

# Atlatls and Darts to Bows and Arrows – A Revolution in Projectile Technology

By Gene Gade

Sometimes important change is subtle, proceeding over long periods in such small increments that it is barely noticeable (for example, when sea level rises or falls a few inches in a century). Sometimes change is quick and radical, more like an asteroid impact that causes mass extinctions with major irreversible changes in entire ecosystems over-night.

For 12,000-plus years, Native American hunters and warriors used a device called an “atlatl” as their primary weapon to kill large prey animals. The groups of people who are thought to have crossed the land-bridge into North America and peopled the interior of the continent, probably brought atlatls with them from Asia.

Then, like a metaphorical asteroid, the venerable atlatls essentially disappeared from the arsenal of American Indians and were replaced by bows and arrows. Introduction of the bow occurred at different times in different regions of North America and, in a few instances, atlatl use persisted. The Aleuts of coastal Alaska and some coastal Eskimos, for example, found atlatls preferable when they were hunting sea mammals from kayaks, because atlatls could be thrown with one arm while holding a paddle in the other. Bows required use of both arms. Over-all though, Native Americans much preferred the bow and arrow.

## Bows Come To The Plains

The transition from atlatl to bow occurred among the Plains Indians about 1500 years ago. The speed with which Indians discarded their atlatl throwing sticks and picked up the bow was remarkable.

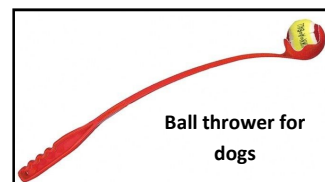
Less than two hundred years after the bow was introduced to the Plains Indians, atlatls were essentially gone. That’s a relative blink of an eye when compared to the period of atlatl use. Atlatl use was discontinued at least 1,000 years before tribes began using the Vore Site. Only arrow points are found at the VBJ, though many classic types of atlatl points are found at older sites in Wyoming and elsewhere on the Plains.

## The Basics of Atlatls

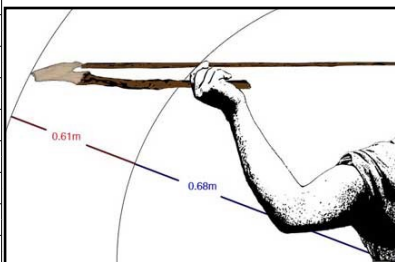
There were many variations on the atlatl theme around the world. What all variants have in common is the use of a stick about the length of a human forearm, with a hook, spur, or cup at the distal end that fits into the fletched end of long projectile. Often the handle end was modified to improve the grip and usually a counter weight was added to the stem of the atlatl to improve balance and power. (see illustrations on page 5)

## The Physics of Atlatls

Many people exercise and train their dogs by teaching them to fetch tennis balls. Often they use a simple device, like the one shown at right, to throw the ball farther and faster with less arm stress.



The principle of the atlatl is similar. In the act of throwing, the arm acts as a lever. Using an atlatl as an extension of the arm, causes the projectile (dart) to move over a longer distance before release which greatly increases the energy transferred to the dart. The extra leverage allows the thrower to increase both the distance and speed of the dart. The illustration (bottom left) shows how the atlatl effectively acts as an extension of the forearm, creating a bigger arc and thus more throwing power.



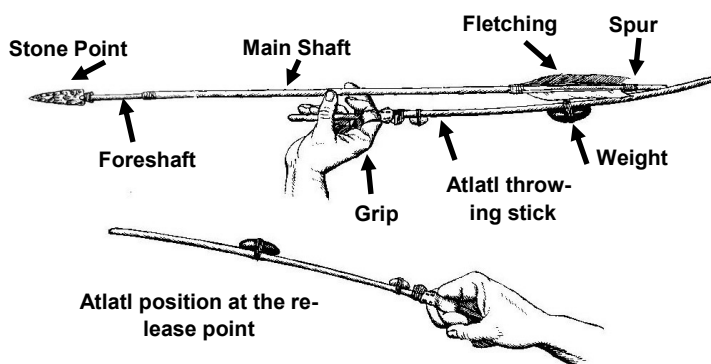
Velocity is the variable that gives one projectile more force than another projectile of similar mass. It’s all related to Newton’s Second Law... $f=ma$  or — force equals mass times acceleration. So, if you can accelerate a projectile, as you can with an atlatl, you greatly increase its force. Even a small projectile will have enough force to penetrate hide, bone and muscle to reach the vital organs of a prey animal if that projectile is moving fast enough. With practice, it’s also possible to increase accuracy, making the atlatl a much more lethal weapon with greater range than, say, a hand-thrown spear.

## Atlatls continued —



The photo at left shows a "spur" attached to an atlatl stick with sinew. The spur fits into the feathered end of a dart, holding it in place through the arc of the throw until its release.

Atlatl darts were usually much longer than arrows with a thicker, heavier wooden shaft and larger point. They were usually fletched with feathers as are most arrows. Often, a shorter "foreshaft" with stone point attached, was fastened to the main shaft. When the projectile hit an animal, the foreshaft and point lodged in the prey; this main shaft could be used again with a new foreshaft/point assembly.



Atlatl dart foreshafts with points. The point and shaft could detach from the main shaft

All of the many types of projectile points found in interior North America that date from the Clovis, at least 13,000 years Before Present (B.P.) to the Late-Prehistoric or Classic Periods (about 1,850 years B.P.) were hafted to spears or atlatl darts. In fact, the changes in the size and shape of projectile points as atlatls were replaced by bows and arrows is one of the main criteria that anthropologists use to distinguish the end of the Archaic period.

Some arrow points from the transition period may have just been scaled-down dart-style points, but soon points with distinctive notches, bases, etc. appeared in the archaeological record. Because of the limitation on the length and "draw-weight" of bows, arrows necessarily have shorter, thinner shafts and correspondingly smaller, light-weight points than do the darts thrown by an atlatl. Usually, stone arrow points are less than 1 ½ inches in length, ¾ inch or less in width and weigh less than an ounce. It is not the size and weight of a point that determines the lethality of a stone-tipped projectile, it's the velocity. Small points, traveling really fast, are quite capable of penetrating the hide and into the vital organs of prey animals.

George Frison, the revered "Dean" of Wyoming archaeology, made the following comparison of atlatl/dart and bow/arrow technology in his 1978 book *Pre-historic Hunters of the High Plains*: "Dart points and bow and arrow points can usually be distinguished by size. The dart consisting of the long, heavy mainshaft and projectile point used with a foreshaft does not travel as fast as the shorter, lighter shaft and projectile

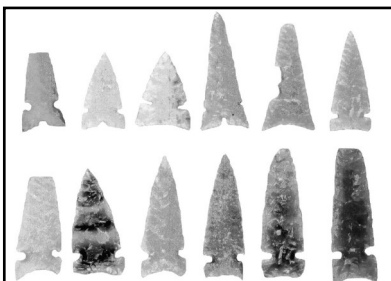


Native hunter throwing a dart with an atlatl (dart-thrower). Illustration by Donald Monkman in Pettipas (1996).

Complete Throwing Motion of an Atlatl

used with a bow. However, the evidence from bison kill sites indicates that one is about as effective as the other since penetration of bison bones was about the same for both dart and arrow points.

Perhaps the sudden popularity of the bow and arrow was due to a combination of many attributes. The smaller projectile points could be manufactured from more easily obtainable quarry materials and they were easier to make. Arrow shafts are also easier to manufacture than dart shafts. The atlatl dart has to be relatively long and straight to allow accuracy and penetration and it is difficult to carry very many of these. There is believed to be at least one reason for using a separate foreshaft since a large bundle of these could easily be carried. When a projectile was lodged in an animal, it separated from the main part of the mainshaft, which was then retrieved to be used again with another foreshaft. A bundle of arrow shafts, each one complete, seems a much better solution. The bow has a longer range than the atlatl dart, and proficiency with the former is more quickly and easily attained than with an atlatl and dart."



The points shown above have been recovered from sites in the northern Great Plains. They were attached to spears or atlatl darts and are much older and larger than the arrow points found at the Vore Site shown at left. Size of point is a major criterion in distinguishing arrowheads from older projectile types.