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Identifying Chipped and Ground Stone Artifacts found in South Dakota and Adjacent Regions

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RENEE M. BOEN, EDITOR

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In February 2020, only weeks before the Covid pandemic changed everyone's lives forever, the Archaeological Research Center (Center) sponsored a training session on chipped and ground stone artifacts at its Rapid City office. Local archaeologists were invited, and staff made everyone lunch. Artifacts were laid out on tables with definitions and photographs printed on cards. The training was presented by the authors. The efforts to organize the training were later expanded into this document, the Center's second publication in the Cultural Material Series. Katie Lamie and Lynn Griffin assisted the authors with locating examples of artifacts. Lynn Griffin did an amazing job with photographing the artifact examples for the guide. Thanks to everyone on the Center's staff who contributed to this project!

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Introduction

In the 1990s, the Archaeological Research Center (Center), a program of the South Dakota State Historical Society, created an electronic cataloging system called the *Hierarchical Archaeological Cataloging System* (HACS). This required creating a list of acceptable artifact types for data entry. Cataloging is an inventory tool; a means of organizing an entire archaeological collection for analysis and, eventually, permanent curation. The purpose of this guide is to provide archaeologists standardized definitions for identifying and cataloging chipped and ground stone artifacts in HACS or to identify artifacts in the field (Appendix 1). Depending on the research focus, archaeologists may need to expand these categories beyond the artifact types in HACS. The guide also provides artifact categories beyond those used in HACS, and notes where they belong in the cataloging tree.

Nomenclature reflects the most well-known or frequently used terminology for chipped and ground stone artifacts described in the South Dakota archaeological literature. Descriptions include other names for an artifact type, types of tool stone used to make such an artifact, time periods such items are or may be associated with, diagnostic characteristics of each artifact category, and possible functions. The time periods referenced in the guide represent the general chronology for South Dakota archaeological sites (Figure 1). Definitions for named projectile point types are beyond the scope of this guide.

Chipped and ground stone artifacts can be weapons, parts of a weapon, tools, a stage of manufacturing, waste material from manufacturing, a well-made formal artifact, or a quickly made expedient tool. Most categories for cataloging artifacts are defined by the shape or form of the item and possibly the dominant method of manufacture–chipped versus ground, for example–because more than one means of manufacturing may be employed or an artifact may be reworked into something different from its original purpose. Overall, this guide will provide the reader with a foundation for identifying a variety of artifact types and their subtypes, as well as what characteristics to consider when an artifact could fit into more than one category. The guide is organized into two parts, 1) Chipped Stone Artifacts and 2) Ground Stone and Large Chipped Stone Artifacts. Within each section, the artifacts are organized alphabetically.

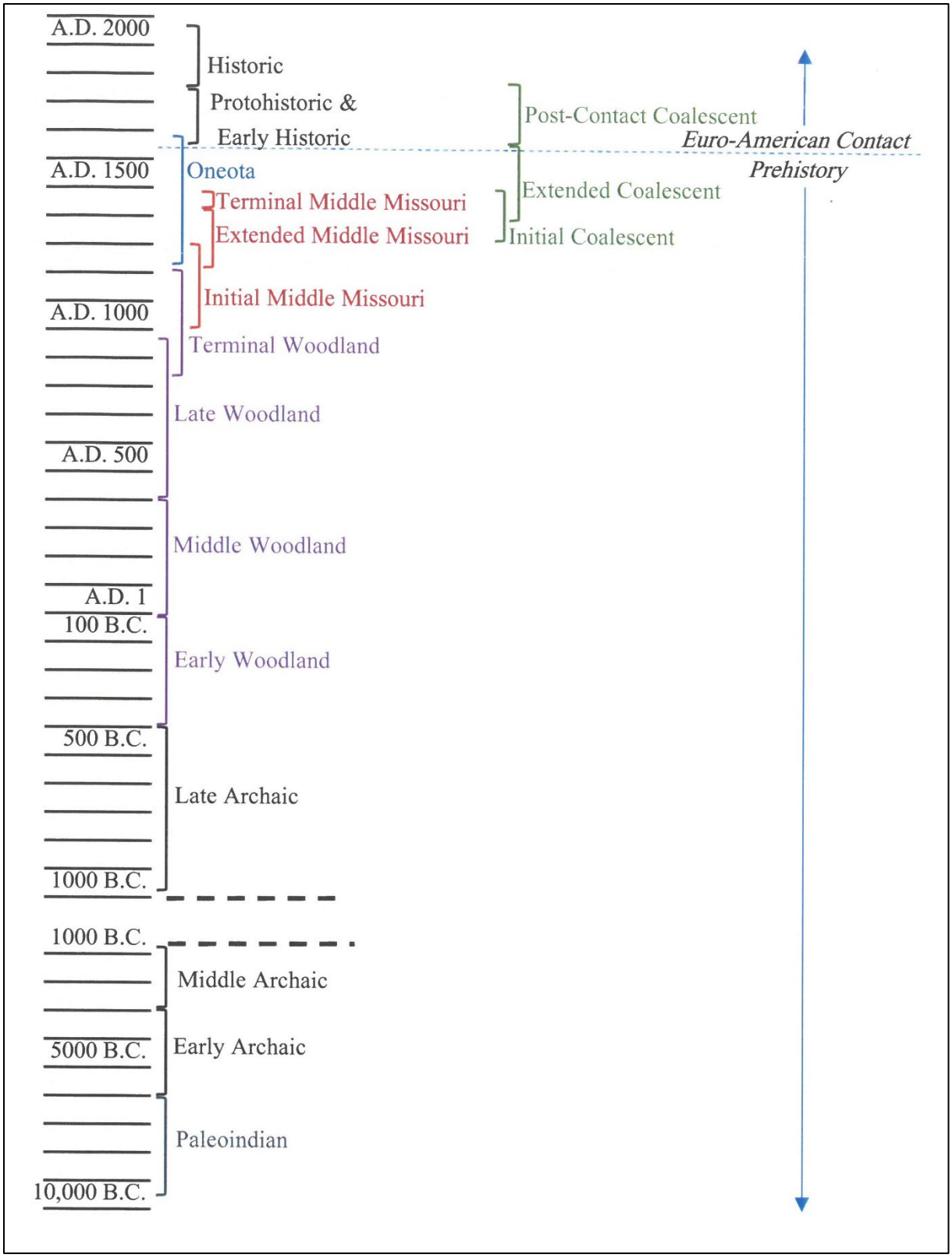

Figure 1. Generalized chronology for South Dakota.

Chipped Stone Artifacts

Because stone is highly durable, chipped–or flaked–stone tools and the debris produced as by-products of their manufacture and maintenance usually constitute the largest category of artifacts found at prehistoric archaeological sites. The ability to produce usable tools through the repetitive application of force to lithic raw materials enabled people to fashion the implements necessary to obtain and/or modify a wide variety of other materials vital for sustenance, constructing shelter and clothing, gathering fuel, and making items for ritual use and personal adornment. The process of producing chipped stone tools is reductive, or subtractive, in nature. Beginning with a nodule, slab, chunk, blank, or flake of suitable raw lithic material, the flintknapper removed portions from the objective piece in a controlled manner, using percussion and/or pressure to detach pieces usable as tools without further modification. The objective piece, or a piece removed from it, could be reduced by further subtractions to form a more complex tool. The reduction process can result in dozens, hundreds, or thousands of individual lithic artifacts that the archaeologist must categorize or classify to determine the activities that took place at the site, any specific techniques or technologies employed, and the temporal and cultural affiliation of the people who left the artifacts.

Ambiguously Worked Flake

Description. An ambiguously worked flake is a flake displaying discontinuous or irregular nibbling or retouch along the edge or across the face.

Function. Ambiguously worked flakes may be the result of expedient use or reflect post-discard damage, rather than nibbling or retouch from a task.

Time Period. Associated with all prehistoric time periods.

References. None.

Biface

Description. Biface is a general chipped stone category subsuming a variety of tools and non-tool artifacts with negative scars of flake removal present over both faces (Figure 2-4). They can exhibit considerable variation in size, morphology, and degree of thinning and retouching. Bifacially flaked tools, such as knives and projectile points, usually display scars from multiple episodes of thinning and retouch and even, regularized edges.

Function. Bifacial tools include items used for piercing, cutting, drilling/boring, and chopping functions. Non-tool bifaces may function as stores of usable stone or cores for further flake production and as quarry blanks or preforms for specific tools.

Time Period. Associated with all prehistoric time periods.

References. Crabtree 1972, Osborn et al. 1995, Whittaker 1994

Figure 2. Bifaces.

Figure 3. Badlands chalcedony knife.

Figure 4. Badlands chalcedony knife.

Bifacially Modified Flake

Description. A bifacially modified flake displays continuous retouch on both faces along a portion of one or more margins to form a low-angle edge (Figures 5 and 6).

Function. Bifacially modified flakes are generally considered to be cutting tools (knives) for use on meat, hide, and other softer materials.

Time Period. Associated with all prehistoric time periods.

References. Tratebas 1986

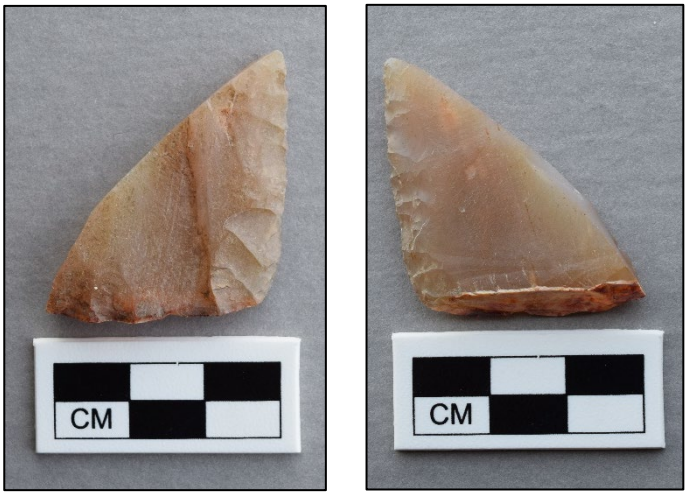

Figure 5. Bifacially modified flake.

Figure 6. Bifacially modified flake.

Check Core and Tested Cobble

Description. Check cores (Figure 7) are pieces of raw material with one or more flake scars; tested cobbles (Figure 8) exhibit two or more flake scars.

Function. Testing by flintknapper to determine quality and suitability of raw material for use in tool production.

Time Period. Associated with all prehistoric time periods.

Reference. Osborn et al. 1995

Figure 7. Check cores.

Figure 8. Tested cobble.

Core

Description. A core is any piece of raw material, such as a nodule, cobble, thick flake, or tabular piece, from which flakes have been removed for production of stone tools (Figure 9). It bears a negative flake scar or scars. The alignment of cleavage scars on various faces can be random or systematic. Cores can be embryonic; for example, a piece of natural, unprepared, raw material with a flake scar or scars, or can be termed exhausted cores, or core nuclei, discarded when too small to produce additional flakes of the desired shape or dimensions. They can take a variety of forms depending on type and orientation of flakes removed and can be classified by shape and orientation of flake removal. Block cores, or tabular pieces, are used in the production of irregularly shaped flakes. Blade cores are used in the production of regularly shaped blades or flakes. Categories for cores in HACS include multifaceted, polyhedral, bipolar, bifacial quarry blank, bifacial preform, core shatter, check core, or modified cobble. All flaked stone industries are represented by either flakes or cores.

Function. Cores represent the raw material used in the flaked stone industry.

Time Period. Associated with all prehistoric time periods. Blade cores are usually associated with Plains Woodland and more recent cultural periods but are also known to be part of Paleoindian technologies.

References. Crabtree 1972, Osborn et al. 1995, Brown et al. 1982

Figure 9. Cores.

Core Shatter

Description. Core shatter is angular debris that is characteristic of the early stages of raw material reduction (Figure 10). It may result from flaws or pre-existing fractures in raw material or excessive application of force. It can be cubicle or irregularly shaped and does not exhibit flake characteristics.
Function. Core shatter represents the waste material created when raw material is tested for suitability and/or during tool stone industry activities.
Time Period. Associated with all prehistoric time periods.
References. Osborn et al. 1992, Brown et al. 1982, Binford and Quimby 1963

Figure 10. Core shatter.

Decortication Flake

Description. A decortication flake is a flake removed from a larger stone that has any of the flake characteristics but exhibits cortex, which is the natural surface or rind of the stone material (Figure 11). Primary decortication flakes exhibit cortex coverage across the entire exterior face; secondary decortication flakes exhibit at least some cortex on the exterior face; tertiary decortication flakes do not exhibit any cortex. Primary and secondary flakes usually represent the early stages of core reduction, while tertiary flakes represent a later stage. A decortication flake may fall under another descriptive flake or tool category, such as unifacially modified flake; in that case, stating that the unifacially modified flake exhibits "cortex" and possibly describing the percentage of cortex, simply helps further describe the flake. In this case, it would be cataloged under the unifacially modified flake category, not as a decortication flake.

Function. Decortication flakes represent the waste product from removing the exterior surface of raw material to check suitability of the material, eliminate unusable weathered, flawed, or battered near-surface material, provide a platform for further removals, and to access the usable interior of the piece.

Time Period. Associated with all prehistoric time periods.

References. Crabtree 1972

Figure 11. Decortication flakes: A and D) remnant limestone matrix, B and C) remnant battered, stream-worn exterior surface.

Denticulate

Description. A denticulate exhibits tooth-like serrations or projections on the margins of the artifact; that is, multiple notches or teeth such as seen on a saw (Figure 12). The edge modification may be unifacial or bifacial.

Function. A denticulate is used to process (shred) plant materials, saw harder organic materials such as wood or bone, or to process meat.

Time Period. Associated with all prehistoric time periods.

References. Crabtree 1972, Tratebas 1986

Figure 12. Denticulate.

Drill/Perforator

Description. A drill/perforator can include both bifacial and unifacial tools with elongated bits (Figure 13). Bit cross sections can be rounded, although they usually are bi-convex or trapezoidal. Some examples represent reworked projectile points or bifaces, however, they can also be made on flakes.
Function. Drills/perforators are used to drill holes in durable raw materials such as wood, bone, and shell; they also may have been used to make holes in animal hides.
Time Period. Associated with all prehistoric time periods.
References. Crabtree 1972, Osborn et al. 1995, Brown et al. 1982

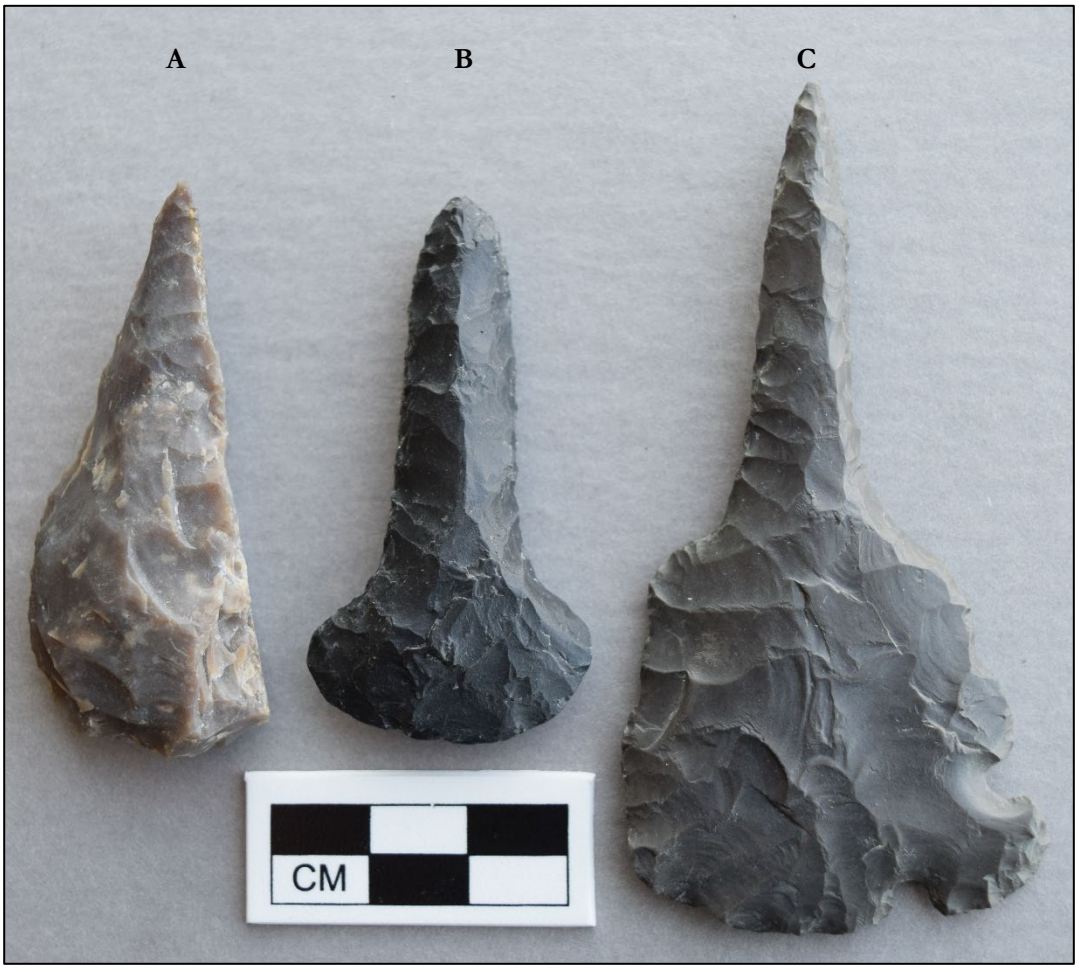

Figure 13. Drills/perforators: A) bifacial drill/perforator, B) bifacial drill, C) drill made on a bifacial tanged knife.

Endscraper

Description. Endscrapers are tools commonly produced by steep retouch on the distal (transverse) edge of a relatively thick, expanding flake to produce a strong, steeply angled edge (Figure 14). They are usually unifacial and modified distally. Endscrapers may also exhibit additional modification along lateral margins to facilitate hafting or be completely flaked on the dorsal flake surface. Occasional specimens are bifacially flaked. Endscrapers are frequently hafted in wood, antler, bone, or ivory handles, although the hafting element is rarely found in an archaeological setting. Endscrapers tend to be plano-convex in cross-section.

Function. Endscrapers were used for scraping and softening animal hides or possibly light-duty woodworking tools.

Time Period. Associated with all prehistoric time periods.

References. Osborn et al. 1995, Tratebas 1986

Figure 14. Endscrapers.

Flake

Description. A flake is a piece of stone removed from a larger stone by force (Figure 15). It would have one or more of the following: a striking platform or striking platform remnant, point of percussion or force, erailleur scar (flake formed between the bulb of force and bulbar scar; does not leave a scar on the core; compression rings not present on dorsal side but present on ventral side), bulb of percussion or force on the proximal end, compression rings, termination, previous flake scars, and/or arris (sharp edge formed by the meeting of two flat or curved surfaces, usually down the center of the flake) (Figure 16). Flakes may be of any size or dimension. Blades are flakes that are at least twice as long as they are wide and have a thin profile, like thinning flakes (Figure 17). Flakes can also occur naturally by, freeze-thaw action, other weathering activities, or breakage by the weight of animals or vehicles across the surface of the land.

Function. Flakes represent the waste products created by flaked stone industry activities.

Time Period. Associated with all prehistoric time periods.

References. Crabtree 1972, Brown et al. 1982

Figure 15. Flake interiors.

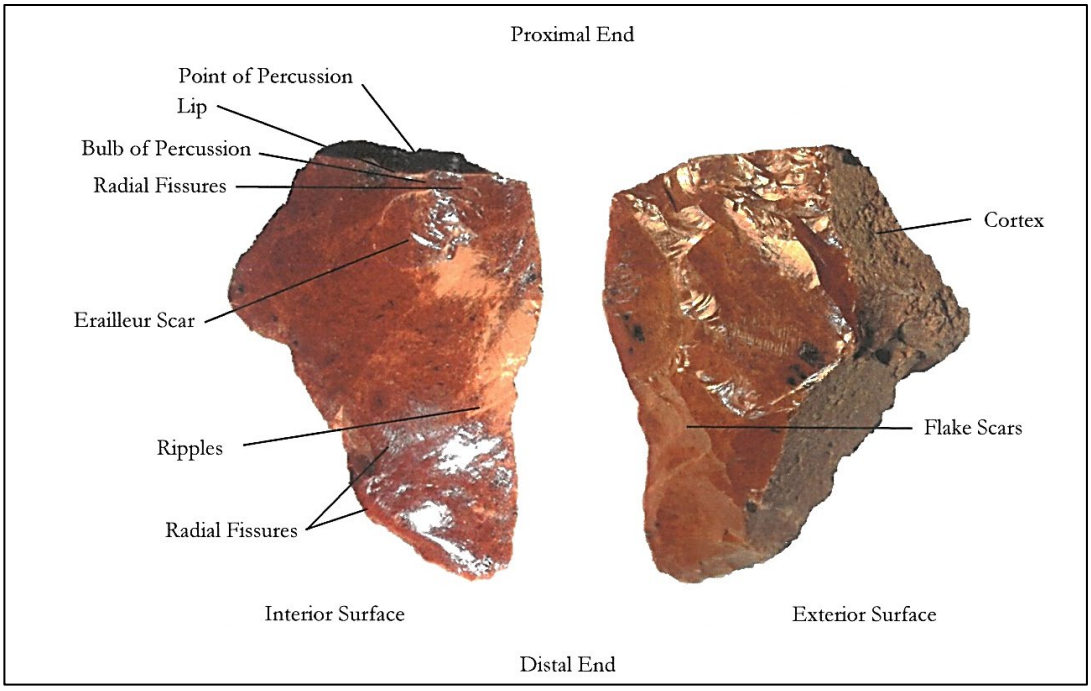

Figure 16. Flake features.

Figure 17. Blades.

Graver

Description. A graver is generally made by pressure flaking and intentionally designed to have a pronounced functional point or points, which may also be call beaks or projections (Figure 18). The projections are often plano-convex in cross-section and have unifacial modification. Some archaeologists consider burins and gravers as separate tool types; others do not. If the distinction is made, it is that a burin would be a small beak or projection on a flake or modified flake, or may be created on another tool type, such as an endscraper.

Function. Cutting, scraping, engraving, or hafting elements on organic materials and soft stone or as a lathe-like tool for cutting wood, antler, bone, or ivory.

Time Period. Associated with all prehistoric time periods.

References. Crabtree 1972, Osborn et al. 1995, Barton et al. 1996

Figure 18. Graver, about 6 cm in length.

Gun Flint

Description. A gun flint is a unifacially or bifacially retouched flint or high-quality chalcedony flake that is square or rectangular in final form. Its size is approximately 2.5 cm by 3 cm (Figure 19). They are often mistaken for endscrapers. They were made in Spain, England, and France and brought to the United States by Europeans. As guns were traded to the Native Americans after contact with Europeans, the tribes would often flint knap their own gun flints to replace ones that had worn out.

Function. Gun flints were placed in the cock of a musket or pistol to strike a metal arm which, in turn, would produce a spark to ignite the gunpowder.

Time Period. Although flintlock firearms were manufactured as early as 1630, they were not introduced into the Northern Great Plains until about 1750. Gun flints, themselves, were mass produced in France and England until the late eighteenth century, although certainly traded in the United States after that date.

References. Fort St. Louis-Texas Beyond History 2022, History Detectives: Special Investigations 2022

Figure 19. Gun flints.

Modified Flake

Description. A modified flake is a flake that exhibits retouch on its margin or invasive modification along one or more lateral edges or ends (Figure 20). If the retouching is only on one face, it is considered a unifacially retouched flake or unifacially modified flake. If the retouching occurs on both faces, it is considered a bifacially retouched flake or bifacially modified flake. Flakes can also be modified by use, showing edge damage in the form of nibbling or discontinuous micro-flake scars, striae, or polish.

Function. Modified flakes are highly variable, depending on the type and location of retouch, size and shape of the object, edge angle, and use wear patterns.

Time Period. Associated with all prehistoric time periods.

References. Crabtree 1972, Osborn et al. 1995, Brown et al. 1982

Figure 20. Unifacially modified flakes.

Preform

Description. A preform represents an unfinished stage of manufacturing a tool (Figure 21). It exhibits marginal and/or invasive modification on one or both faces and does not exhibit well-defined working edges or areas of utilization. Manufacturing usually includes direct percussion but can include pressure. The term preform is often applied to the intermediate stages of projectile point manufacture, and in some technologies, the nearly finished form of the point, minus hafting modifications, can be recognized. Preforms represent a more finished form of tool and are generally smaller than larger quarry blanks, although both may be prepared or found at lithic quarry or procurement sites.

Function. Preforms may be knapped at a quarry or collection point for the material to reduce volume and weight during transport and cached for later use. Can serve a variety of tool functions at several stages on manufacture trajectory.

Time Period. Associated with all prehistoric time periods.

References. Brown et al. 1982, Montet-White 1968

Figure 21. Preforms.

Projectile Point

Description. A projectile point is a unifacial or bifacial flaked stone tool fashioned on a flake or other blank type to produce a variety of forms ranging from lanceolate to triangular in outline (Figure 22). Features normally include a sharp tip or point, well defined working edges, and a haft element. Cross-sections are generally bi-convex but include plano-convex, alternately beveled, and diamond-shaped. It is manufactured by percussion, pressure, or a combination of techniques. Haft element modifications vary widely and include fluting, stems, notches, or a combination. Grinding may be present on portions of haft elements. Fragments of projectile points are more commonly found than complete examples, and impact fractures on a few specimens are the best indicators of projectile use.
Function. These are affixed to the distal ends of shafts of projectiles (including spears, darts, and arrows) to pierce hide and to induce hemorrhage by puncturing organs and cutting tissue. Some may exhibit use as knives. Projectile points made of organic materials, such as bone, ivory, antler, wood, and shell (or composites of these and stone), are sometimes seen. Some were "blunts" designed to deliver blows to stun or kill by blunt force trauma rather than piercing.
Time Period. Associated with all prehistoric time periods.
References. Brown et al. 1982, Crabtree 1972, Tratebas 1986

Figure 22. Projectile points.

Quarry Blank

Description. A quarry blank is a piece of raw material, usually in the form of a flake blank with initial edging or an early-stage biface, prepared for transport from a procurement site for future use by removing cortex, unusable material, or flawed portions (Figure 23). It may be any size. They are commonly found at lithic procurement sites, but caches of blanks intended for later tool manufacture or trade have been found far from sources. In some cases, buried caches of quarry blanks have been found that were never retrieved by their owner. Burying lithic material for later use may help maintain the flaking quality of the stone as opposed to constant exposure to the atmosphere.

Function. Quarry blanks can be a preform for production of a specific tool or may serve as a core from which flakes can be produced for additional tool use/manufacture.

Time Period. Associated with all prehistoric time periods.

References. Whittaker 1994

Figure 23. Quarry blank.

Scraper

Description. A scraper is a tool with a unifacially, steeply retouched edge. There are many varieties, including endscrapers, sidescrapers, and spokeshaves.
Function. These are used for scraping a variety of materials.
Time Period. Associated with all prehistoric time periods.
References. Crabtree 1972, Montet-White 1968

Sidescraper

Description. Sidescrapers are unifacially-modified tools commonly produced by steep retouching on one or both lateral edges of a flake (Figure 24). Working edge(s) are usually straight to convex. They are generally made on a larger flake. Sidescrapers usually lack hafting modification; they were probably handheld. A keeled scraper has a plano-medial ridged cross-section (Figure 24C). The retouched edge occurs on one or both lateral edges.
Function. Sidescrapers were used to dress animal hides or work wood or bone.
Time Period. Associated with all prehistoric time periods.
References. Osborn et al. 1995, Brown et al. 1982

Figure 24. Scrapers: A and B) sidescrapers, C) keeled scraper.

Spokeshave

Description. A spokeshave is a scraper with a concave working edge, commonly produced on a flake or other blank by unifacial marginal retouch to form a rounded notch (Figure 25). The working margin is usually smooth or regular and may display step fractures.

Function. Spokeshaves were used to shape and smooth wood or other materials. They are generally associated with the manufacture of cylindrical tool hafts or shafts for projectiles.

Time Period. Associated with all prehistoric time periods.

References. Brown et al. 1982, Tratebas 1986

Figure 25. Spokeshaves. Arrows point to the working edge.

Thinning Flake

Description. A thinning flake is a flake removed from a preform, biface, or uniface to reduce thickness during the manufacture of a tool (Figure 26). A thinning flake usually shows some form of platform modification/preparation and multiple flake scars on the dorsal (exterior) surface. Flakes derived during biface thinning often display faceted platforms (showing the remnant edge of biface), lipping of platform, and a longitudinal cross section that curves towards the ventral (interior) surface.

Function. Thinning flakes represent the waste product from thinning the objective piece, smoothing surface irregularities, and reducing thickness at a greater rate than margin reduction.

Time Period. Associated with all prehistoric time periods.

References. Crabtree 1972, Whittaker 1994

Figure 26. Thinning flakes, A and B) exterior, C) interior, arrow points to the platform (proximal end).

Ground Stone and Large Chipped Stone Artifacts

Ground stone or large chipped stone tools are typically manufactured by battering, pecking, grinding, polishing, indirect percussion, and/or smoothing. Grinding and smoothing may be accomplished with the help of water for continuous removal of fine grains, possibly holding the artifact in a stream or periodically washing away loose grains during the manufacturing process. Choppers and chipped stone axes typically exhibit the indirect percussion method of manufacture, which may be followed by grinding a haft or polishing or grinding away sharp edges of a chipped stone haft.

Abrader

Description. An abrader may exhibit one or more narrow grooves on sandstone, scoria, or other soft stone (Figure 27). They were used in a sanding action to both sharpen tools or to dull sharp edges prior to hafting. They were also used to polish wood.

Function. Abraders were used to manufacture and maintain tools.

Time Period. Associated with all prehistoric time periods, although they were more common during the Plains Woodland and Plains Village[1] periods.

References. Brown et al. 1982

Figure 27. Scoria abraders showing smooth wear from sanding or polishing.

[1] The Plains Village Pattern includes the Middle Missouri and Coalescent Traditions as shown in Figure 1.

Arrow Shaft Abrader

Description. Arrow shaft abraders, made of sandstone, are also known as arrow shaft smoothers or arrow shaft straighteners (Figures 28 and 29). They are a subset of abraders. Arrow shaft abraders typically have a narrow, parallel-sided, single u-shaped groove running the length of a rectangular-shaped stone. They would have been used in pairs.

Function. Arrow shaft abraders were used to smooth wood arrow shafts.

Time Period. Associated with all prehistoric time periods but are more common during the Plains Woodland and Plains Village periods.

References. Brown et al. 1982

Figure 28. Arrow shaft abrader, one of a pair.

Figure 29. Fragments of arrow shaft abraders.

Atlatl Weight

Description. An atlatl weight, or bannerstone, is part of a compound weapon, the atlatl, that was introduced in the late Paleoindian/Early Archaic period. The atlatl includes a throwing board used to propel the dart. An atlatl weight may be incorporated into the design of the throwing board, lashed to the underside towards the distal end, as a possible means of stabilizing the board, or for sound suppression (Figure 30). All interpretations of their purpose have been debated. Although usually made of stone, they could be made of antler. Atlatl weights are rare finds in South Dakota. Size and shape of the weights can vary, they are generally shaped by grinding and polishing, and they may have a drilled hole or tapered ends to facilitate attachment to the throwing board. Types may include loaf-shaped, end-ridged, long ellipsoidal, zoomorphic, and miscellaneous.

Function. Possibly to stabilize the throwing board of the atlatl weapon or for sound suppression.

Time Period. Associated with Late Paleoindian and Archaic periods and, in some areas, into the Plains Woodland period, until their use was completely replaced by the bow and arrow.

References. Keddie 2007, Perkins 2022, Neuman 1967

Figure 30. Atlatl weight. Scale is in centimeters.

Bead

Description. A stone bead may be made from gypsum, catlinite, or other soft stone (Figures 31-33). Its shape may be oblong, sub-rectangular, barrel-shaped, or other. A barrel-shaped bead may taper toward flattened or rounded ends. Holes in elongated beads are typically drilled from both ends. This results in the visual appearance of two cone-shaped drilled holes that meet near the middle of the interior of the bead, preparing it for stringing. Beads with a narrow profile may present a circular-shaped drilled hole, even if it was drilled from both sides.

Function. Beads were created for ornamental purposes.

Time Period. Although evidence for stone beads during all time periods has not been identified in South Dakota at this time, it seems highly probable that they do exist.

References. Brown et al. 1982

Figure 31. Stone beads.

Figure 32. Stone bead.

Figure 33. Stone bead. Scale is in centimeters.

Celt

Description. A celt, or adze, usually made of diorite or granite, is a somewhat cylindrical tool with a sharp, wedge-shaped blade on one end and a poll on the other end (Figure 34). They are ungrooved, ovoid or rectangular in cross-section, and the poll may exhibit battering. Hafting was accomplished using a socket and wedge style rather than lashings. The blade of an adze is usually flat on the ventral face and angled on the dorsal face for shaving wood; although the term celt has been used for this blade style, adze is a more accurate term.

Function. Celts and adzes were used for wood splitting or shaving.

Time Period. Associated with the Plains Woodland and Plains Village periods.

References. Lehmer 1971, Brown et al. 1982, Morrow 2017

Figure 34. Celts.

Chipped Stone Axe

Description. A chipped stone axe can exhibit a variety of shapes and sizes (Figures 35 and 36). The distal end has a sharpened blade created by percussion flaking. The poll, or proximal end opposite the blade, may be straight, convex, or concave and is designed as the hafting portion of the tool. Their final shape depends on their intended use. They are typically made from quartzite or other hard stone materials.

Function. Chipped stone axes are designed for chopping wood or similar activities.

Time Period. Associated with all prehistoric time periods.

References. Winters 1969, Brown et al. 1982

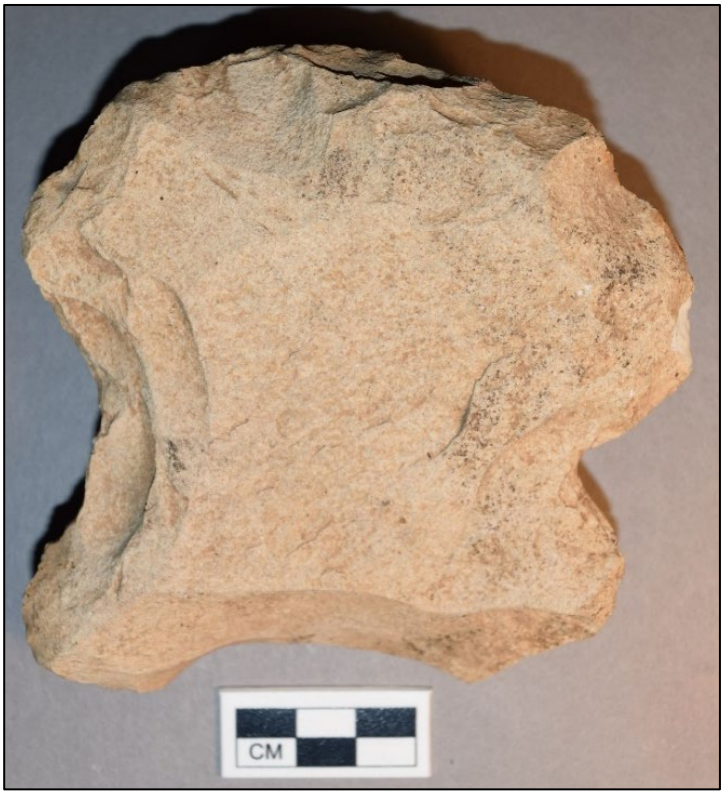

Figure 35. Chipped stone axe notched for hafting.

Figure 36. Chipped stone axe (artifact is mislabeled as "Chopper").

Chopper

Description. A chopper is usually bifacially worked using percussion techniques (Figures 37-39). It may be made from a cobble or large blank shaped by removing large flakes to create a working edge. The working edge is usually convex. It would be made of a hard durable material, such as quartzite.

Function. A chopper would be used for chopping bone during butchering or marrow extraction or other similar activities, when a chipped stone axe would be too much tool for the job.

Time Period. Associated with all prehistoric time periods.

References. Brown et al. 1982

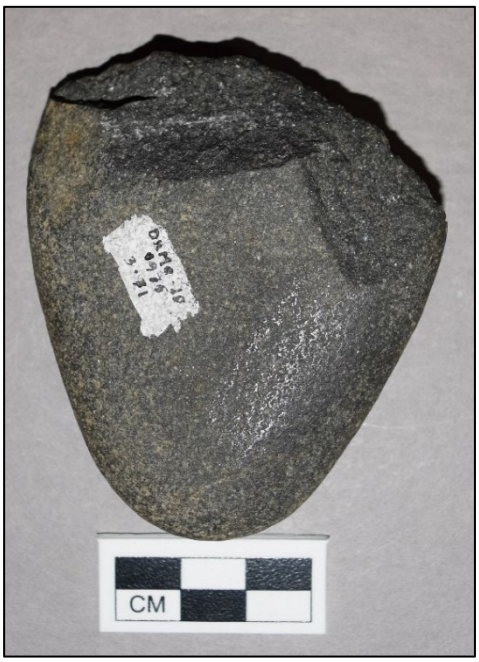

Figure 37. Chopper.

Figure 38. Chopper.

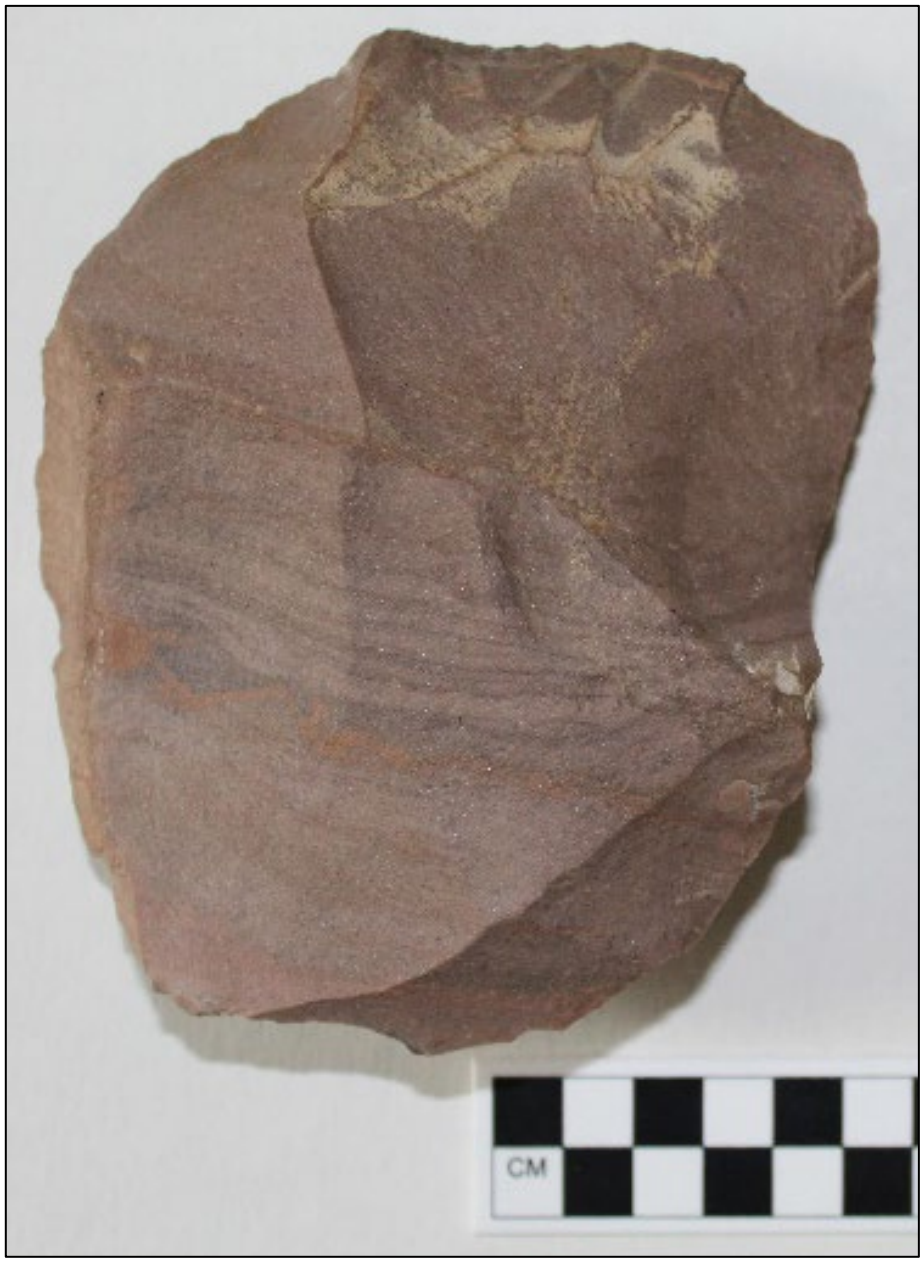

Figure 39. Chopper.

Cone-Shaped Maul

Description. Cone-shaped mauls have been found in northwest Iowa in Woodbury County, west-central Minnesota just east of Big Stone Lake, and in Charles Mix, Minnehaha, McPherson, and Haakon counties, South Dakota. The Iowa and Minnesota examples at the Center were photographed for this guide (Figures 40-41). They are uncommon artifacts in South Dakota and are a heavy tool with either a pointed, flared and flattened, or concave distal end. The proximal end, or poll, is flat and circular or rectangular with rounded corners. They are full or three-quarter grooved for hafting more than halfway down from the distal end. Manufactured on diorite, granite, or other hard material, they are created by pecking, grinding, and polishing. The distal end tends to exhibit high polish while the flat proximal end, of the two examples pictured, are pecked and polished, but do not show any use-wear. Their overall length varies.

Function. These mauls were used for food processing and possibly digging tools; may have played a role in prairie turnip extraction and processing. They resemble the pestles used by the Pomo for acorn processing in the Southwestern United States, however, the wear patterns on these tools include battering on the poll end. The mauls found in South Dakota do not exhibit this pattern of battering, suggesting they were not used to process acorns or other nuts.

Time Period. Probably associated with the Plains Woodland period.

References. Tabeau 1939, Over 1940, Fosha 1995

Figure 40. Full-grooved cone-shaped maul, found in Woodbury County, Iowa.

Figure 41. Large three-quarter grooved cone-shaped maul, found east of Big Stone Lake, Minnesota.

Gaming Piece

Description. A gaming piece is usually made from a soft sedimentary rock, such as tabular sandstone, although there are examples of harder materials being used, such as schist and granite (Figures 42 and 43). Its shape can be square or a disk approximately 5–6 cm diameter and 1.5 cm in thickness. The edges may be smooth although they are often roughly chipped. A gaming piece may have incised lines or geometric designs, and some have holes drilled in the center. Manufacturing methods includes grinding, chipping, and/or incising.

Function. These artifacts are thought to have been used as gaming pieces.

Time Period. Mainly associated with the northern Post-Contact Coalescent sites.

References. Lehmer 1971

Figure 42. Schist gaming piece.

Figure 43. Granite gaming piece.

Grooved Axe

Description. A grooved axe, usually made of granite, diorite, or quartzite, is long, wide, and roughly rectangular with a sharp blade on one end and flat to rounded poll on opposite end (Figure 44). They were full or three-quarters grooved by pecking with an often-flattened side. The groove, used to facilitate hafting, is typically situated toward the poll end.

Function. Axes were woodworking tools.

Time Period. The earliest appearance is Middle Archaic period; they fell out of use around 1,000 BP. Those that are thin, fully grooved with definite ridge around the groove, may date to the Extended or Terminal Middle Missouri variants.

References. Lehmer 1971, Brown et al. 1982

Figure 44. Grooved axes: A-C) full grooved, D) three-quarter grooved.

Grooved Maul

Description. Grooved mauls were often made from waterworn cobbles of granite, quartzite, diorite, or other hard material (Figures 45-47). Manufacturing techniques included grinding and/or pecking, creating wide, blunt ends and a full or three-quarter groove around the circumference, near the center, or towards the proximal end, for hafting. Their shape can be ovoid to spheroid to irregular. Battering is usually present on both ends; sizes vary although they tend to be massive. Cross-sections can be circular or elliptical.

Function. They are used for heavy pounding and hammering activities.

Time Period. Associated with the Middle Archaic period through Euro-American contact.

References. Lehmer 1971, Brown et al. 1982

Figure 45. Full-grooved maul, approximately 15 cm wide.

Figure 46. Full-grooved maul and photos of the distal and proximal ends.

Figure 47. Example of hafting a grooved maul.

Hammerstone

Description. A hammerstone is a fist-sized or smaller, typically flattened, cobble of granite, diorite, or other hard stone with battering on one or more edges (Figure 48). Its shape is variable but usually ovoid or circular.

Function. A hammerstone could be used for hammering, pecking, direct percussion flaking stone or bone tools, maintenance tasks, animal butchering, or marrow extraction.

Time Period. Associated with all prehistoric time periods.

References. Brown et al. 1982, Morrow 2017

Figure 48. Hammerstones.

Mano and Metate

Description. A mano, or grinding stone, is used with a metate, or platform, for food or pigment processing. Manos and metates could be made from sandstone, quartzite, or an igneous material. They first appear at Archaic sites in South Dakota as plant processing and food storage becomes more important to cultural groups. Their use continues into incipient agriculture, then into the full-fledged farming periods. They were often cached, most likely because of their bulk and special use, and probably used seasonally where groups were collecting or growing, storing, and processing plants instead of transporting during periods of mobility. In the southern Black Hills, they are frequently associated with Archaic period rock shelters.

Mano. Traditionally, there are two categories of manos, the one-hand mano with a length up to 14–17 cm and the two-hand mano, with a length greater than 14–17 cm (Figures 49 and 50). Cross-sections can be tabular, bi-convex, plano-convex, wedge, or indeterminate. The shape outline can be rectangular, ovoid, oblong, or irregular.

One-hand manos may be expedient tools made on a cobble or shaped tools of fine- to medium-grained sandstone. Shaped manos tend to have two grinding faces, are tabular or plano-convex in cross-section, and have smoothed and ground lateral edges. They are typically fist-sized, with wear on one or both surfaces.

Two-hand manos can be large, thick, and rectangular and may have rounded edges, or they can be thin and wedge-shaped.

Metate. A metate is a large, usually flat to basin-shaped stone with grinding marks on the working surfaces (Figures 51-57). Metates can be shallow trough, deep trough, unshaped, or shaped slabs. Food to be processed on a metate is rolled in a back and forth grinding or circular motion.

Function. Manos and metates are used to grind vegetal products, meat, or pigments.

Time Period. Associated with the Archaic, Plains Woodland, and Plains Village periods.

References. Osborn et al. 1995, Lehmer 1971, Brown et al. 1982

Figure 49. One-hand manos: A) circular outline, "biscuit-shaped", plano-convex cross-section, and pictured face shows use wear, B) irregular outline, wedge-shaped cross-section, and both faces show use wear, C) circular outline, "biscuit-shaped", concave-convex cross-section, pictured face shows use wear, D) circular outline, "biscuit-shaped", plano-convex cross-section, and pictured face shows use wear and red pigment.

Figure 50. Manos: A) one-hand mano, sub-rectangular outline, bi-plano cross-section, face pictured shows use wear, B) incomplete, probably a two-hand mano, sub-rectangular outline, slightly bi-convex cross-section, pictured face shows use wear.

Figure 51. Metate, sub-rectangular outline, shallow basin, plano-concave cross-section.

Figure 52. Metate, irregular rectangular outline, shallow trough, plano-concave cross-section.

Figure 53. Metate with red pigment.

Figure 54. Metate.

Figure 55. Metate, rectangular, concave-concave cross-section.

Figure 56. Metate.

Figure 57. Metate, circular outline, convex-slightly concave cross-section.

Nutting Stone

Description. A nutting stone, depending on the area of the United States, may also be also known as a pitted stone, pitted hand stone, nut stone, or cup stone. Nutting stones tend to have one or more circular, shallow pits measuring 2.5 to 3 cm in diameter and circular depressions created by pecking or grinding; their size and shape vary (Figures 58-60). They may be flat, about 5 cm thick, and have ovoid outlines with wear on both faces. Nutting stones should not be confused with non-cultural omarolluks, which are glacial erratics that exhibit prominent rounded, often deep, hemispherical voids and pits that are created by the dissolution of carbonate concretions.

Function. Cracking nuts or preparing paint pigments

Time Period. Associated with the Archaic, Plains Woodland, and Plains Village periods; occurs with regularity in the Middle Missouri Tradition.

References. Lehmer 1971, Brown et al. 1982

Figure 58. Nutting stone.

Figure 59. Nutting stone.

Figure 60. Nutting stone.

Pendant

Description. A stone pendant may be made from catlinite, slate, or other easily worked material and have any one of a variety of outlines, such as ovate, rectangular, triangular, tear-drop shaped, or square (Figures 61 and 62). Cross-sections can also range from bi-plano to convex-convex or somewhere in between. Methods of suspending the pendant can include a hole drilled on one end, notching, or a groove encircling the pendant to facilitate stringing.

Function. Pendants are ornamental artifacts.

Time Period. Associated with all prehistoric time periods.

References. Brown et al. 1982

Figure 61. Slate pendant, irregular triangular outline, cone-shaped, bi-plano cross-section, drilled hole for stringing.

Figure 62. Catlinite pendant.

Pipe

Description. A pipe can be made from Catlinite, soapstone, or other stone that is easily ground. Methods of manufacture include grinding, smoothing, drilling, and/or polishing (Figures 63-65). Pipes can be elbow-shaped, tubular, t-shaped, prowed (a projection of the stem extending in front of the bowl), or have a plain or stylized or animal effigy bowl above a platform. Bowls can be barrel-shaped, cone-shaped, bulbous, straight, or stylized. Late examples may be incised and inlaid with lead or white metal. They may be designed to be smoked with a wooden stem attached; the length of the wood stem can vary as can the type of wood, although ash has a soft pithy center that is easily burned open.

Function. Pipes were used for smoking tobacco or special mixes of tobacco and other plants; used recreationally or for religious ceremonies.

Time Period. Associated with the Plains Woodland, Plains Village, and Historic periods.

References. Lehmer 1971, Brown et al. 1982

Figure 63. Catlinite pipe preform.

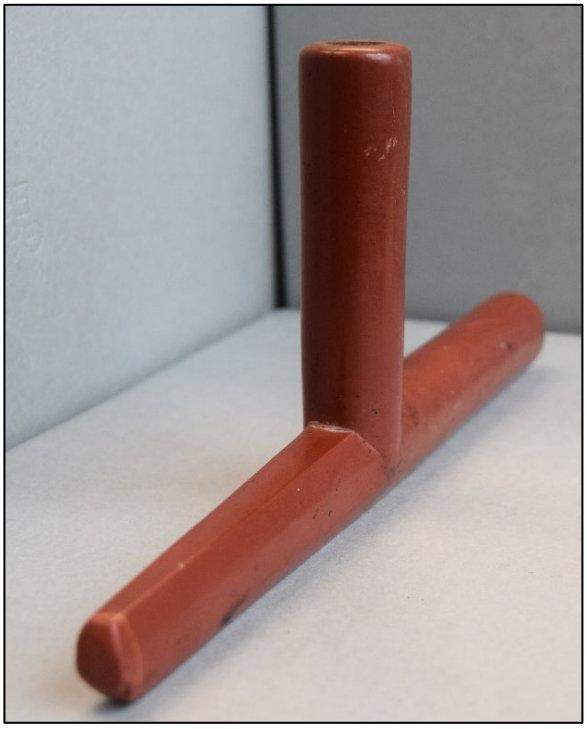

Figure 64. T-shaped Catlinite pipe.

Figure 65. Catlinite platform pipe.

Plummet

Description. A plummet, or grooved stone, may be made of hematite or copper and used as a fishing weight or sinker (Figure 66). Plummets are typically tear drop shaped (like a plumb-bob) with either an encircling groove or hole drilled in the narrow end for stringing. A grooved stone is another style that is more or less cylindrical, about 3.5 cm in length, with flat or rounded ends and narrow encircling grooves at the center.

Function. Both plummets and grooved stones were used as fishing weights or sinkers.

Time Period. Rare in Initial Middle Missouri variant villages; more common in Extended and Terminal Middle Missouri variant villages.

References: Lehmer 1971

Figure 66. Plummet.

Reamer

Description. A reamer is a tapered piece of abrasive stone that is round in cross-section and made of scoria or sandstone. They are similar to drills, but the working end is not as narrow and the material of a drill is usually chert, chalcedony, or quartzite, not scoria or sandstone.
Function. A reamer is used to smooth and enlarge drill holes in wood or bone.
Time Period. Unknown
References. Brown et al. 1982

Stone Ball

Description. A stone ball, or spheroid, is a nearly spherical stone with discernible pecking and/or grinding marks (Figure 67). The sizes may vary but the diameters are often about 6.5 cm. They are typically made of a hard sandstone, quartzite, or catlinite.
Function. Their function is unknown.
Time Period. Middle Missouri through Post-Contact Coalescent) periods, until Euro-American contact.
References. Lehmer 1971, Brown et al. 1982

Figure 67. Stone ball.

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Appendix A: The Archaeological Research Center's Hierarchical Archaeological Cataloging System (HACS) for Chipped and Ground Stone Artifacts.

Table 1. The Archaeological Research Center's categories for cataloging chipped and ground stone artifacts.

Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
CHIPPED STONE				
Core	multifaceted			
	polyhedral			
	bipolar			
	biface	quarry blank		
		preform		
	core shatter			
	check core	(tested cobble)[2]		
	modified cobble			
Biface knife	tanged			
	notched/hafted			
	Cody			
Badlands knife				
Drill/Borer				
Chopper				
Wedge (see celt/adze)				
Projectile Point	lanceolate	Clovis		
		Goshen		
		Folsom		
		Agate Basin		
		Hell Gap		
		Allen		
		Angostura		
		McKean		
	stemmed	Scottsbluff 1		
		Scottsbluff 2		
		Alberta		
		Eden		
		Duncan		
		Hanna		
	corner-notched	Pelican Lake		
	side-notched	Hawken/Early Archaic		
		Oxbow		
		Besant		
		Avonlea		

[2]Some categories of artifact types are not specifically listed in HACS or the authors prefer a slightly different name for an artifact type. In both cases, those artifacts are listed in (parentheses) to show the reader the best placement in the electronic cataloging system. For example, a (tested cobble) would be cataloged under check core. In these cases, additional descriptors for an artifact can be included under the "Comments" section of the HACS catalog record.

Table 1 cont.

Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Projectile Point		Plains/Prairie		
		Plains Village		
	unnotched	Plains Village		
	triangular	Unnotched		
	point preform			
Flake	decortication	primary		
		secondary		
	tertiary			
	thinning			
	modified	bifacially	flake	
		modified	knife	
		unifacially	scraper	endscraper
		modified		
				sidescraper
				keeled scraper (see sidescraper)
				spokeshave
		burin (see graver)		
		graver		
		denticulate		
GROUNDSTONE	(atlatl weight)			
	(bead)			
	(gaming piece)			
	(nutting stone)			
	(pendant)			
	(reamer)			
	(stone ball)			
Shaft Abrader	(arrow shaft abrader)			
Mano				
Metate				
Stone Axe	(chipped stone axe)			
	(chopper)			
	(grooved axe)			
Celt	(adze)			
Grooved Maul	(cone-shaped maul)			
Plummet				
Pipe/Calumet				
Hammerstone				
ARMAMENTS GROUP				
Firearm	firearm part	gunflint		