Paleoindian Use of Obsidian in the Greater Yellowstone Area

New evidence of the mobility of early Yellowstone people

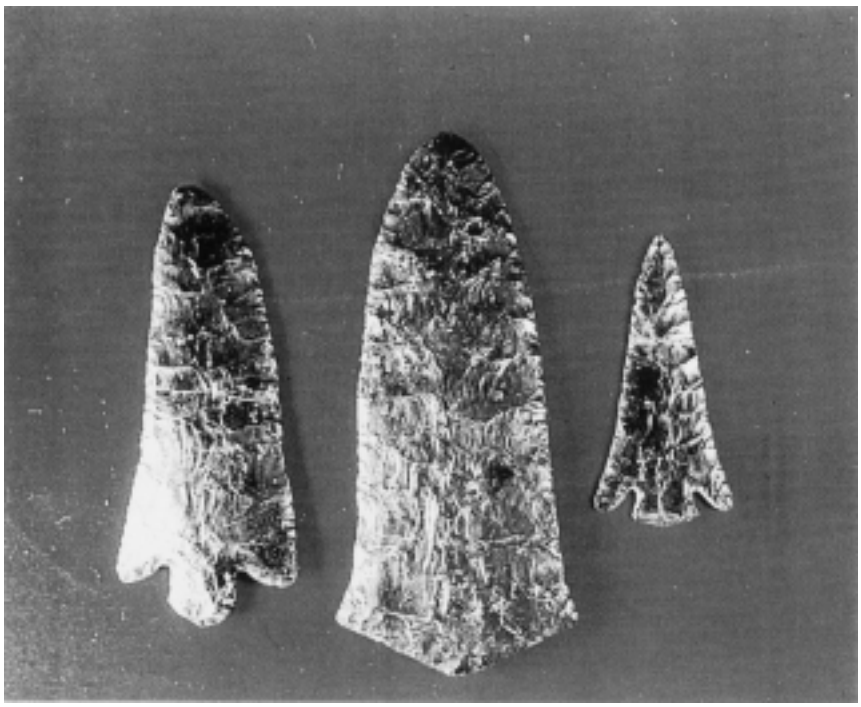
by Kenneth P. Cannon

Many myths exist about Yellowstone, but none is more persistent than the notion that American Indian groups rarely ventured into the area because of their fear of the geothermal features. A great amount of archeological, anthropological, and historical research has made it clear that Native Americans have called the present park area home, or at least a seasonal residence, for more than 10,000 years.

On the other hand, archeologists have only recently begun to investigate how prehistoric groups used upland and mountain environments in the west, because for many years it was generally accepted that such areas were too environmentally harsh to support a significant number of people. That belief, like the belief that prehistoric people were afraid of the Yellowstone region, has now been discarded by many of us who study the archeological record of North America's native mountain inhabitants.

But we still have much to learn about how these pioneers used the land--when they arrived, where they were from, and where they went when they left. Fortunately, we have some very durable evidence that allows us to trace at least some of their movements: the obsidian points that these people used to tip a variety of implements and weapons.

During the last three decades a number of archeologist have been interested in understanding the geochemical composition of obsidians in Yellowstone National Park and adjacent areas, in order to track the movements of these materials, which were so important to Yellowstone's first human visitors for toolmaking. Many of these studies focused on how obsidian from Obsidian Cliff, in north-central Yellowstone Park, was distributed across the west and midwest. This research has provided evidence of the direction and extent of prehistoric trade networks.



The points discussed in this article mark the beginning of a long tradition of expanding use of Yellowstone-area obsidian. The raw material used to produce these obsidian spear blades (left) was much more recently imported from Yellowstone to present Ohio, where such elegant ceremonial pieces were used in religious ceremonies by Hopewellian peoples. The largest blade is about 10 inches long. Yellowstone obsidian was apparently widely traded between the park area and Ohio in the centuries just prior to EuroAmerican settlement. Photo courtesy of NPS/ Hopewell Culture National Historical Park.

One of the first studies was conducted by archeologists from the University of Michigan, who were interested in locating the source of obsidians found with high-status individuals buried in earthen mounds in the Ohio River drainage. These studies, and subsequent ones, have shown that Obsidian Cliff is the main source for such obsidian in the midwest, specifically the upper Mississippi and Ohio River valleys.

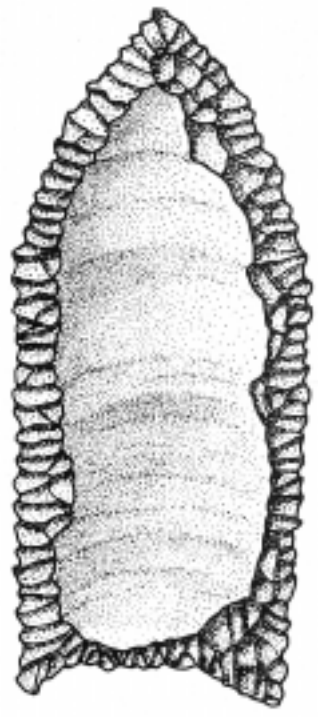
During the late 1970s and early 1980s, archeologists from the State University of New York, Albany, continued geochemical studies of obsidians to locate the sources of obsidian artifacts found in the park. These studies suggested that material from Obsidian Cliff was almost exclusively utilized by prehistoric peoples in the park. However, at least one obsidian sample was from an unknown source, and it was insubstantially attributed to a volcanic flow in Yellowstone Park.

Since 1989, the National Park Service's Midwest Archeological Center, in Lincoln, Nebraska, has been involved in survey and testing of sites in Yellowstone, mainly as part of archeological investigations relating to park lands that will be affected by future road reconstruction. An integral part of this research has been the identification of obsidian sources used by early inhabitants of the area.

We determine the age of these artifacts through a process known as obsidian hydration, which is based on the rate at which obsidian absorbs water at its surface. By measuring the thickness of the "hydration layer," that is the layer that has absorbed water since the artifact was chipped from a larger piece of obsidian, we can determine the date of manufacture. So far, we have analyzed approximately 500 artifacts, but this paper will focus on the earliest of those, from the Paleoindian Period, 12,000 to 8,000 years ago.

As of this writing, the only clues to Paleoindian occupation of the Yellowstone Plateau come from artifacts recovered from the surface rather than from excavations. The earliest human occupation of the area is suggested by a Folsom projectile point discovered in the Bridger-Teton National Forest, during research by Forest Service archeologist Jamie Schoen. The obsidian point, dating between 10,900 and 10,200 years ago, was sourced to Obsidian Cliff.

Large, fluted (that is, with a concave



Folsom point, representing the earliest evidence of human occupation of the greater Yellowstone area. All points are illustrated approximately actual size, and were drawn by Janet Robertson.

depression running the length of the point) Folsom spear points have been excavated in the basins east and south of Yellowstone National Park, associated with the bones of an extinct bison species, as well as with pronghorn and elk bones. Thanks to this and other discoveries, we know that humans were using the Yellowstone area since shortly after the ice departed, but we still wished to know more about their movements and patterns of use.

As part of our current study, eight Late Paleoindian obsidian points (all surface finds) were analyzed by Dr. Richard Hughes of Geochemical Laboratory. Dr. Hughes used x-ray fluorescence spectrometry to determine the geologic sources of the obsidian. X-ray flourescence is a nondestructive technique by which the obsidian is bombarded with x-rays, allowing rare radioactive elements to be counted in parts per million. Most obsidian contains the same elements; what x-ray fluorescence tells us is the relative proportions of those elements in each sample.

Each obsidian source has its own unique "geochemistry," depending upon the underlying geology of the region that produced it. Thus, once the major known sources have been subjected to x-ray flourescence spectrometry, an artifact can be analyzed and compared to the sources until a match is found.

In our study, substantial evidence of human occupation comes from Agate Basin and Hell Gap point types, which Dr. Hughes dated to approximately 10,000 years ago. The earliest point type represented in our analysis is the Agate Basin point, which came from Obsidian Cliff.

The Hell Gap type of point is represented by one complete point, whose source was Bear Gulch, Idaho. Three Hell Gap type bases (that is, the base of the point only) have also been found; Bear Gulch and American Falls, Idaho, were identified as sources for two of the bases, while the source of the third base has not been identified.

Incidentally, independent corroboration for this dating is provided by two Hell Gap artifacts from the Indian Creek site in west-central Montana. Obsidian hydration dates of 9,850 (plus or minus 278) and 9,650 (plus or minus 248) years ago were calculated for these artifacts by Dr. Les Davis of Montana State University.

An additional Paleoindian spear point type, known as the Alberta type, was dated at 9,500 years ago. This point, which consisted of the base only, was also sourced to Bear Gulch, Idaho.

Two reworked (that is, broken and worked to a new point) lanceolate points (spear points) attributed to the Foothills-Mountain Complex also were analyzed. The Foothills-Mountain Complex is an archeological tradition found only in the foothills and mountains of the Central Rocky Mountains. Their economy was focused mainly on bighorn sheep and mule deer, supplemented by plants and small game.

These Foothills-Mountain Complex points date to between 8,500 and 9,000

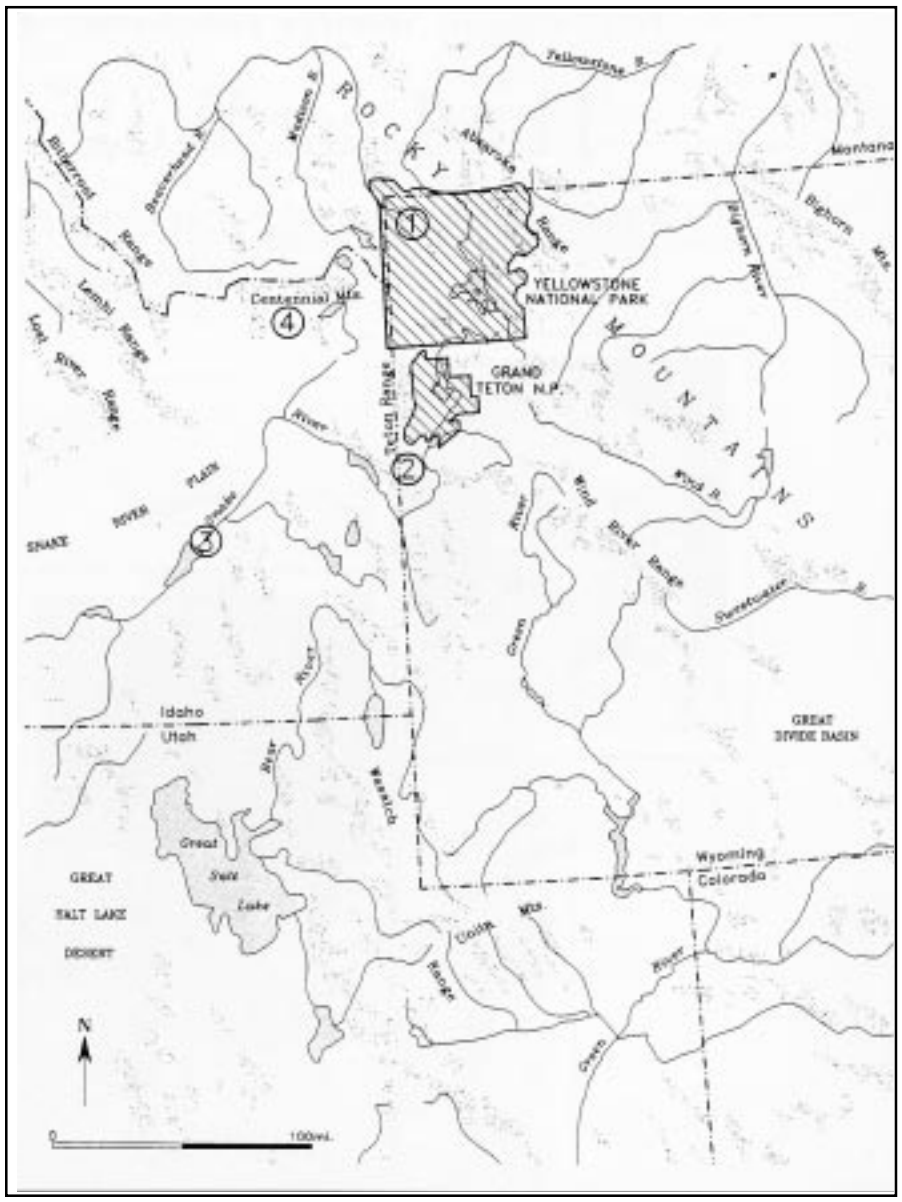
Agate Basin point, sourced to Obsidian Cliff, Yellowstone National Park, and dated to about 10,000 years ago. Dotted lines indicate areas where grinding occurred during reworking.

Hell Gap point, sourced to Bear Gulch Idaho, and dated to approximately 10,000 years ago.

Heavily reworked Late Paleoindian lanceolate point, sourced to Teton Pass, Wyoming, and dated to between 8,500 and 9,000 years ago.

Carol Moxham

Recent archeological research indicates that even the earliest human occupants of the Yellowstone area were quite mobile, and were taking advantage of obsidian from several areas, including the park's now-famous site. Sources of obsidian used by Paleoindian peoples in the Yellowstone area: 1. Obsidian Cliff; 2. Teton Pass, Wyoming; 3. American Falls, Idaho; 4. Bear Gulch Idaho.



Reworked late Paleoindian lanceolate point, sourced to Bear Gulch, Idaho, and dated to approximately 8,500 to 9,000 years ago.

years ago. The first is a heavily reworked and beveled point with evidence of grinding along the base. A significant number of small "step fractures" present on the edges of the tip suggest utilization as a drill. This point was sourced to Teton Pass, Wyoming.

The second lanceolate point has also been reworked along the blade. The flaking pattern is parallel-oblique with grinding along the base. The concave base appears to be fortuitous (that is, happenstance rather than intentional design), and post-dates the final flaking episode, as indicated by the differences in the amount of weathering. This point was sourced to Bear Gulch, Idaho.

Obviously these early people were not dependent upon Obsidian Cliff for their obsidian. Other sources represented in the assemblage are located some distance from Yellowstone National Park (see map). Bear Gulch, Fremont County, Idaho, is 59 miles (90 km) to the west; American Falls, Power County, Idaho, is 174 miles (280 km) to the southwest; and Teton Pass, Teton County, Wyoming, is 76 miles (125 km) to the south.

Like a number of previous investigators, we find ample evidence that humans moved considerable distances in and around the Yellowstone area. As in later prehistoric periods, it is clear that Paleoindian people were highly mobile, and transported the products of their culture considerable distances as they went about their business.

Continuing analysis of obsidian from Yellowstone will contribute substantially to understanding Paleoindian group mobility patterns. An important result of our recent studies, one that has been relatively unappreciated until now, is evidence that prehistoric groups had contact, either through direct access or by trade, with areas to the west. The study of obsidian, in concert with other studies, will provide us with a better understanding of how prehistoric groups moved and settled on a yearly and seasonal basis in order to maintain economic autonomy.

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