza, pages 304-6.

Location 2 is in northwestern California on a steep hill near St. Helena in the Napa Valley. Occurring as nodules, the obsidian is rarely larger than a fist and imbedded in soft white pumice. The whole hill slope is mantled with at least 100,000 cubic feet of obsidian flakes mixed with numerous, rejected implement blanks and round hammer stones of sandstone, rhyolite, quartzite, and tuff used to break the obsidian nodules and strike off the flat flakes.

On the hilltop some shallow pits are dug about six feet in diameter. Once larger and deeper, now they are nearly filled by the deep layer of workshop material found across the ridge. It was here, most likely, where the Indians easily separated the obsidian nodules from a solidly packed, loose aggregate of pumice.

The largest site is Location 3 at Big Borax Lake near Clear Lake in northern California. In 1944 Heizer wrote, "The outcrop of black rhyolitic obsidian in the quarry extends on a north-south front of nearly half a mile where it was exposed on the western slope of the obsidian flow. The massive outcrop is now buried under an eight-foot blanket of refuse flakes, quarry rejectage, and hammer stones"—several thousand tons and hundreds of thousands of cubic feet of waste obsidian scattered over the quarry and workshop area. He adds, "There can be no doubt that we have here an obsidian source of great aboriginal importance, and one that was worked intensively over a long period of time."

Location 7 is Glass Mountain. "Somewhere on this volcanic mountain," wrote Heizer in 1944, "though the exact spot is not recorded, was a large obsidian quarry from which the Atsugewi, Achomawi, Yana, and McCloud River Wintu secured implement material."

Location 8 is Sugar Hill, a large volcanic mountain with an excellent, important obsidian deposit used by the Achomawi, the Pit River peoples, and their neighbors to the north, the Northern Paiute.

Location 15 is Obsidian Butte on the southeastern shore of the Salton Sea, near the Mexican border. Flaked obsidian is found around the butte and obsidian here has small gaseous blowholes lined with a deposit of calcium. Similar obsidian has been found at ancient Indian campsites from San Felipe on the Gulf of California in Mexico to Palm Springs, California, and eastward to the Colorado River.

Location 22 is Coso Hot Springs at the southern end of the Coso Mountains in southeastern California. The obsidian quarry, near the crater of an extinct volcano, has abundant chipped rejectage material along the outcrop talus.

5. SITE OWNERSHIP

Although one Indian may have discovered an obsidian mine or quarry site, as far as we know no private, individual site ownership existed. The sites were considered natural resources owned by the group and everyone shared them. An individual's advantage could come through a special ability to produce finished articles from stone material (Heizer and Treganza, 1944, 299-300).

"Rarely, if ever, did a tribe establish a rigid monopoly on a certain material, even though this could have been done by refusing access to the source. The Elem, a tribelet of the Pomo group, controlled the excellent Lake County obsidian quarries. The Elem allowed any Pomo-speaking group and even alien tribes (the Long Valley Wintun and the Coyote Valley Miwok) to visit the quarries and secure implement material." (Heizer and Whipple, 1971, 356) For example, the Masut group of the Pomo tribe living around Calpella traveled 50 miles to Clear Lake for obsidian from the quarries owned by the other Pomo groups. All the groups had to ask permission to quarry the stone but did not pay for the privilege (Heizer and Whipple, 1971, 353)

Locations 7 and 8, Sugar Hill and Glass Mountain in Modoc County, were visited by most of the northern California tribes every summer to secure some obsidian (Heizer and Treganza, 1944, 305).

This is not to say there were no conflicts. "When a neighboring group did not recognize the ownership of an obsidian quarry," Heizer wrote, "and was apprehended in the attempt to steal, warfare was the result...Conflicting claims of ownership of quarries which lay near the boundary division of two tribes were also the cause of contention. The Kato and Yuki both claimed the Black Rock obsidian deposit at Location 23, and the disagreement caused open warfare between the two tribes." (Heizer and Treganza, 1944, 300; Kroeber, 1928) The Modoc and Achomawi both claimed the Sugar Hill obsidian quarry at Location 8, and war resulted when the two tribes came into contact (Heizer and Treganza, 1944, 300).

6. RELIGIOUS ASPECTS

Conserving natural resources was a California Indian philosophy running through everything, including the use of mines and quarries. Mining for obsidian certainly had

religious aspects (Heizer and Treganza,1944,300). The Wintu of McCloud River in northern California used obsidian from Glass Mountain and in the summer, two or three men would make a two- to three-day trip northeast to the quarry. The men fasted throughout the journey, as the act of obtaining obsidian was in the nature of a semi-religious quest (Heizer and Treganza,1944,303).

In more eastern areas of the United States, some quarry sites—including the obsidian cliff at Yellowstone National Park—were recognized by all Indians as neutral ground where tribes who were bitter enemies could meet but not fight. The same concept and practice of neutral ground occurred in California at the obsidian quarries of Clear Lake in northern California, where any hostile group could meet each other but trouble was forbidden. The system worked out of common consent for the mutual good, as there was no other way to enforce it (Heizer and Treganza,1944,301).

A final example, though not of obsidian, illustrates the religious aspects of mining. A sacred flint mine was reached through a cave at Table Mountain near Oroville in northern California. The opening was small and a person had to crawl in, throwing ahead offerings like beads or dried meat. Only the amount of flint that could be dislodged by one blow could be carried away on each visit, and the miner had to crawl out backwards (Dixon,1905,132-3).

7. OBSIDIAN TYPES

All obsidian flows are unique, as X-ray fluorescence spectrometry shows, and the differences can affect usefulness. California Indians noted variations in obsidian physical and chemical characteristics—texture, hardness, cleavage, and color—and chose the best obsidian for each project. The Pomo Indians of Clear Lake in northern California divided the local obsidian into two types: *batixaga*, or “arrow obsidian,” from Lower Lake, Location 3; and *dupa xaga*, “to cut obsidian,” from Cole Creek, Location 5. The first was used for arrow points and the second, which breaks cleanly with sharp edges, for knives and razors (Heizer and Treganza,1944,294).

The Wintu in northern Sacramento Valley said they did not quarry obsidian that has been exposed to the sun for an exposed surface was weathered and altered so it would not flake properly (Fowke,1896,173). In 1935 an archaeologist wrote that the alteration probably came from more than just sunlight (Dubois,1935,127). In fact, a matte finish resembling weathering is one effect of fire on obsidian, and without knowing this, the Indians, in effect, may have been avoiding obsidian altered by fire. See the section, “Using Fire.”

8. OBSIDIAN POISON

Obsidian, although very widely used in California, was sometimes considered extremely poisonous (Heizer and Treganza,1944,295). A number of California Indian tribes believed in the reputedly toxic properties of obsidian. Location 14 in east-central California is an obsidian deposit in the Owens Valley the Paiute thought poisonous (Steward,1933,262).

Among the Western Achomawi of Modoc County, an arrow point maker carefully inspected chips struck from a block of obsidian, judging if each one was poisonous: one chip might be poisonous and the next one not. Splitting off a flake, he examined it and said, “This for grizzly bear, this

for coyote, this for war.” These are the pieces he kept (Voegelin,1943,191).

Wintu arrow points were mostly obsidian, although some were of other stone. The red and white ones were considered supernaturally poisonous, especially the red (DuBois,1935,125).

Why obsidian was considered poisonous is not known, but the effectiveness of obsidian arrowheads in war and hunting may be a reason (Heizer and Treganza,1944,295).

9. MINING OBSIDIAN

“Many native mines and quarry sites in California seem to have been worked over a long period of time by different groups or individuals who needed the specific material at the moment, such as the Glass Mountain obsidian quarries. No evidence exists that any tribe had a special class of miner whose sole job was mining raw material. Some evidence suggests that in a few tribes specialists devoted most of their time to producing finished stone articles.” The Pomo recognized their obsidian chippers, calling the artisans *ce emai tsu donta*, or “bow-arrow maker.” (Heizer and Treganza,1944,301)

Mining obsidian mostly meant breaking down outcrop materials (Heizer and Treganza,1944,292). Sometimes these were solid masses of obsidian and sometimes not, as with the fist-sized nodules in Location 2. Sometimes very large amounts of obsidian were quarried out, such as at the Borax Lake and St. Helena obsidian quarries. However intensive mining operations with systematic, large-scale, continuous exploitation of a rock or mineral deposit didn’t occur.

At location 22, Coso Hot Springs in southeastern California, subtriangular obsidian hammer stones, weighing about a pound, were used to quarry obsidian and break it into flat, portable pieces (Fig. 3) (Heizer and Treganza,1944,306). The pieces would be carried off, perhaps traded, and made into finished objects elsewhere. At location 24 in northern California, the Yahi Indians collected obsidian boulders to trade to neighboring tribes (Heizer and Treganza,1944,306).

Breaking rocks with fire was a mining technique known widely among North American Indians. However in California, the only statement on record for mining obsidian with fire concerns the northern Sacramento Valley Wintu, who split off blocks of obsidian from Glass Mountain by building a fire against the rock (Heizer and Whipple,1971,358).

10. USING FIRE

Perhaps so few references for mining and working obsidian include fire because the Indians knew the results, that fire leaves obsidian with matte finish (that may look like weathering), surface sheen, fine crazing, deep surface cracking, vesiculation, incipient bubbles, and fire fracture, to use modern terminology (Steffen,2002,164-5). Higher fire temperatures and lengths of exposure amplify these changes, which may explain why some Indians felt safe just briefly heating the pieces of obsidian they wanted to work on.

For example, in 1877 Indians artisans were watched using fire to prepare a piece of obsidian for chipping (Heizer and Whipple,1971,360-2). The Viard, in far northwestern California, processed pieces of obsidian by heating it “in the fire” and then cooling it slowly, which splits it in small



Figure 3. California Indians quarrying and chipping obsidian, as drawn by artist Thomas Moran after a life group in the U. S. National Museum. The seated man is making a large, ceremonial blade (Heizer and Treganza,1944).

pieces. The arrow maker would choose among the pieces and set to work (Powers,1877,104). In fact, the technique of gently warming the obsidian prior to pressure or percussion chipping was fairly widespread in northern California (Holmes,1919,364).

Under the section “Obsidian Types,” it was noted that in 1898 the Wintu Indians would not use obsidian they thought weathered or altered, saying it wouldn’t flake correctly. They believed the sun caused the weathering, but a *weathered appearance* is a sign of burned obsidian. The Indians really could have been saying that burned obsidian—with all of its physical changes—was no longer good for flaking—and this finding is important.

As mentioned in the “Mining” section, just one recorded statement reports Indians using fire to mine obsidian. Anthropologists thought that other California tribes may have used the fire-breaking technique because it was so widely known among North American Indians (Heizer and Treganza,1944,303). It also could be true that California Indians knew the results of fire on obsidian and chose to avoid them.

11. HYDRATION BANDS

Hydration bands are a relative, not absolute, way to measure the time since a piece of obsidian was chipped off another piece. The bands form because freshly exposed surfaces of any piece of obsidian begin to absorb water. Over time the band grows thicker as more moisture is absorbed. By measuring the band width, we learn how long ago the flake was made.

Fires, however, pose difficulties “by reducing or increasing hydration band width, by diffusing bands so they can no longer be accurately measured, or by eliminating bands entirely.” (Benson,2002,95) Not only does this happen in modern-day fires. California Indians themselves frequently set fires to maintain meadowlands and increase forage, especially for deer. Work is underway to study obsidian rehydration after exposure to fire (Deal,2002,28,32).

12. TRADE ROUTES AND X-RAY FLUORESCENCE

A great deal is known about the trade routes of California Indians, and obsidian was one of the earliest items traded in prehistoric California (Heizer and Elsasser,1980,150). Obsidian trade was brisk from sites around the state: north, central, eastern Sierra Nevada, the southern coast, and the far south.

Both obsidian cores and finished articles, like arrowheads, were traded with neighboring tribes in exchange for other unfinished raw materials and manufactured articles. Obsidian from Location 3, the large and important Lake County deposit in northern California, was traded very widely north and south, and also east to the Sacramento Valley tribes. In northern California, obsidian came down the Klamath River via the Shasta and the Karok Indians from the Achomawi, who got it at Medicine Lake, Location 7 (Heizer and Elsasser,1980,206).

Through obsidian X-ray fluorescence spectrometry, a great deal has been learned of obsidian trade routes. Analyses identify the exact sources of the obsidian used to make many Indian implements, associating the proportions of trace elements in a piece of obsidian with a specific quarry or mine, for every obsidian flow has a different chemical

fingerprint. Thus we know that some San Francisco Bay area archaeological sites, although they contain obsidian from nearby sources such as Napa County, also have significant numbers of tools made from obsidian originating in the mountains of eastern California.

Even the smallest obsidian flake is full of information. It can be matched to its source by X-ray fluorescence spectrometry and, barring fire, have its hydration bands measured to learn how long ago it was made. Because of this, flakes at obsidian mining sites in the Owens Valley are studied to learn how mining rates altered over millennia—and results show they varied widely (CalTrans,2002).

13. ARROWHEADS

By the second half of the nineteenth century, explorers watched mostly old men making arrowheads. Stephen Powers wrote that “even common arrowheads are now manufactured only by old Indians, who cling to the traditions of their forefathers.” Visiting the southern California Yokuts and watching an arrowhead being made, he noted, “Old men are usually seen at this employment.” (Powers,1877,52)

In 1877, Paul Schumacher said of his experiences among the Klamath River Yurok Indians in northern California, “I had the good luck to meet the last arrow maker of the tribe, on the right bank and near the mouth of the Klamath River, who has since joined his forefathers in the happy hunting-ground. He showed me the mode of making stone weapons, of which the following is a description.” His description and accompanying illustration, figure 4, follow (Heizer and Whipple,1971,360-2).

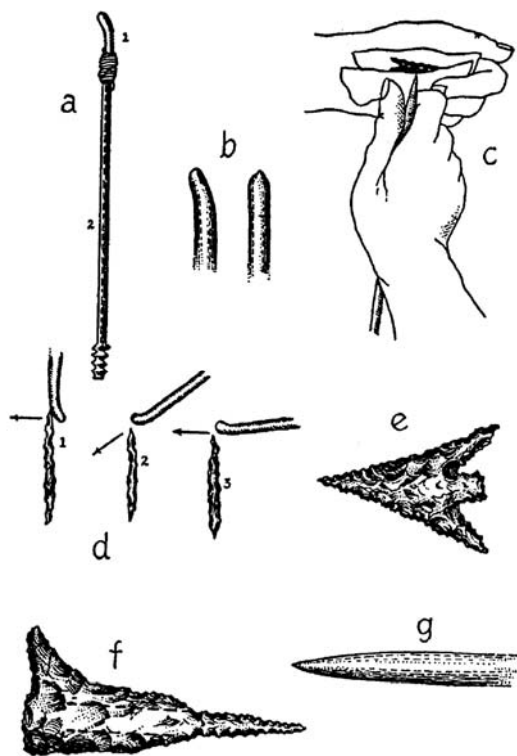


Figure 4. The Yurok Indian method of making stone weapons, by P. Schumacher, 1877. Reprinted from the *U.S.G.S.*, vol. iii, Bulletin 3, Article 17.

Schumacher wrote, “For the manufacture of arrow and spear points..and knives...obsidian and similar stones of conchoidal fracture are used. The rock is first exposed to fire, and, after a thorough heating, rapidly cooled off, when it flakes readily into sherds of different sizes under well directed blows at its cleavage. The fragments are assorted according to shape and size best corresponding to the weapons desired; the small ones, best fit in shape and thickness, are used for arrowheads; similar sherds, but larger in size, for spear points, and so on.

“To work the flakes into the desired forms, certain tools are required, one of which is represented (a) in the figure. It consists of a stick, which is in form and thickness not unlike an arrow shaft and about 1½ feet in length, to one end of which a point is fastened, of some tough material, as the tooth of the sea-lion, or the horn of elk, and even iron among the present Klamaths, although the rock does not work as well, and brittles where the edge ought to be sharp. The point (b of the figure) is represented in natural size to better illustrate its beveled curve, which form admits a gradual pressure to a limited space of the edge of the sherd. During the operation, the rock is partly wrapped in a piece of buckskin for better manipulation, its flat side resting against the fleshy part of the thumb of the left hand, only the edge to be worked (c) being left exposed. The tool is worked with the right hand, while the lower part of the handle, usually ornamented, is held between the arm and the body so as to guide the instrument with a steady hand.

“The main movements are shown in figure (d). With the first movement as illustrated, larger flakes are detached and the rock is roughly shaped into the desired form; while with the second movement long flakes are broken, which frequently reach the middle of the sherd, producing the ridge of the points of knives; finally with the third movement the smaller chips of the cutting edge are worked. The work proceeds from the point, the more fragile part of the weapon, toward the stronger end, as illustrated by the unfinished borer, the form of which, as frequently found, is shown by dotted lines. To work out the barbs and projections of the arrow or spear points (e,f), a bone needle (g) is used, as pictured in natural size in the figure, about 4 to 5 inches long, without a shaft.”

14. SPEARS

The Miwoks made a crude, though effective spear by binding a large obsidian spearhead with sinew to the end of a smooth mountain mahogany pole about seven feet long. The spear was used mostly for war (Barrett and Gifford,1933,212).

15. BOWS AND BATTLE

To make a bow, the Central Miwok hacked a cedar bough from a tree and roughly trimmed it with a sharp-edged stone. They scraped it with a flake of black obsidian or a split deer leg bone and rubbed it with a stone like emery and a piece of scouring rush (Barrett and Gifford,1933,215-16).

In battle, the Miwoks used bows, arrows, and spears. Neither shields nor armor were used. A warrior depended for safety on dodging the missiles of his enemy. One member of each band of warriors worked behind the fighting line to collect the arrows shot by the enemy. These were shot back at them (Barrett and Gifford,1933,215).

16. KNIVES AND SCRAPERS

Stephen Powers reported that the northern California Yurok valued obsidian knives for cutting and skinning (Powers,1877,56). In southern California, the knife blades were of different lengths and chipped to an edge on each side. The hunters used the long, slim, sharp, pointed ones (Patenco,1943,124).

The Atsugewi and mountain Maidu of northern California sometimes affixed wooden handles to obsidian knives, as did the Yukuts in southern California (Schulz,1954,77;Dixon,1905). The Northern Maidu made the handles by tying two pieces of wood together and securing them with pitch. The Shasta Indian's knives often seemed to be without hafting, although sometimes a piece of buckskin was wrapped around the end (Dixon,1907,391).

Scrapers very often were made of red obsidian by the Shasta Indians (Dixon,1907,391).

17. OBSIDIAN BLADES AND SHAMANS

Obsidian blades and shamans were central to California Indian life, and California Indians may have made the largest, flaked obsidian blades in the world. Leaf-shaped specimens measuring over three feet long have been found. Smaller blades up to two feet long were objects of wealth and used for ceremonial display in northwestern California (Rust,1905). Either single or double pointed, they probably were not knives but shamans' paraphernalia. All the evidence from central California points to this use and the Maidu add that such pieces were worn hung from the neck (Kroeber,1925,418).

Stephen Powers saw obsidian blades in the early 1870s and wrote they were probably passed down as family heirlooms through generations, to be borne aloft as a sort of mace on certain solemn occasions. He continued that the "Indians of today have the same articles and use them for the same purpose, but they no longer manufacture them, but confine their ambition to keeping them in the family." (Powers,1877,432-3)

For many California Indians, obsidian and obsidian blades were critical elements of shamanic rituals. The northern California Yuki had several kinds of shamans who all dreamed of supreme spirits, on whom their power depended, but who exercised their curative and other functions by aid of lesser spirits, whom they actually controlled.

The supreme spirits are "*Milili* and the creator. *Milili* lives in the sky above the visible one, and owns an enormous block of obsidian of which all obsidians in the world are fragments that he has thrown down. He has the shape of an enormous eagle or condor and controls deer, *mil*, to which his name refers. *Kichil-lamshimi*, obsidian doctors, *mil-lamshimi*, deer doctors, and *mit-lamshimi*, sky doctors, all derive their power from *Milili*. These doctors (shamans) differed in functions and powers and some doctored by singing and some by sucking—perhaps like diagnosing and extracting physicians. Some sucking doctors extracted actual arrowheads from wounds received in battle and others sucked out invisible obsidian points that the spirits had shot into one in lonely places."

The Obsidian Ceremony, *Kichil-woknam*, was an important Yuki ritual directed by the prestigious obsidian shamans. The seven-day ceremony was used to find and perhaps assist the children "who were or would be endowed with the power of becoming an obsidian doctor." The first day,

"one of the sky shamans took a long obsidian blade—believed to have fallen from heaven—from a net sack full of such pieces. He went among the children rattling this sack and lightly striking them with it." Each day had its own rituals and every night they danced the obsidian dance, *Kichil-wok*. The obsidian shamans also treated diseases. Sometimes they built a kind of little funnel of earth, perhaps two feet long. The patient reclined at one end and at the other, obsidian blades were set up. "The doctor then blew tobacco smoke through the hole on the sick person."

"A Yuki shaman recalled that when he was a boy and his tribe was having a doctor dance, called *Lamshi-wok*, to train two or three new doctors, a life-changing event occurred. He explained that "when new doctors are receiving their training, still younger ones often first learn of their powers; and so it was with me. The first night of the dance I was sleeping outdoors, between my brother, who has the creator as spirit, and another doctor. Then I, too, dreamed of the creator, *On-uhaⁿk-namlikiat*. I did not see his face or body; but I was in the sky, and saw many colors, like a mass of flowers. In the morning I was bleeding from mouth and nose and badly frightened...I was so much younger than usual that the people had not thought my bleeding was due to my becoming a doctor. But as my brother also had dreamed of *On-uhaⁿk-namlikiat*, he knew.

"When I first saw the creator, he sang a song that I was always to sing. Something like a string stretched from him to my head. He sang another song, and told me to use that also." After more dreams of the creator, the young shaman's curing powers finally reached all but the highest level of the obsidian shaman, and he began ministering to his tribe.

He ended by explaining why he never became an obsidian shaman, saying, "I can cure all disease except that caused by spirit obsidians. I did dream of such obsidians once, but did not reply to the spirits who were addressing me, thinking the dream would come to me again and be clearer. Later I was told by the old people that I had made a mistake, that the obsidian spirits never spoke to anyone more than once." (Kroeber,1925,193-8)

18. TATTOOS

Miwok men and women, usually between the ages of 12 and 15 years, practiced tattooing purely for decoration (Fig. 5). Normally the design extended from the edge of the lower lip to the umbilicus and other designs were placed on the shoulders, arms, hands, chest, stomach, and thighs.

To tattoo, the black ashes from the root of a plant called *ku'ya*—probably angelica—supplied the pigment. The scaring instrument was a sharp point of obsidian set in the end of stick about the size of a pencil. After the area to be tattooed was thoroughly pricked until blood flowed freely, the black ashes were mixed with the blood and rubbed into the tiny wounds.

Tattooing also was employed medicinally when the skin directly over a severe pain was tattooed. A Central Miwok woman, observed in 1913, had lines tattooed on her neck, reputed to have cured consumption (Barrett and Gifford,1933,223-4).



Figure 5. Huchnom tattooing in northern California (Powers, 1877).

19. SCARING

Scars were intentionally made with obsidian flakes. Chicago's Field Museum of Natural History has an obsidian flake—its largest dimension is 27 mm—used as to make scars by the southern California Miwok in sickness and grief (Barrett and Gifford, 1933, 212).

Scaring by some northern California Indians also was accomplished with small flakes of obsidian. Its purpose was to strengthen the arms and legs of men about to go out on a hunt (Schulz, 1954, 31-2).

20. CHARMSTONES

Obsidian "Stockton curves" were used by the Central Miwok. These were declared to be imitation bear claws, or *tisus uzumatiñ*, and worn on the left hand by dancers of the *uzumati* or grizzly bear dance. Four of the curves were attached to sticks that were lashed to the four fingers (Barrett and Gifford, 1933, 213).

21. DEATH

The most sorrowful mourners at an Atsugewi's death were the deceased's close relatives—but friends also mourned. A close watch was kept to prevent anyone from committing suicide. Among the most common methods was to swallow small bits of obsidian (Schulz, 1954, 145).

Miwok Indians cut their hair with an obsidian knife only as a sign of mourning for a close relative. The knife was hidden or buried with the corpse to prevent a malicious shaman from finding it and causing illness or even death by "placing certain medicines upon it and performing special ceremonies over it." (Barrett and Gifford, 1933, 222)

22. CONCLUSION: OBSIDIAN'S VALUE

As trading was mostly a matter of individual barter and evaluation, it was difficult to prepare a list of equivalent values for objects. In Yowlumne territory in southern California, obsidian could be traded for anything and had a very high trading value (Latta, 1949, 66). Some Indians held the longest ceremonial obsidian blades so valuable that no price was ever set upon them (Rust, 1905). The following valuation list was collected from several northern California Wintus in 1935 (DuBois, 1936, 26).

A deer hide: a *loptci* of rope

Basket: a similar basket

Sack of wheat flour: 20 or 30 salmon

Woodcock head: \$1

Woodpecker scalp: 25 cents

Pestle: \$5

Very good storage basket: \$10

Cooking baskets: \$1 to \$4

1 pound lump of obsidian: \$20 (This figure is from 1880, when \$20 was a huge amount.)

For millennia and at least through 1880, California Indians valued obsidian above many other things. Through centuries of trial and error, they learned to use it, creating artifacts and beliefs central to their physical and emotional lives.

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