A Brief Introduction to Flintknapping

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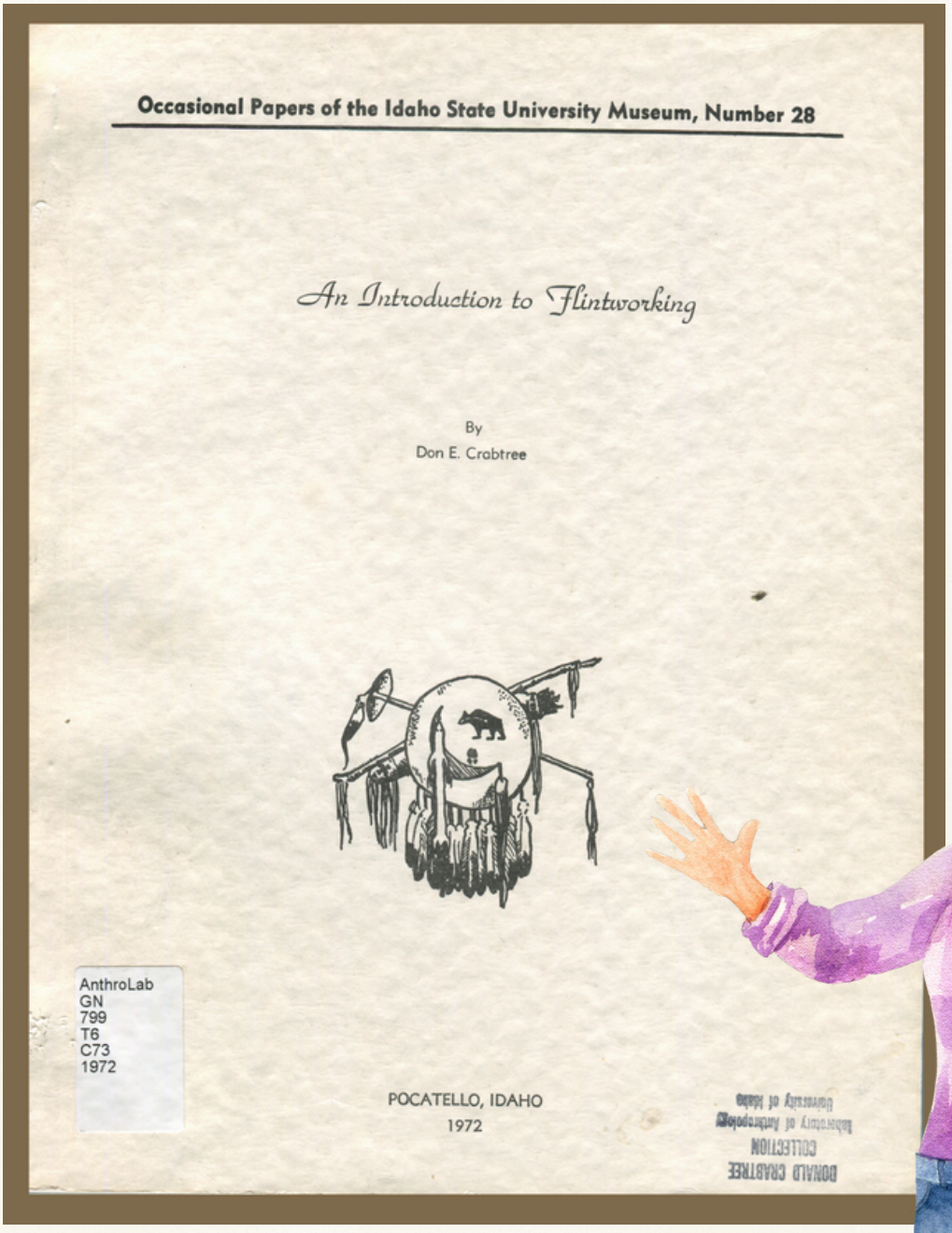
Introduction

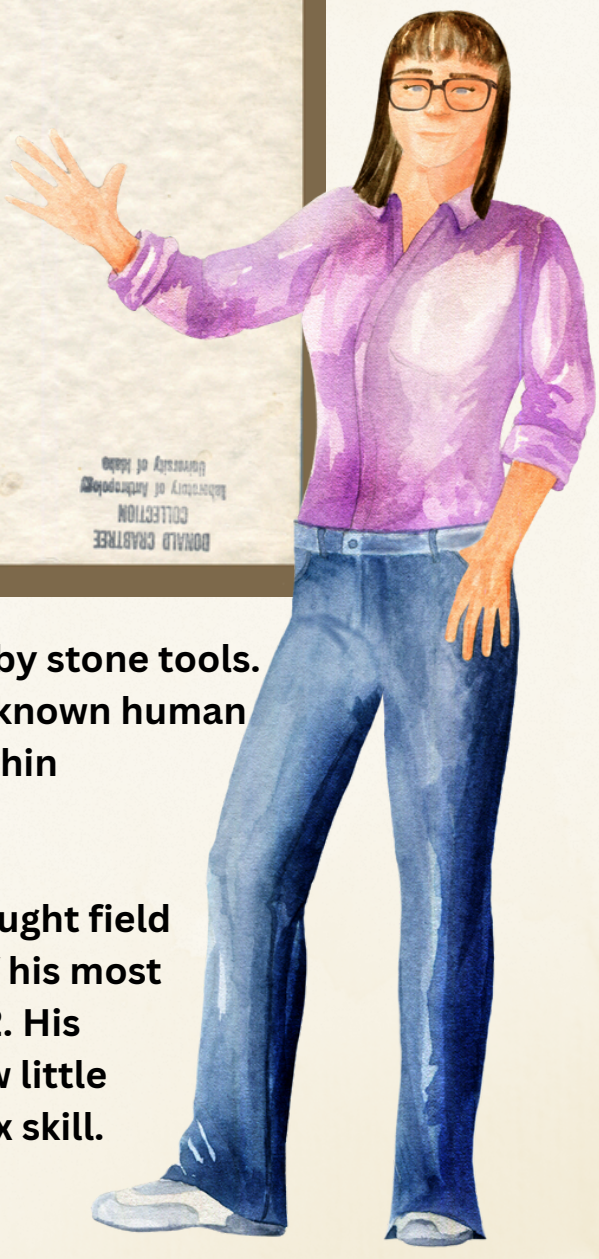
Humans and our ancestors have been creating and using stone tools for at least 3.3 million years. Every culture around the globe has found a way to use stone tools to adapt to new environments, eat, make clothing, or shelter.

Traditionally, the knowledge of how to make stone tools has lived within the worlds Indigenous cultures and remains best understood by those creators.

Within scientific circles, the practice of stone tool creation and modification was poorly known until the 20th century when archaeologists sought to understand the process in earnest.

This overview is an extension of the Donald E. Crabtree Lithic Comparative Collection and website created to share his work more broadly. The format and even some of the images in this booklet are partially inspired by his work.





From an early age, Donald Crabtree was fascinated by stone tools. He spent nearly six decades researching the oldest known human technology and became recognized as an expert within archaeological circles.

Although he attended international conferences, taught field schools, and wrote several scholarly articles, one of his most enduring works was a slim volume published in 1972. His *Introduction to Flintworking* helped those who knew little about stone tools learn the basics of a truly complex skill.

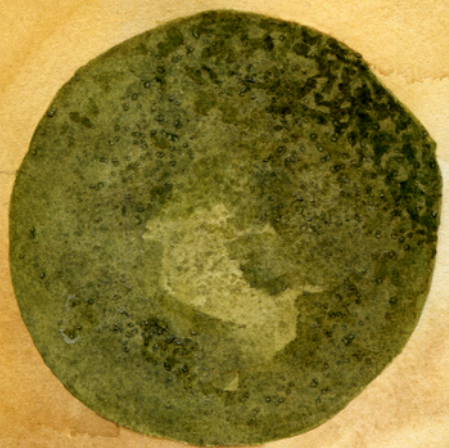
Flintknapping requires specialized tools.
Here are the essential parts of basic knapping kit.

A large moose or elk antler works as a perfect billet to strike off flakes.

A thick piece of leather can offer protection from sharp flakes.

A modified antler tine is useful for adding notches or other fine details when finishing a tool.

Abraders like this one shear off rough or brittle edges.

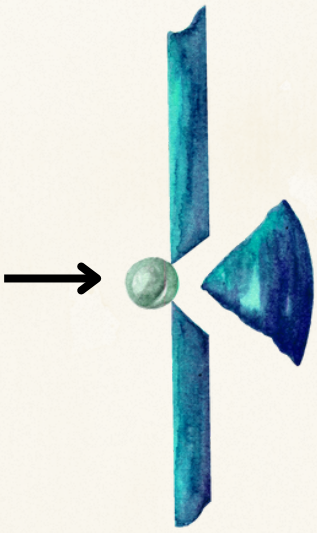


Hammerstones are great for removing cortex or shaping certain tools.

Some modern knappers prefer to use wooden handled tools with copper nails, rods, or surfaces to remove flakes.

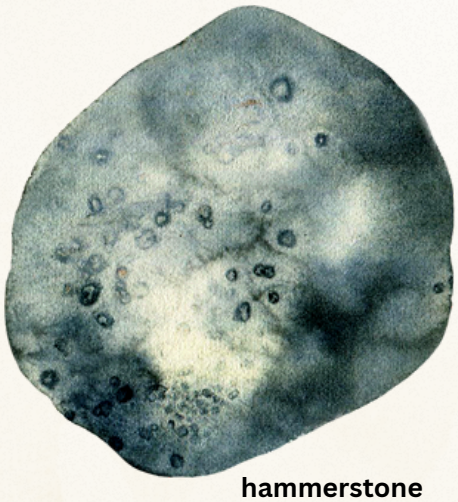
All stones can be broken with the right amount of pressure or striking force. When making stone tools, creators need to know how a stone will break. Glassy stones, or those with high levels of silica, break in highly predictable ways.

When a glassy stone is hit, the force of the blow radiates outward - creating a cone shape. Flintknappers use their knowledge of the “cone principle” to know where and how to strike to create the shape they want.

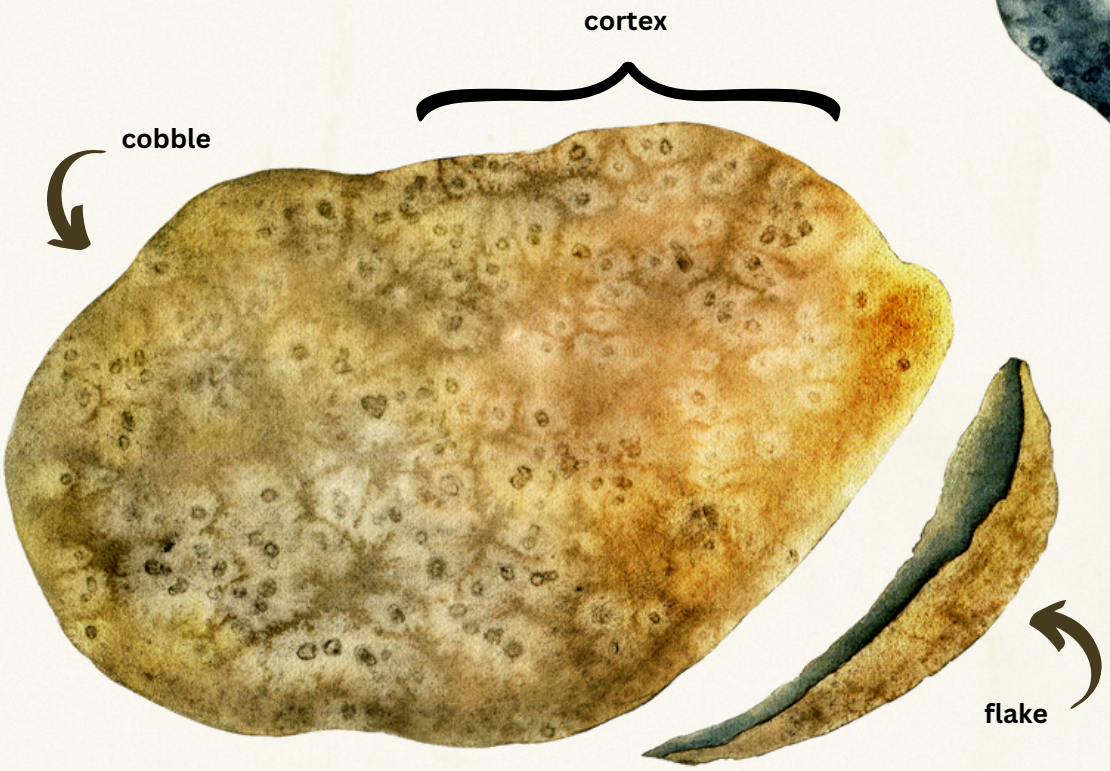


Donald Crabtree demonstrated the cone principle with a bb pellet and a pane of glass. When a pane is shot with a bb pellet, a perfect cone will usually snap free of the pane.

Crabtree was also able to demonstrate how the cone principle worked from inside a cobble. Focusing a blow can often times create a noticeable cone inside the body of a cobble. Once created, removing the top and sides of the cobble will reveal the intact cone within.



hammerstone

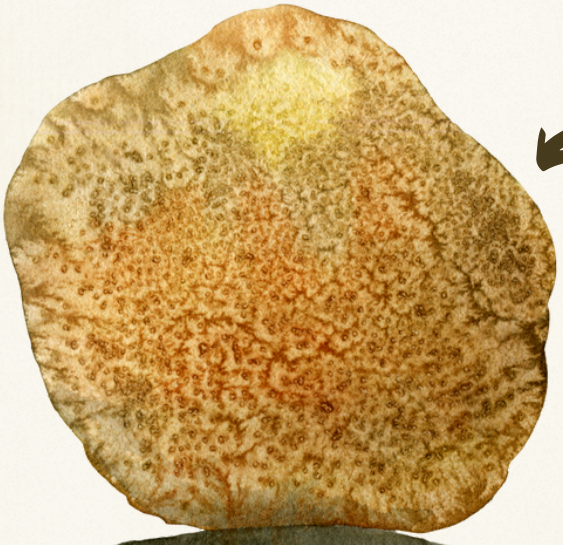


Cortex is often weathered or battered, creating an irregular surface that will not break predictably. To make a tool, knappers need to remove the cortex. Striking the cobble at the correct angle with a hammerstone will remove flakes to expose the good stone within.

The method shown above is called “direct percussion.” This means a knapper is hitting one stone with another.

Another common way to open a cobble is to place it on anvil stone and use a hammerstone to split it in two.

hammerstone

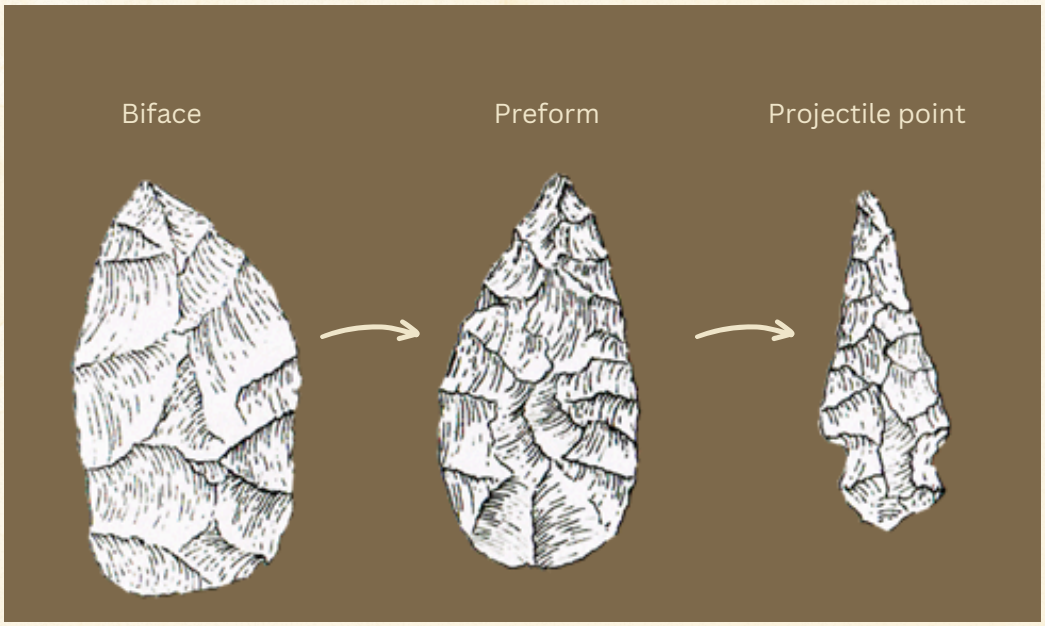


cobble

anvil stone

split cobble

Once open, a flintknapper can turn a cobble into almost any kind of tool. Common items found in archaeological sites include flakes that have been shaped for use as projectile points, cutting or sewing tools, and many others!



However a knapper chooses to begin the tool making process, there are typically a few steps they will choose to follow. Often called the "reduction sequence" these stages shrink the mass of a large cobble to smaller pieces that can be easily carried, or worked further.

Large bifaces can be used as cores or be refined to create a variety of formed tools.

If used as a core, a flintknapper will carefully keep removing flakes until the biface can no longer be worked or is exhausted. Each flake can be made into an assortment of tools.

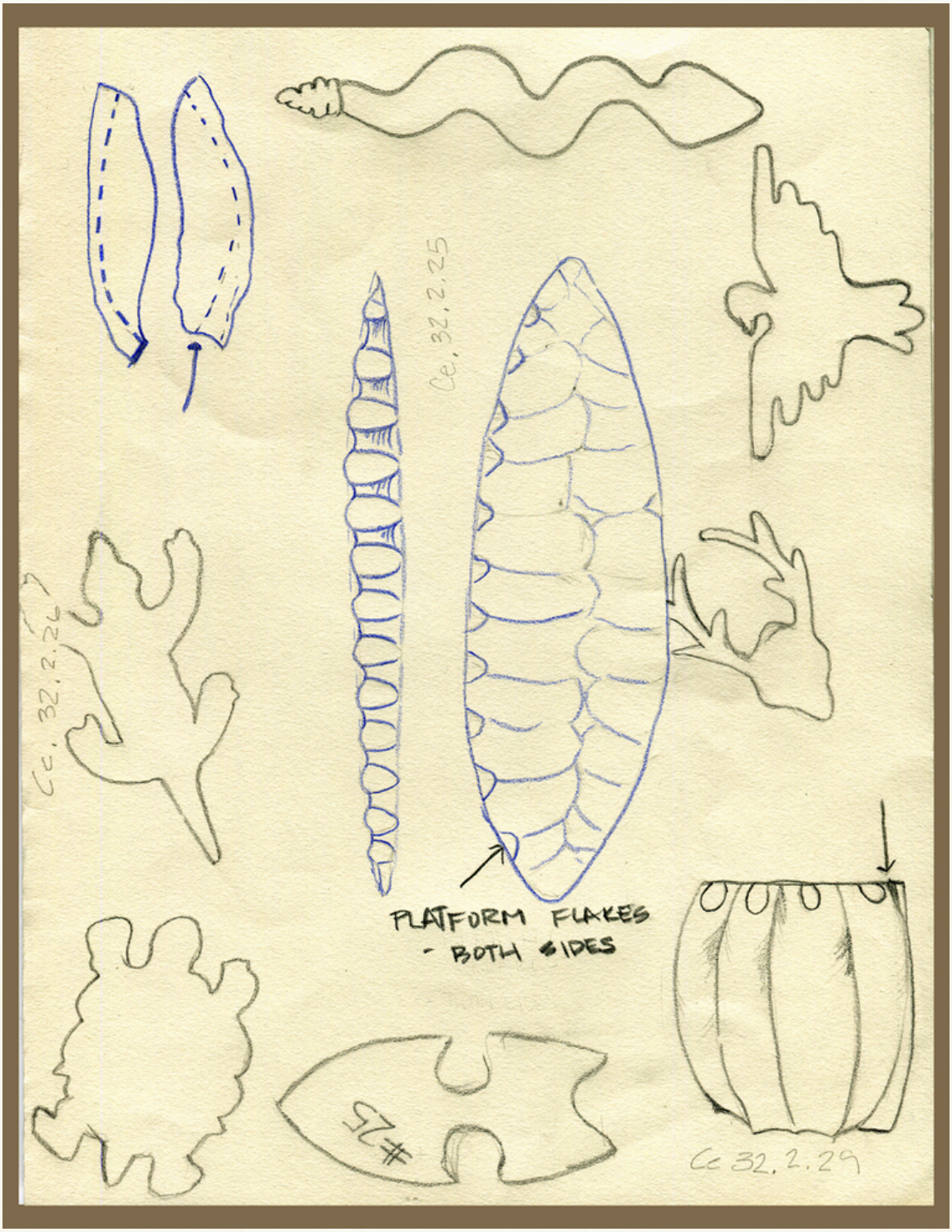
These scrapers shown above are either lightly shaped (left) or heavily modified (right) to create tools for specific needs.

If a flintknapper is trying to create a formed tool, further refinement of a basic biface is needed, as shown in the reduction sequence.

No matter how good a flintknapper is, mistakes can still happen. In the preform on the left, the work is correct and the tool is ready for final shaping into a projectile point. The tool on the right shows evidence of end shock damage at the base. This happens when the worker doesn't adequately support the tool during manufacture and the force of a blow explodes from the center of the piece.

For many makers, a projectile point is often the intended product. If their work has made it this far, the last thing they need to do is finish the base and add notches so the tool can be hafted.

Projectile points used by Indigenous peoples tend to be hafted onto dart points or arrow shafts. The style of a projectile point can indicate how old it is and how it was meant to be used.



Just like any other art form, flintknappers have to learn all of the "rules" of stone working before they can break them in intentional ways. Donald Crabtree was a master knapper who knew how to break the rules. He created fantastic artworks in the same way jazz musicians make new combinations of sounds.

Art pieces or unusually shaped items are called eccentrics. Crabtree made several of the designs shown on this page and can be found on the website accompanying this booklet.

Tool Anatomy and Glossary:

For anyone interested in studying stone tools knowing every kind and term is impossible given that humans and our ancestors have been working stone for millions of years.

Common terms help people talk about stone tools. Mostly, these terms relate to the anatomy of a tool or how it is made.

This type of core (above left) is used to make blades (right) that can be used for a variety of cutting needs.

Abrader: coarse stone used to smooth the edge of a flake or tool. Abraders are rubbed lengthwise against the tools to remove uneven or brittle edges so new flakes can be struck off.

Anvil: a stone of variable size used to support a cobble for splitting or other manufacturing processes. Some techniques require a cobble to be swung into the anvil to remove a large amount of material. Most anvils are large and stationary, but some smaller more portable versions are also used.

Artifact: any items made or modified by humans.

Biface: a stone tool that is worked on both the front and back.

Biface tool

Billet or baton: a tool used to remove flakes from a core or other stone tool. Usually, billets are made of hardwoods, heavy bodied antlers like moose or elk, or other modern material.

Blade: technically a blade is any flake that is twice as long as it is wide and has roughly parallel sides. This simple definition doesn't include the many types of blade creating technologies from around the world. Blades removed from a carefully prepared core (blade core) are useful for cutting tasks and require specialized techniques to make.

Modern billet or baton

Blank: an early stage of the lithic reduction process. Blanks tend to be large bifaces that lack form and are "blank" templates ready to be made into whatever the knapper desires.

Conchoidal fracture: a unique scar left on flaked stone. Generally, these scars are associated with intentional blows to a glassy stone but can occur in nature if the conditions are correct. When a knapper strikes a stone, the force of the blow moves through stone, compressing the material as it goes. These compression rings leave a wavy scar pattern that loosely resembles a mussel shell.

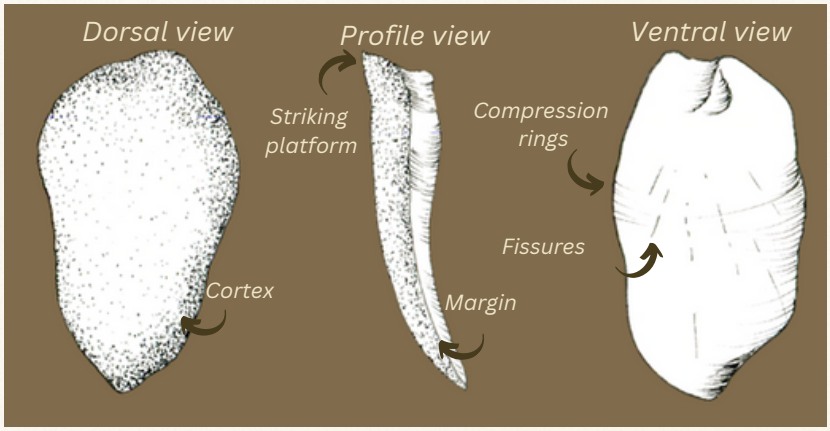
Most knapping can be done using a hard hammerstone or softer antler or hardwood. These thinning flakes show how each method shapes the resulting flakes.

Hard hammer debitage tends to be narrow (top) while softer percussion work creates wide and flat flakes(bottom).

Core: a cobble with the cortex removed so knappers can create stone tools, flakes, or blades. Cores can come in a variety of shapes and sizes depending on the kind of work a knapper is doing.

Debitage or flake: material created during the tool making process. Because flintknapping is a destructive process, hundreds of flakes are made while making even simple tools. Some are considered trash while others are good enough to be made into tools.

Fissures: thin hair-like lines that radiate outward from the bulb of percussion.



Not all debitage looks the same, but there are some typical elements on each piece. Above, there are three views of the same flake. From left to right, the flake is seen in the dorsal or back view, profile, and ventral or interior view.

In the profile and ventral view, the swooping compression rings or conchoidal fractures show how the force moved through the stone. The long hair-like lines radiating outward from the top, or striking platform, of the flake are stress fractures or fissures.

Flaker: traditionally made of antler or wood, these tools tend to be modified so knappers can create notches or other fine finishing details on stone tools. Modern knappers use nails, copper rods, or other products to press flakes off tools.

Flintknapping: the skill, science, and art of making stone tools.

Groundstone: a stone that has been made into a tool or ornament by grinding and polishing.

Modern flaking tools are often made with wooden handles and a metal rod used to press flakes off of a tool during the finishing process.

Hammerstone

Hammerstone: a hard stone used to remove the cortex of a cobble. Some knappers will also use a hammerstone to create bifaces and blanks before turning to a billet for finishing work.

Lithic: either a stone or relating to stone.

Groundstone production can start by breaking off unwanted material before the slow and tedious process of grinding or polishing a stone into its final shape begins.

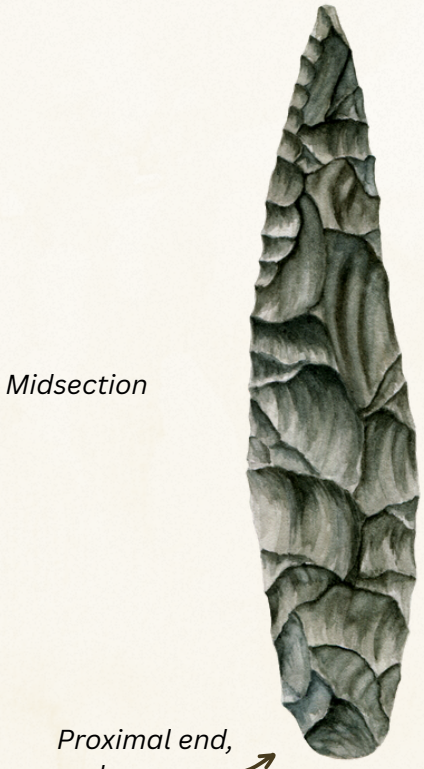
The most common type of groundstone is used for processing food but can also be used for fishing weights or axes. It can even be used to make fine ornaments like jewelry.

Projectile point: commonly referred to as an arrowhead. Projectile point is a more exact term because “arrowhead” implies that a tool was intended to be mounted on an arrow shaft.

Thinning flake: a special kind of flake used in the reduction process to remove bulk and shape a blank or preform into a formed tool.

Typology: a classification system used in archaeology to group together similar types of artifacts so they can be more easily understood and studied.

Uniface: a stone tool that is mostly worked on the dorsal or ventral side, but not both.



The hafting element of a projectile point can be one of the most identifiable parts of a tool. The base of this tool is rounded while others might have sharp tangs or notches.

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References:

Many of the images in this booklet were adapted from other well known images. We would like to thank the creators of those works.

“Aurignacian.” Wikipedia, 27 Feb. 2024. Wikipedia, https://en.wikipedia.org/w/index.php?title=Aurignacian&oldid=1210585098.

Crabtree, Donald. “An Introduction to Flintknapping.” Occasional Papers of the Idaho State University Museum, vol. Number 28, 1972.

Whittaker, John C. Flintknapping: Making and Understanding Stone Tools. 1st ed, University of Texas Press, 1994.

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Marco Seiferle-Valencia serves as Open Education Librarian at the University of Idaho Library. He grew up in Northwest New Mexico where his family have lived since time immemorial and more recently as European settlers and immigrants. Marco is proud to join the story of his Native Chicanx ancestors and many Native relations embodied in the Crabtree collection.

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