FIELDWORK COMPANION

A Guide for Passport in Time Volunteers

Produced by The PIT Clearinghouse

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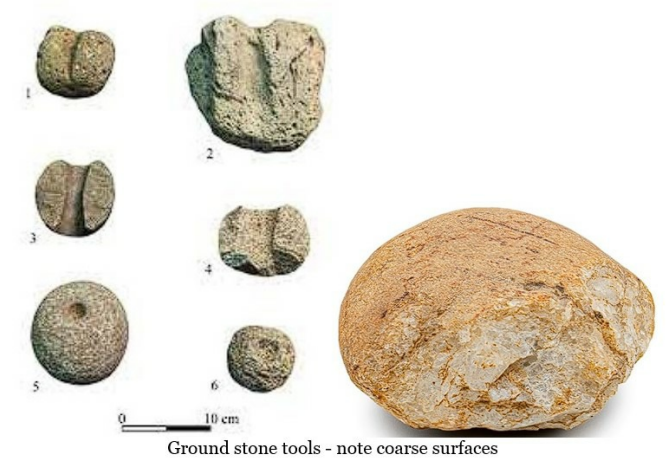
SECTION #1b: GROUND STONE

We have already broadly outlined certain aspects of stone tools and their manufacture in this guide, and we have defined ***attributes***: those qualities of an object such as the type of stone used to create the tool or remnant, its size, weight, overall surface features, and so on. We also briefly defined how certain of these traits can be diagnostic of an archaeologically defined "culture," the process of reduction, and the creation of debitage and manufacturing debris. In this section, we are going to examine the second type of commonly-occurring stone tool type: ground stone.

Ground stone, as the name implies, is stone that has been ground, flaked, or broken into a specific and desired shape by human hands. It is then ground further to shape a particular type of object with a directed use itself, or then used to break or grind other materials. In forming the final, desired object, or in using the object in tandem with a stone of the same or similar tool type, there is typically an "***active stone***" (the tool used to perform the action) and a "***passive stone***" or target (the surface that will receive the action) – a sort of 'Stone A' versus 'Surface B' articulation; think pestle versus mortar – with whatever grist may be in the middle, if the object is to reduce something more than the stone. So, you will likely be unsurprised that ground stone is most often observed to have been used to process and refine another material for consumption. Examples of processing include grinding food stuffs like types of corn (maize, wheat, seeds, etc.); ***macroreduction*** (such as breaking long bones to extract marrow). ***Directed grinding***, on the other hand, is the shaping of the object itself – through grinding, rather than via the process of flaking – another intended use, such as another grinding surface, a long-use tool such as a hafted hammer, tool for smoothing or straightening shafts for projectile weapons, and even cosmetic items.

Identification



Ground stone tools - note coarse surfaces

As with flaked stone, you will observe that most ground stone tools share one particular attribute, regardless of what shape and function their end product took on: the types of stone used to form them. In flaked stone tools, you'll recall we generally see tool-stone from quite smooth and ultrafine ***cryptocrystalline*** (very dense, non-porous, and tightly-packed molecules that form glass-like crystalline structures) sources like chalcedony, flint (chert), obsidian, or sometimes slightly more porous materials like dense basalt or limestone. In ground stone tools, we typically see coarse, grainy, often porous, rough, and quite dense and molecularly heavy tool-stone being used. Examples include porous limestone, rhyolite, sandstone, gritty basalt, and granite. This stone is most often more ***macrocrystalline*** in nature, meaning that the crystalline structures, at least toward the surface, are usually observable without the aid of a microscope or other magnifying device. They are also less prone to **planing** (predictable crystalline fracture along planes of molecular bonding), and are easily compacted inward,

from surface to core. In lay terms, they condense and "round" or smooth under the exertion pressure much more easily than they break.

Uses and Interpretation


Extracting bone marrow

Ground stone tools were created and used for a wide variety of purposes, and can be both ***expedient*** ('pick it up and put it to use, then discard it') and, as alluded to above, ***directed*** ('purposefully shaped for a given task for use reuse') in nature. Each use results from a different developmental and practical process, and is determined by the end function of the tool. What we mean here is that a cruder use – something like a hammerstone for shaping other stone tools or for breaking long bones – doesn't require much engineering thought to be useful other than to find something the right size, shape, and weight, whereas shaping a ground stone tool or decorative object for a particular and ongoing use requires planning, sourcing, and precision. In the Southwest, for example, we often see rounded, palm-sized stones with "peck marks" on one end associated with lithic scatters of the finer stone types mentioned in the section on flaked stone. These expedient "hammerstones" were likely simply gathered from the surface, used to make the tools humans required, then cast aside when the job is done. Conversely, '***manos***' (a hand-held grinding stone) and '***metates***' (the shaped *or* expedient trough or table the mano is ground against) are laboriously formed into specific shapes and sizes that conform to the task that they will serve; generally the processing of vegetal food stuffs like grains and stalks.



Left: Hammerstone with visible pecking
Right: Mano and metate

There are other directed tools, of course. For instance, we alluded to shaping tools earlier in the discussion. This type of tool is often small – about hand sized – and is one wherein a hole of specific size is bored through the coarse stone to be used to remove bark from branches, or coupled with another of the same tool-type to facilitate re-bending or straightening. They may also be observed as ''notches' in the side of a stone object, and/or a groove or series of grooves against which an object is passed to smooth or further conform it to the makers' needs. Similarly, we may encounter ground stone formed to create axe- or hammer-heads, wherein only specific aspects of the tool are shaped to facilitate hafting, or the attachment of some other element for creating a compound tool or decoration. Ground stone slabs of various sizes were also deliberately created to served as whetstones for sharpening other tools.


Historic quernstone (ca. 1846)

As stated, more often than not, archaeologically, we see ground stone associated with the processing of food, mainly grains and seeds, and we see them show up both prehistorically and historically. Large quern-stones, for example, are often found associated with abandoned homesteads and farms, and were used on a much larger scale and for a much larger yield than the processing tools in prehistory. Ground stone was also often used to form dinnerware – bowls and plates are commonly recovered from some sites. Jewelry, beads, ear spools and other decorative ground stone objects are also common in both prehistoric and historic sites and, in some instances, particularly in prehistoric sites, seen as a sign of high status, due to the time and effort needed to make pieces of such small size and detail. In short, it is often quite easy to determine whether a ground stone tool was expedient or had a directed use. The ground stone toolkit would have lent itself amenable to performing tasks for the everyday, the artistic, and even warfare.


Left: Arrow shaft shaper/straightener
Right: Ground stone hammer or axe


Prehistoric earspools, Mesoamerican, ca. 650 AD

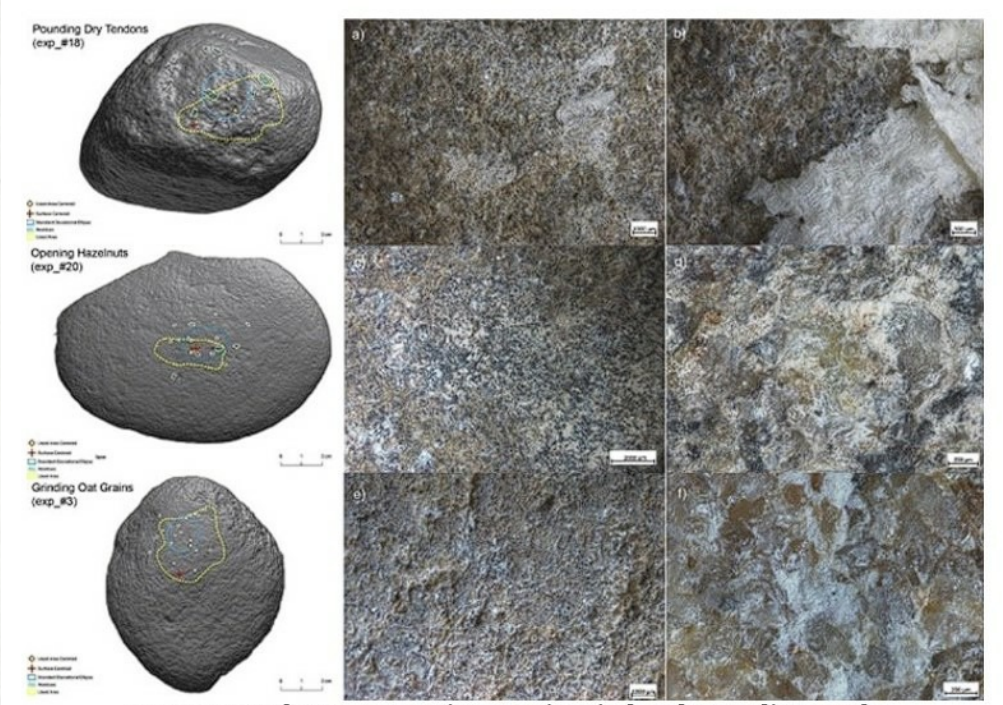
Early Native American groundstone beads and buttons from the Cohokia Mounds Site, IL, ca. 1250 AD

Analytical Methods

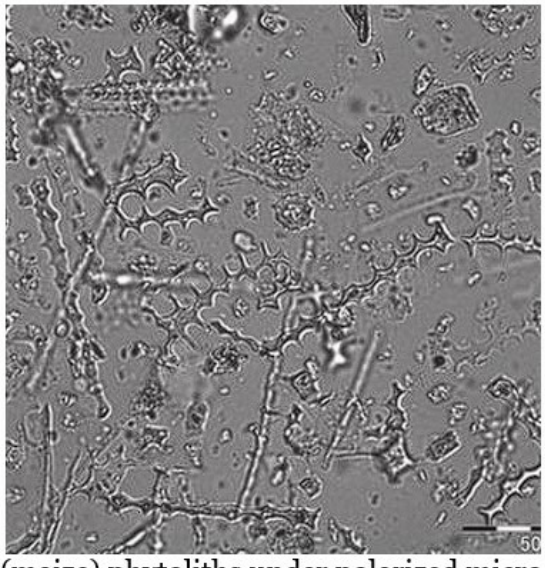
In archaeology, ground stone is quite often associated with the practice of agriculture, and the process of ***sedentism*** (staying in one spot permanently, as opposed to seasonal or regular movement by an individual or group) and ***domestication*** (the process resulting from cultivation and training). And, since ground stone technology is most often identified with daily life activities involving subsistence, regardless of time period, there are certain things we can look for in the laboratory beyond size, shape, and weight: we can look for wear patterns and the presence of botanical and other residues.

Use-wear analysis is a technique in which we observe – macro- and microscopically – the traces left on tools created by the actions of the users. Things like pounding, grinding, and cutting leave linear marks on both the active and passive surfaces, and the more a ground stone object is used, the smoother the used surfaces become. As such, the observer can often even infer when the tool or tools reached the end of their use-life. Further, we can often look for and identify botanical and other remains on striking and cutting surfaces and, in the case of vegetable processing, on the "mortar," the "pestle," or more oftentimes, both use surfaces.

Starch grains and ***phytoliths*** (microscopic, stone-like plant remains) are botanical remains which are well preserved in archaeological context and are small enough to be trapped in the micro-crevices of ground stone tools or even as readily observable concentrations – again using the Southwest as an example, we've observed "chaff deposits" (the unusable portions of grains, corn, and seeds that accumulate during grinding) that still cling to the receiving surfaces. Standardized protocols – often using polarized microscopes – are used in the lab to study plant remains, and those remains are referenced against increasingly growing libraries of analogs to determine the 'when,' the 'where', and the 'how' people of the past were interacting with their environments. The studies are fascinating, and can tell us much about the way humans thought about the landscape, always inventing ways to articulate with its ever-changing resources, climes, and increasing populations.



Use-wear analyses - note microscopic grind and pounding marks


Corn (maize) phytoliths under polarized microscopy