



## Flint Knapping Workshop

WITH THE PUGET SOUND KNAPPERS ASSOCIATION



**Date:** Saturday, February 16, 2019

### SYLLABUS

1. **What is “Flintknapping”?** (5 mins)
  - a. Purposeful use of force for removal of stone flakes from a “core” to produce sharp-edged tools for a variety of purposes.
  - b. The “core” can be refined with continued flake removals to produce larger tools such as spearheads, lanceolate blades or knife blades.
  - c. Flakes can be used for cutting or scraping with or without additional shaping.
  - d. Subsequent knapping of flakes can be done to make smaller tools such as projectile points, drills, perforators, burins, or scrapers.
2. **History of Flintknapping** (10 mins)
  - a. Our human ancestors have been making flaked stone tools for about 3 million years. The period of time that preceded the use of metals is commonly known as the “Stone Age”.
  - b. The primary early knapped tool was a pear-shaped biface<sup>1</sup> that is commonly referred to as a “handaxe”.
  - c. The style of the handaxe changed little over about 2.5 million years.
  - d. Flintknapping styles and tools evolved rapidly over the past 30,000 years or so.
  - e. The “Stone Age” survived in the Americas until after Europeans arrived about 500 years ago.
  - f. Flintknapping skills were essential to human survival and adaptation for more than 95 percent of human history.
3. **What Makes Stone Knappable?** (5 mins)
  - a. Must be **brittle** enough to be broken using reasonable force.
  - b. Must break with smooth, curving fractures (**conchoidal fracture**), without preferential grain in the stone.
  - c. Must produce **sharp edges** at the intersection of fracture surfaces.
  - d. Edges must be **durable** enough for intended use.

<sup>1</sup> A biface is a core that has been flaked sufficiently to produce flake scars across both sides of the core, and a continuous edge around the entire core.



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#### 4. What Types of Stone are Knappable?<sup>2</sup> (10 mins)

- a. Although there are several types of knappable stone, and it occurs in different types of host rock, quality stone that is useful for flintknapping is somewhat uncommon. Almost all rock that occurs at the ground surface is NOT knappable.
- b. Knappable igneous rock (once molten)
  - i. Must be glassy and/or fine-grained.
  - ii. Obsidian is very knappable, but is only found west of the Mississippi River in the continental USA.
  - iii. Glassy dacite, rhyolite and basalt also can be knapped. The glassier the stone, the more knappable it is.
- c. Knappable sedimentary rock (originally deposited in layers by rivers, deltas, beaches, oceans, wind, etc.)
  - i. Some sedimentary rock types include secondary deposits consisting mainly of CCS (cryptocrystalline silica). Examples of CCS rock types include chert, flint, agate, chalcedony, and jasper. The most common knapped artifacts in the archeological record consist of CCS materials.
  - ii. Silica (chalcedony) can also fill the void spaces in some sedimentary rocks (like sandstone or siltstone) to create orthoquartzite (aka, silicified sandstone or “sugar quartz”).
  - iii. Silica can also replace carbon in organic sedimentary materials, resulting in petrified wood and petrified bog (petrified peat), some of which is knappable.
  - iv. Large quartz crystals or vein quartz is sometimes knappable.
- d. Knappable metamorphic rock (modified by heat, pressure or both)
  - i. Porcellanite (clay or shale that has been naturally fired by underground coal fires).
  - ii. Meta-rhyolite.
  - iii. Metaquartzite (tough).

#### 5. Flintknapping Safety (2 mins)

- a. Safety glasses (mandatory)
- b. Gloves
- c. Silicosis – Knap outdoors, or in an area with good air circulation
- d. Leather lap pads and hand pads
- e. First aid supplies (particularly bandaids)

#### 6. Knapping Methodologies (3 mins)

- a. There are many video and book resources available regarding knapping methods.<sup>3</sup>
- b. Percussion knapping – striking the core directly or indirectly, usually for removal of larger flakes and/or for creating a biface.
- c. Pressure flaking – removal of flakes from a refined biface (aka perform) by the direct application of controlled pressure.

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<sup>2</sup> More information on knappable stone is available in “The Flintknapper’s Guide to Rock” by James A. Miller.

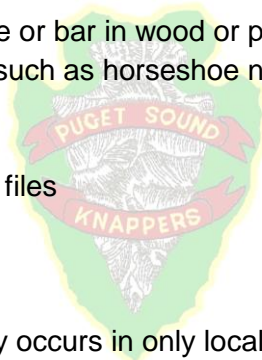
<sup>3</sup> The DVD “Caught Knapping” by Craig Ratzat ([www.neolithics.com](http://www.neolithics.com)) is an excellent video reference.



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## 7. Knapping Tools (aboriginal and modern) (5 mins)

- a. Percussion tools
  - i. Aboriginal
    1. Antler
    2. Bone
    3. Hammer stones
    4. Dense wood
  - ii. Modern
    1. Copper billets (solid)
    2. Copper boppers (lead-filled copper caps)
    3. Copper paddle billets
- b. Pressure flaking tools
  - i. Aboriginal
    1. Antler
    2. Bone
    3. Wood
  - ii. Modern
    1. Copper wire or bar in wood or plastic handles
    2. Mild steel, such as horseshoe nails
- c. Other tools
  - i. Abraders
  - ii. Diamond-surfaced files
  - iii. Edge shears
  - iv. Lever jigs



## 8. Knapping Ethics (5 mins)

- a. Knappable stone generally occurs in only localized areas and is a finite resource (depending on stone type). Take only what you need.
- b. Dispose of debitage<sup>4</sup> along with markers (like pennies or other small, modern objects) so that the material cannot be interpreted as ancient.
- c. Sign finished flaked tools with a permanent marker (I use a diamond-tipped scriber) so that the item will not be interpreted as an ancient artifact.

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<sup>4</sup> Debitage consists of the waste flakes produced by flintknapping. In general, about 95% of a rock by weight will end up as debitage to produce a finished knapped tool.



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## 9. Knapping Basics for Percussion and Pressure Flaking (20 mins)

- a. Hertzian cone
  - i. If an object strikes a brittle material at right angles to the material surface, a Hertzian cone can be produced as the brittle material breaks (for example, when a BB hits a window pane). The angle of the cone surface relative to the direction of impact is generally about 75 degrees.
  - ii. If the brittle material is struck on the edge, a Hertzian cone is generated, but the cone surface flattens out along the plane of the material as a conchoidal fracture.
  - iii. A “bulb of percussion” on a flake removed by pressure or percussion shows how the Hertzian cone expanded its shape into the stone.
  - iv. Flakes do **not** detach in the same direction as the angle of applied force! The angle of force applied against the edge of a core must be less than 90 degrees in order to detach a flake. Too steep an angle of impact will result in cone fractures within the stone that will frustrate further attempts at knapping the piece.
- b. Center plane and centerline
  - i. The “center plane” is the imaginary, nearly flat, surface that extends through a biface from edge-to-edge.
  - ii. The “centerline” is the imaginary line on the surface of a biface that extends from the tip to the middle of the base.
- c. Knapping basics and hints
  - i. “Platforms” are needed to strengthen the edges of bifaces for percussion strikes and pressure flaking. Without platforms, the energy from a percussion strike or edge pressure will only crush the edge and frustrate the knapper.
  - ii. Platforms are typically strengthened by abrading.
  - iii. Flakes like to follow “ridges” on the surface of the biface.
  - iv. Thinning of a biface can only occur if flakes extend from the edge to beyond the centerline.
  - v. Removal of flakes from below the center plane allows flakes to travel further with less curvature.
  - vi. Percussion and pressure flakes must follow convexity. A flake will terminate if it extends into a concavity (valley) on the surface of the biface.
  - vii. Larger flakes require more energy for detachment.
  - viii. Work on symmetry of a biface from the very start.
  - ix. Striking the end of long, narrow bifaces must be done with careful support to reduce the risk of “end shock” breakage.



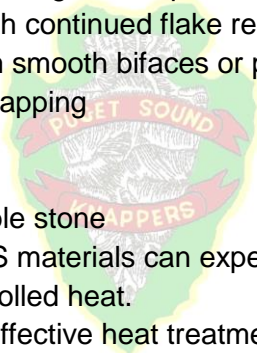
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## 10. Final Thoughts (2 mins)

- a. Flintknapping is not easily learned. But there is true satisfaction in making a stone tool that links us with our Stone Age ancestors.
- b. Although knapping concepts are not difficult, the subtleties of biface support, striking force, angle of applied force, stone type differences and tool selection can only be mastered with experience.
- c. Breakage is part of the learning process.
- d. There are different knapping methods available to accomplish the same ends. Watch other knappers, try new methods, and select methods that seem to work best for you.
- e. Practice, Practice, Practice!!!

## 11. Advanced Knapping Concepts (not covered in introductory class)

- a. Working with sawed slabs
  - i. Create an edge around the slab with “upstairs-downstairs” flaking.
  - ii. Remove additional flakes from the edge to produce a symmetrical edged slab (with obvious point and base).
  - iii. Thin the ends of the edged slab preform by percussion or pressure.
  - iv. Finish the piece with continued flake removals.
- b. Parallel flake patterns from smooth bifaces or preforms
- c. Flake-over-grind (FOG) knapping
- d. Notching
- e. Fluting
- f. Heat treatment of knappable stone
  - i. Some types of CCS materials can experience improved brittleness with the application of controlled heat.
  - ii. Temperatures for effective heat treatment depend on stone type and thickness, but can range from 375°F to 900°F.





More Information about the **PUGET SOUND KNAPPERS ASSOCIATION** is available at <http://www.pugetsoundknappers.com/>

*PSK is an informal association of people who enjoy the Ancient Art of Flintknapping. Started in Western Washington, PSK now has members throughout the Pacific Northwest, Western Canada and several other states and countries. With over 750 active knappers, PSK hosts a number of major events or 'Knap-ins' each year. They also participate in a number of other events and activities such as Boy Scouts, various Rock Club Shows, and School and Museum Demonstrations.*

