

The Momentous Arrival of the Bow and Arrow

By Gene Gade

An Incomplete Puzzle

It is hard to picture Plains Indians without bows and arrows. Yet, archaeological evidence indicates that, in the span of human history in the Americas, bows and arrows are relatively recent technology. Unless they are deposited in very unusual conditions (ex. permafrost, anaerobic peat bogs or protected sites in extremely dry cold or hot environments), bows, sinews, arrow shafts and the like will weather and decay. The stone tips of projectiles are the only component of ancient bows and arrows that are inorganic and don't decompose. So archaeologists make inferences from incomplete evidence, concluding that a change from larger, heavier projectile points to smaller, lighter ones indicates a change from spears and atlatls to bow and arrows.

Bow and arrow technology existed in Africa and around the Mediterranean for at least 13,000 years and apparently spread to Europe and Asia from there. However, there is controversy within the Archaeology/Anthropology community as to when bows arrived in North America. The issue is complicated by stone artifacts called microblades that are found in Arctic sites as old as 9,000 years on this continent. Microblades were generally smaller than atlatl points and can be mistaken for arrow points. Microblades were used for multiple purposes. Some were attached to tips of spears and harpoons that were hand-thrown, rather than propelled by bows. Microblades definitely came with people migrating from Asia to North America, but there is not complete agreement as to whether bow technology came from Asia or was independently discovered and developed on this continent. That issue is muddled because the migration into the New World occurred in at least three waves or phases.

The issues of who brought technologies and when they brought them is too complicated to develop here. However, it is generally agreed that Eskimos living along the Arctic coast from Alaska to Greenland were using bows and arrows at least 3,000 years ago. These coastal dwellers were primarily hunting marine mammals like seals, walruses and small whales. Spears, atlatls and harpoons are more effective in hunting marine mammals than bows. The coastal people probably supplemented their larder seasonally with meat from terrestrial animals such as caribou, hunting them with bows and arrows. Diffusion of bow-arrow technology from the coast to the interior was apparently slow, taking about 1,000 years before it completely replaced atlatls in the "Woodland Culture" of the eastern U.S. and even longer in the Plains and Rockies.

Bows Arrive On The Plains

As additional human migrations occurred, cultures developed in the conifer forests farther inland where people hunted large ungulates such as caribou and moose. For that type of hunting, bows and arrows proved superior to atlatls. About 2,000 years ago some of the Boreal forest Indians, presumably Athabaskan speakers, moved south onto the Plains and adapted to buffalo hunting. Arrow points

begin to appear in the Plains archaeological record in Alberta and Saskatchewan about that time.

Some of the oldest arrow points found in Wyoming are from the Wardell Buffalo Trap in the upper Green River drainage which was used many times over hundreds of years. Avonlea-type arrow points found at Wardell date from about 1,600 years ago. There is some speculation that these artifacts were left by Athabaskan-speakers migrating slowly south. These people may have been ancestors of the modern Navajos.

Once it was taken out of the Boreal forests, dispersal of bow-arrow technology was rapid, spreading through the Plains as far south as Texas and through the Great Basin about 1,500 years ago. In his 1988 article in *North American Archaeologist* titled *Adoption of the Bow*, J.H. Blitz noted, "Several styles of small, thin corner-notched and side-notched points together with ceramics of a proposed Algonquin affiliation are widespread in the (Plains) region by A.D. 500."

Bows and arrows had completely replaced atlatls by the time Indians used the Vore Buffalo Jump. All of the projectile points excavated from the Vore Site, which was first used about 1560 A.D., are arrow points. These projectile points are perhaps the most important artifacts found at the Vore Site because they provide clues as to when the Site was used, who used it and where they may have come from.

Bow and Arrow Construction

Many Native American bows were fashioned from wood. Several criteria determine whether wood is acceptable for making bows. The most important thing is that the wood must be flexible yet strong enough to bend without breaking. Relatively straight grain and absence of knots are also important, as are response to changes or extremes in temperature and humidity.

Native Americans used many different tree species to provide wood for constructing bows, depending on what was available in a given region. Choices were somewhat limited by the lower species diversity in the semi-arid American West. Chokecherry and serviceberry were sometimes used for bows, but oak, ash and juniper were better and more common choices when available.



An Avonlea arrow point from a kill site in Montana



Photo at left shows a notch cut from a juniper "Bow Tree" in central Wyoming.

The wood was used to make the primary staves of a bow, but may have been reinforced with sinew



The photo shows how a notch was cut into the trunk of a juniper tree in central Wyoming so the wood could be extracted to make the primary structure of one or more bows. For perspective, Sandra Reher standing beside the notch shows that it is about four vertical feet and several inches in width along the grain of the trunk. Once the blank was extracted, it was thinned and shaped to the desired form.

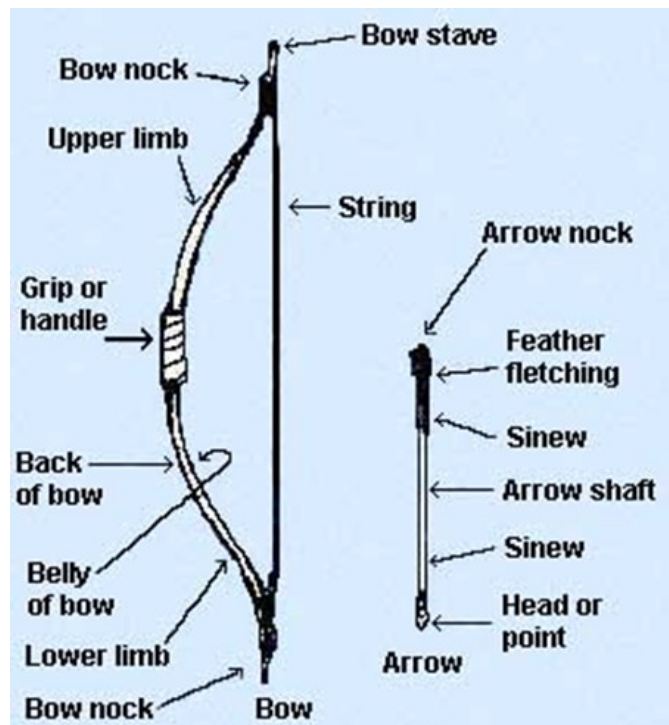
Indians of the Plains and Mountains didn't stop at wood-based bows. They developed or adopted ingenious changes to improve their power and resiliency.

Most importantly they developed techniques for reinforcing the wood usually with laminations of sinew from leg tendons of large animals glued lengthwise to the back (side facing the hunter) of the bow. Additional sinew was often wrapped around the bow limbs to prevent delamination. Sinew-backing greatly increased the strength and power of the bow.

Horn Bows

Plains and Mountain tribes commonly took the process further by eliminating wood and using horns from bighorn sheep or antlers from elk as the main structure of the limbs of the bow. True "horns" are actually fused hair that form tough keratin sheaths that grow on the outside of bone cores that project from the skull. After drying and weathering, the outer portion of the curled horns of bighorn rams (composed of a tough material called keratin) was pulled off the bone core on the sheep's skull. The horn was scraped to smooth the outer surface and then cut lengthwise. When straightened out, a full-curl ram horn can produce a strip 1 ½ to 2 feet long and naturally tapered toward the ends, where the bow string will be attached. The horn strip was then soaked for long periods (preferably in hot water), which softened it and made it possible for the horn to be tied onto a form, bent into the desired shape and dried. After the thus-formed limbs were dried, they were overlapped at the center (grip) of the bow and joined with a strong glue derived from animal hides. This central overlap was then reinforced with a good deal of sinew wound around the grip. The limbs were also reinforced and strengthened by lengthwise laminations of sinew. This technology was probably developed by ancestors of the Shoshone tribe who lived in areas where Mountain Sheep were abundant and a significant source of food.

This rare bow was fashioned from bighorn sheep horns, probably by a Shoshone hunter. It was found in the Gros Ventre Mountains of western Wyoming.



Bow and arrow diagram from State Archaeologist at the University of Iowa

Antler Bows

"Antlers" are essentially bones grown and shed annually by mammals of the deer family. The growth tissue that builds antlers is the soft, highly-vascularized tissue called "velvet" on the outside of antlers that the animal rubs off during the mating season when the antler is fully developed.

Antler-based bows were created in a process similar to that of horn bows. Usually the main stem of large antlers from a bull elk were used as the primary limb structure. The tines (or branches) were removed and stone tools were used to chop or scrape away unwanted material to form long, thin bands of antler bone that became the bow limbs.



As with horn bows, the antlers have to be soaked, steamed and formed into the desired shape. The limbs were then overlapped, glued and bound with sinew at the grip. Again, the limbs were reinforced with lengthwise laminations of sinew. Sometimes rib bones or tough plant fibers were also used for the strengthening process. As the laminates dried, they shrank and became very tightly bound to the base material of the limb. Scraping and shaping resulted in smooth, strong limbs. Most horn or antler bows were only 2 ½ to 3 ½ feet in length, but they were quite powerful

Bows and Arrows Continued

In general, it was advantageous to make hunting bows short and stout. This was especially the case when horses became available and Native Americans did much of their hunting while mounted. Reinforcing the wood with sinew and other materials was especially important with shorter bows. Most later North American bows were recurve style bows in which the ends of the limbs curve away from the archer. Recurve bows store more energy and deliver it more efficiently than straight bows. Recurves also increase the energy and speed of an arrow and make shorter bows possible.

Bow strings were usually fashioned from sinew (animal tendons) though these could soften and stretch when wet. Sometimes bow strings were woven from tough plant fibers such as yucca, thistle or the inner bark of certain trees and shrubs.

Arrow shafts obviously need to be straight (or straightenable using stone tools designed for the purpose) and light weight, but not so brittle they would shatter on impact. Western Indians often used chokecherry, ash, wild rose, dogwood and occasionally, even tall grasses or reeds, for arrow shafts.

Bows and arrows are a weapon system. If one part of the system is changed adjustments must be made in the rest of it. For example, if a bow is shortened, there must be commensurate modifications to the length of the arrow shaft, and the size and weight of the point. That is one reason why arrow point styles changed over time. It was essential to the survival of hunters and the people who depended on them that they constantly worked to improve their techniques and technologies. The arrival of bow and arrow technology greatly increased the effectiveness of Native American hunters and marked a momentous change in their cultures.



An 1830s Karl Bodmer painting of a Hidatsa warrior dancing. Note the short, slightly recurved bow, probably reinforced by lengthwise lamina-