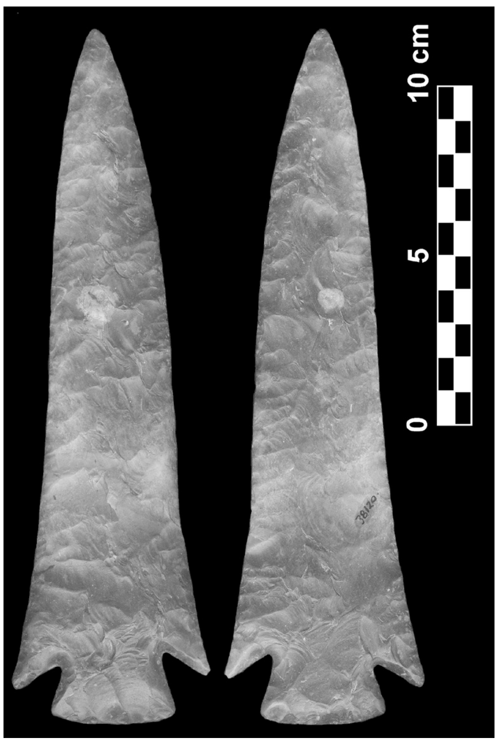
THE WYOMING Archaeologist

VOLUME 63; NUMBER 2; 2019



ISSN: 0043-9665
[THIS ISSUE PUBLISHED
November, 2022]

THE WYOMING Archaeologist

WYOMING ARCHAEOLOGICAL SOCIETY, INC.

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On the Cover:

Large ceremonial blades from Garret-Allen site, Carbon County, Wyoming and Gas Hills Area, Fremont County, Wyoming. Eckles, this issue.

THE WYOMING ARCHAEOLOGIST
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WYOMING CULTURAL TRUST FUND
BECAUSE OUR CULTURE MATTERS

"Publication of this issue of *The Wyoming Archaeologist* is supported in part by a grant from the Wyoming Cultural Trust Fund, a program of the Department of State Parks and Cultural Resources."

THIS ISSUE PUBLISHED November 2022

ATYPICAL STONE ARTIFACTS FROM THE GARRETT ALLEN (ELK MOUNTAIN) SITE, 48CR301
by
David G. Eckles

The Garrett Allen (Elk Mountain) archaeological site (48CR301) is located in southeastern Carbon County, Wyoming at the northern end of the Medicine Bow Mountains and southern edge of the Hanna-Carbon Basin. It is within a homoclinal valley near the perennial Quealy Spring which forms an ephemeral drainage flowing north-northwest. Archaeological deposits are present just south, southwest and southeast of the spring. These deposits are about 10-12 feet above the spring, but their total depth is unknown.

Excavations were conducted by members of the Wyoming Archaeological Society with assistance from the Office of the Wyoming State Archaeologist and University of Wyoming Anthropology Department beginning in late 1968 and continued each year through 1980. Additional work was conducted by the State Archaeologist office in 2014. Units were established on a north-south, east-west grid. Most units were 5x5 feet blocks with some as large as 10x5 and 10x10 feet. Most units were excavated to 12 inches below ground surface with some units reaching 60 inches or more below ground surface. The depth sequence and radiocarbon dating are addressed by Eckles (2013).

Recent research on the Garrett Allen site has discussed the excavation history, projectile points and chronology of the site (Eckles 2013), chipped stone raw materials and obsidian sourcing (Eckles and Guinard 2015), chipped stone projectile points (Eckles and Miller 2019), and research potential of the collection (Clauter 2013). Data on these topics have indicated support for the idea the site represents a series of special place gatherings over about 3,100 years of prehistoric occupation. Analysis of stone artifact types not often found in Wyoming prehistoric sites is presented here. Included are rarely encountered chipped stone artifacts, ground stone atlatl weights, a steatite pipe bowl fragment, a probable stone pendant, quartz crystals, modified sandstone artifacts, minerals, fossils, and a variety of pebble manuports. The raw materials represented by these stone artifacts were brought into the site, most from considerable distances.

CORNER TANG BIFACES

Two corner tang bifaces (Figure 1) were found in the southwestern portion of the site grid in 1980. They were found nearly side-by-side at the edge of a hearth exposed during the University of Wyoming archaeological field school excavations (George Frison and Mark Miller, personal communication, 2016). Based on the existing excavation forms, it appears the unit in which they were found was referred

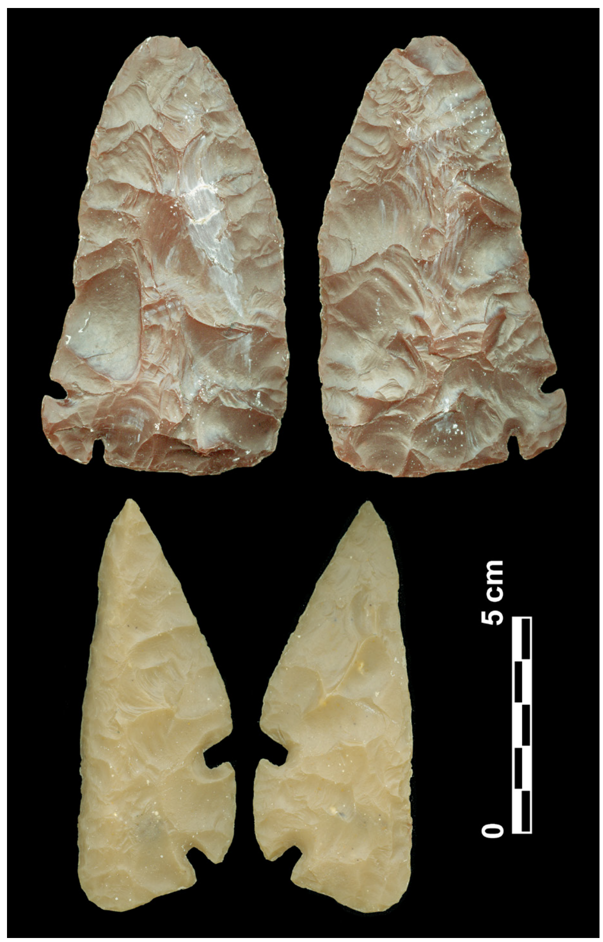

Figure 1: Corner Tang Bifaces (casts) from 48CR301.

to as "Craig's Test," a five-by-five foot unit which was part of a series of similar-sized units established along a backhoe trench excavated to test the depth of deposits, establish an area from which to set up block units, and reveal cultural and geologic (soils) stratigraphy. The two bifaces and a hearth (among other artifacts) were found at a depth of 20 inches below ground surface within this unit. A charcoal sample from the hearth in this excavation unit was found in the collection and submitted for dating on March 15, 2016. It returned a date of 814+/-18 radiocarbon years before present (D-AMS 015960).

The two corner-tang artifacts are both made of dendritic agate, similar to the kind found in east-central Wyoming. One appears to have been recently finished and unused, while the other had been extensively retouched along its working edge and reduced in size. The latter exhibits a relatively steep edge angle of 57 degrees from retouch, forming a beveled edge. It appears it had been resharpened to the point of exhaustion as a usable tool. Both artifacts were discussed by Frison (1991:113) and Kornfeld et al. (2010:57).

RESEARCH AND DATING ON CORNER TANG BIFACES

Kraft (1993) presents a synthesis of research on these highly stylized artifacts. Much of this synthesis is based on pioneering work done by Patterson (1936; 1937) which relied on surface finds of corner tang artifacts. The greatest numbers were found in Texas, with Wyoming and Nebraska having the next highest surface counts. Corner tangs have been found in relatively small numbers in South Dakota, Montana, Colorado, Kansas, Oklahoma, New Mexico, Iowa, Wisconsin, Illinois, Missouri and Arkansas (Fischel 1938; Patterson 1936).

Few such artifacts have been found in dated context. Kraft (1993:41-42) indicates a date range from about 2300 to 700 years B.P. based on corner tang artifacts found in dated contexts in Texas, Colorado, and Kansas. Obsidian hydration of a corner tang biface found on the surface near Bozeman, Montana suggested a date from about 2900 to 2500 years B.P. (Davis 1975). A recent report of a corner tang biface in dated context from a site near Amarillo, Texas indicates a date range of 2540-2240 years B.P. (Quigg 2011:4). A corner tang artifact was recovered from the Glenwood Locality in southwestern Iowa and dated from about 650-800 years before present (Perry 1996). Although not directly dated, a corner-tang biface was found in east-central Wyoming (Converse County) on the site surface near a surface hearth dated to 1145+/-100 years B.P. (Greiser et al. 1982:5-68). In sum, corner tang artifacts appear to date from the early Late Archaic to middle Late Prehistoric periods.

LARGE NOTCHED BIFACE

A large corner notched biface was collected in the mid-1970s from the surface close to the Garrett Allen site (Figure 2). Its location has been identified to a sandstone outcrop on Halleck Ridge just northwest of the spring and excavated deposits (Mark Miller and George Frison, personal communication, 2016). As Frison (1991:355) has stated:

> "… A large notched biface was reported to have been found on the surface in southern Wyoming and its authenticity was questioned. However, part of a large *Busycon* sp. shell was found a year or so later by a different person in the same location and it is now believed the two items were from a human burial that had eroded out nearby. Both items are diagnostic of materials from the lower Mississippi Valley that somehow found their way onto the Plains …"

Dr. Emmett Evanoff of the University of Colorado identified this shell fragment (Figure 3) in 1983 as *Busycon contrarium*, the lightening whelk, a common marine shell along the Gulf Coast states. This shell artifact and the large biface are illustrated in Frison (1991:355-356) and Kornfeld et al. (2010:445-446).

In addition to the probable location of these two artifacts, one human occipital bone is cataloged in the Garrett Allen site collection, although it is missing from the collection. There is no provenience information on the catalog card. Conversations with individuals who participated in the site excavations revealed there was a general consensus human remains had been found in the area of the sandstone outcrop just northwest of the site. Unfortunately, we do not know what these remains are or where they might be located if they were collected.

The area of the sandstone outcrop was examined in September of 2013 and in August of 2014 by staff

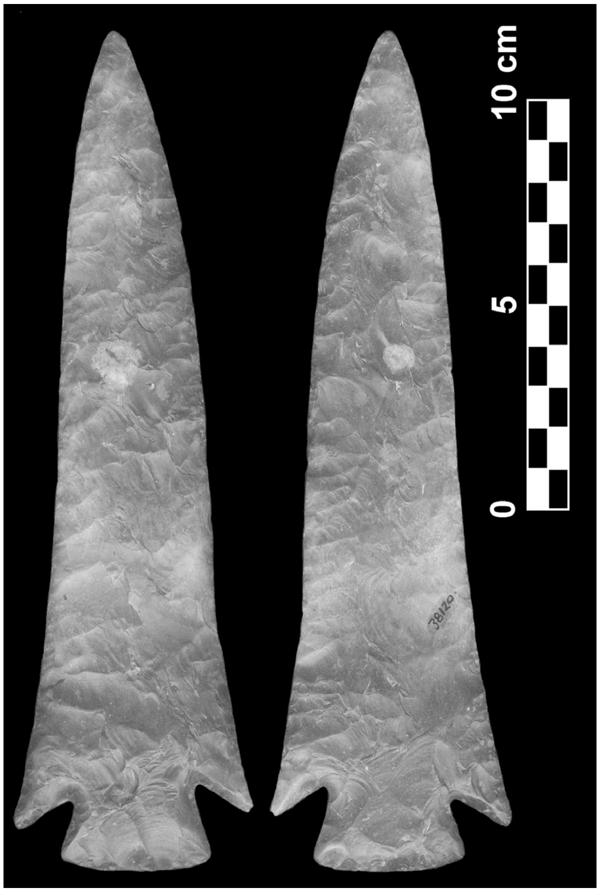

Figure 2: Large notched biface, 48CR301.

from the Office of the Wyoming State Archaeologist and Wyoming SHPO, as well as students from the University of Wyoming. No artifacts or bones were located in or near this outcrop at these times. If a burial was present in this area and the biface and shell artifacts were associated with the burial, it would appear all evidence of the burial has vanished.

Given the surface nature of the find, a question has arisen regarding the biface's authenticity: is it a prehistoric artifact or a modern reproduction? Opinions differ on the matter. The following is a compilation of information about the biface and a brief analysis of its possible identity.

The piece is long and relatively thin with deep corner notches, expanded convex base and slightly recurvate blades. While finely made, the basal portion is asymmetrical with the length from the haft portion to base differing significantly (Table 1). The barbs are also of somewhat different sizes. About one-third of the lower blade area and the barbs shown signs of smoothing as if ground to dull the edges. The flaking pattern is generally collateral,

Figure 3: Busycon shell recovered from near 48CR301.

but flakes scars vary in terms of total size and orientation. In some portions of the blade, the flaking pattern is nearly random. There appears to be minor attrition (post-manufacture breakage) on the blade edges and one barb.

The biface is made from a medium to dark gray and black mottled chert with one rounded sandstone inclusion in the blade section. A lighter gray color appears at the distal end and near the center of the below the sandstone inclusion. This is clearly not a Wyoming raw material type. It is also different from any known raw lithic materials found in the Northern Plains and Northern Rocky Mountains. Suggestions have been made regarding the raw material type include Cobden chert from southern Illinois or Dongola/Wyandotte chert from southern

Table 1: Large Corner-notched Biface, Metrics.

PORTION	MILLIMETERS
Total length	202.3
Maximum width (from barbs)	58.8
Thickness	7.1-9.3
Haft width	29.9
Lengths from haft width to base	14.4
	17.6
Maximum base width	37.3

Indiana (Dr. Ernie Boszhardt, personal communication, 2013) and Georgetown flint from Texas (W. Blackwell, personal communication, 2013). It does not appear to be from an Ohio source (Dr. Mark Seeman, personal communication, 2013). A review of Midwestern lithic raw materials in DeRegnaucourt and Georgiady (1998) suggests some resemblance to the Cobden/Dongola/Wyandotte materials. Illustrations of Texas cherts found on the internet only somewhat resemble the Garrett Allen specimen. It is unlike specimens of Edwards Plateau chert from central Texas of which a few samples are present at the University of Wyoming Anthropology Department.

A few people who have examined the artifact have likened it to the modern large biface reproductions called "gray ghosts."

> "…They were named for and made from gray Edwards chert from Texas …The first ones were produced in Bryon Rinehart's 'flint spear' factory in the 1940s. 'Gray ghosts' are large modern-made flint spears that were made during the 40s, 50s, 60s and early 70s …Each one is a little different and unique …" (Bostrom 2013:1).

Another web posting describes how Rinehart made his artifacts.

> Bryan (sic) Reinhardt had developed a method of mass producing large flint spear points, none of which is under nine inches long … with the use of a rock saw and complex level flaker (fulcrum and lever). Rienhardt (sic) quarried tons of gray Edward's Plateau chert … Once he had the slabs cut and trimmed he would heat treat the material … For the actual flint knapping stages, Bryan (sic) removed the first stage of conchoidal flakes (which) was done with an elaborate jig set up. The jig was an elaborate set of holes and pins that allowed Bryan (sic) to apply fulcrum and level pressure at any angle and from any direction to any size or shaped piece of flint. The edging was done with micro-lever and shearing techniques. This gave the early Gray Ghosts their characteristic steep margin double bevels . . ." (Harwood 2005:2-3).

A more thorough summary of the Rinehart/Gray Ghost phenomenon was presented by Whittaker (2004:50-53). All of the internet information appears in this article, including the devices used to "flake" the pieces. While Rinehart may have been inspired by the prehistoric artifacts from the Spiro Mound in Oklahoma, his points were not intended to be replicas of genuine artifacts. He seemed to be interested in making shapes according to his own preferences (Whittaker 2004:52).

These modern bifaces are no longer being produced by Mr. Rinehart as he passed away in 1982 (Bostrom 2013:1). Other flint knappers have continued to make the bifaces similar to "gray ghosts" after Rinehart's passing, possibly up to the present time (Whittaker 2004:53).

A cursory examination of illustrations of gray ghosts appearing on several websites and in Whittaker (2004:51) shows a wide variety of sizes and basal and blade attributes. Rinehart's "gray ghosts" are flawlessly made, completely symmetrical in all attributes and generally thin to moderate thickness. Final flaking along the blade edges shows flakes of nearly similar sizes and orientations. The flaking pattern can be nearly parallel oblique, horizontal to the vertical plane of the blade or at a low angle to the vertical plane of the blade. Steep double bevels along the blade edges are present on many of the illustrations shown on various websites and in Whittaker (2004:51).

Arguments in opposition to the possibility the Garrett Allen site notched biface is a gray ghost include the following. First, its basal configuration is quite asymmetrical. Second, there are no obvious indications of modern manufacture such as residue from metal implements or the type of crushing which can occur while chipping with, for example, pliers or a metal punch. Third, the flaking pattern on the biface blade is by no means repetitive; flakes are of multiple sizes and orientations. Furthermore, no steep angled double bevel is evident, in fact no beveling is observed. Examination of the specimen under 20x magnification revealed what appear to be small sediment grains in a few of the interstices of hinge fractured flakes, suggesting the artifact had at some point been in contact with sediment. With the limited information available, there do not appear to be any of Rinehart's gray ghosts similar to the Garrett Allen specimen. Other large modern bifaces illustrated in Whittaker (2004) are also quite dissimilar to the Garrett Allen side notched biface.

This large biface is clearly not a typical High Plains or Rocky Mountain prehistoric type. The stone raw material is not from a Wyoming or nearby source. Are there any similar large notched bifaces in other parts of North America, or even Wyoming? Perhaps. In 1971, The Fremont County Chapter of the Wyoming Archaeological Society reported on two large exotic blades found in central Wyoming (Fremont County Chapter, WAS 1971:13-15). They were reported to have been made from the same or similar "dark brownish gray chalcedony," and were both ten inches long. No further information is available on either piece, including present location.

Zeimens and Walker (1977) describe a third similar biface (Figure 4) found in the Gas Hills area of eastern Fremont County:

> "One other artifact from this area is worthy of special mention. It is a large bifacially flaked blade, probably a ceremonial knife or spearpoint. The material it is made from is not found locally …The artifact resembles similar specimens recovered from Hopewell sites in the Ohio River Valley …Only three similar specimens are known from Wyoming. One almost exactly like the Gas Hills blade came from Elk Mountain about 100 miles south and east of the Gas Hills. Another came from the South Pass area 70 miles to the west and one from Douglas 125 miles due east …None have been found in a definable context, and nothing definite can be said about their origin. It is possible that they represent some contact between this area and the Hopewellian in the East" (Zeimens and Walker 1977:20-21).

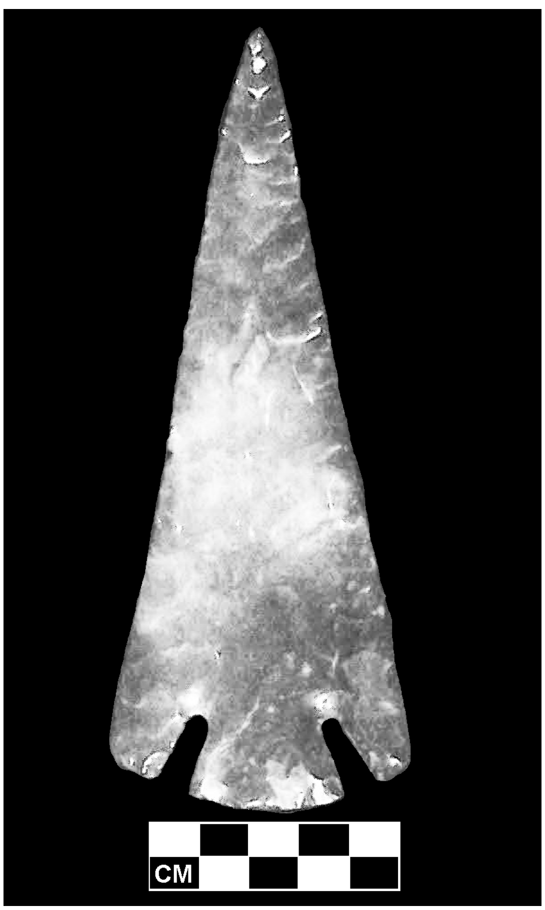

Figure 4: Large biface from the Gas Hills Area, Fremont County, Wyoming.

Like the two blades described in 1971, the present location of this blade is unknown, but based on photographs taken in 1976, the material of the Gas Hills blade appears to be the same, or fairly close to the same, as the Elk Mountain blade. These three other reported occurrences of large ceremonial type blades lend credence to the idea of the Elk Mountain blade being prehistoric and not a modern replica and further shows the probability of long-range trade networks in the region.

A search of the literature (by no means exhaustive) discussing large (probably ceremonial) bifaces points to one particular type known from southwestern and west-central Illinois, northern, central and southwestern Missouri, northwestern Arkansas and northeastern Oklahoma. This is the Etley point which has been found in burials and other contexts. Etley points have been dated from about 4150 to 2550 radiocarbon years before present (O'Brien and Wood 1998:145; Ray n.d.:2).

There is considerable variation among Etley points in terms of metrics, and especially in its notching and basal attributes and configuration of the barbs (see e.g. Banks 2005; O'Brien and Wood 1998; Ray et al. 2009; Roper 1978). Most of the examples illustrated in the literature are not particularly similar (except in length) to the Garrett Allen large biface, but there are two examples of Etley points which are somewhat similar. One is from north-central Missouri reported in Chapman (1975:246) and the other is reported in Holmes (1902:118-119 and Plate XI). The Holmes (1902) specimen shows the slightly recurvate blade, asymmetrical expanded convex base and deep corner notches, but its barbs are longer and the blade appears to be wider than the Garrett Allen site biface. The Chapman (1975) example shows a similar flaking pattern, asymmetrical base and barbs which are more similar to the Garrett Allen specimen.

The large notched biface reported by Holmes (1902) is particularly interesting because it was found while dredging a spring in extreme northeastern Oklahoma. This Etley point was found along with other large bifaces and the bones of bison, deer, wolf, birds, mammoth and mastodon. The remains from the spring obviously include a long time range and the materials were not found in dateable contexts. Holmes considered the stone artifacts and possibly some of the faunal remains were ritually deposited in the spring over prehistoric time.

There are other long notched bifaces in the literature from burial sites and mounds in the Mississippi River system, lower Missouri River valley and in the larger region east of the Mississippi River dating from the Middle to Late Archaic, Woodland and Mississippian prehistoric periods. A few have a vague resemblance to the Garrett Allen site specimen. For example, there is a long notched biface from the Coral Snake Mound in northwestern Louisiana dating to 1650-1750 years B.P. It has deep corner notches, prominent barbs and a slightly expanded, but straight base. The blades are not recurvate (McClurkan et al. 1980).

It must be admitted two or three examples of a stylized artifact which resemble another one is a fairly thin argument for identification of the Garrett Allen biface to a type. The comparison to Etley is suggestive but far from definitive. The raw material is clearly exotic, but from which source is unknown. It does not appear to be a "gray ghost" but it could be a modern reproduction made by someone other than Bryon Rinehart. The arguments presented here point toward the biface, and the three other Wyoming exotic blades, as being prehistoric artifacts, but lacking a dated context, it is difficult to conclude much about them.

STEATITE ARTIFACT

One small fragment of a possible steatite pipe bowl (Figure 5) was found at four inches below surface in the southwestern portion of the site grid. It is likely contemporaneous with the late Late Prehistoric Shoshone Knife, side-notched, tri-notched and unnotched arrow points recovered from about 0-12 inches below surface in many parts of the site (see Eckles 2013). Adams (1992:35-47) has identified sources of steatite and quarry locations in the Teton and Gros Ventre Mountains of northwestern Wyoming, Wind River Range of west-central Wyoming, Owl Creek and Bighorn Mountains of north-central Wyoming and possibly the Seminoe Mountains and the Carbon County portion of the North Plate River drainage of south-central Wyoming.

Figure 5: Steatite artifact, 48CR301.

ATLATL WEIGHTS

Four atlatl weights were recovered from the site (Figure 6; Table 2). All are made of green-black to jet black, dense igneous or metamorphic rocks. Three of the four exhibit smoothing and striations on the formed facets along the long axis of each artifact.

Amphibolite is a dark green to green-black metamorphic rock commonly found in dikes (Miller 1971:19-21). Amphibolite dikes are commonly found in the Laramide mountain ranges of Wyoming, especially in the Cheyenne Belt (a tectonic suture zone) crossing the southern Laramie Range, northern Medicine Bow Mountains and Sierra Madre Range of southeastern Wyoming (Grambling and Tewksbury 1989:1; Hoffman 1989:460-461). Dark green amphibolite schist is also found in the Seminoe Mountains (Lovering 1929:222). Other sources include the Casper Mountain area where amphibolites occurs in dikes, lenses and pods up to 500 meters long and 10+ meters wide (Gable et al. 1988). Amphibolite deposits are also found in the Granite Mountains of central Wyoming (Peterman 1978) and the Wind River Range (Shepard 1985), among others.

Basalt rocks in Wyoming are most commonly found in the Yellowstone-Absaroka field located in northwestern Wyoming. This is the largest volcanic field in Wyoming and is considered to be the source

Figure 6: Atlatl weights, 48CR301.

of most of the volcanic debris in the state. Basalt rocks are found in late Eocene, early Oligocene, Miocene, and early Pliocene deposits in this field (Houston 1964:16).

Basalt outcrops are known from the western edges of North Park, Colorado, in the area of Rabbit Ears Pass and Elk Mountain. Grouse Mountain Basalt overlies Troublesome formation rocks and Rabbit Ears volcanics (Bolyard and Sonnenberg 1997:165-166). Luedtke and Smith (1978) show Late Cenozoic volcanic dikes and flows containing basalt rocks on the western side of North Park, Colorado, north and northwest of Steamboat Springs, up to and just over the Wyoming border in southwestern Carbon County. There are additional basalt dikes and flows south of Steamboat Springs and into Middle Park and central Colorado (Izett 1966:42).

West of North Park, basalt rocks are found in the Elkhead Mountain Volcanic Field which extends from Cedar Mountain near Craig, Colorado north to Battle Mountain, an extinct volcano located in extreme southwestern Carbon County, Wyoming (Carey 1955:44).

Closer to the Garrett Allen site in the Saratoga Valley between Walcott and Saratoga, cross-bedded conglomerates of the Browns Park Formation contain rounded clasts of Precambrian rocks, including basalt, rhyolite, andesite, and other extrusives. These conglomerates were transported from the Rabbit Ears and Never Summer volcanic fields in northern Colorado during Miocene times (Montagne 1991:25). Basalt dikes are also found along the Cheyenne Belt in southeastern Wyoming (Houston and Marlatt 1997).

POSSIBLE PENDANT

A small fragment of a modified stone was found at 5 inches below surface. This artifact has one smoothed surface with a series of nearly parallel abrasion marks (Figure 7). Both ends of the specimen have been incised, creating a narrow groove, possibly for the attachment of a cord. It has been (purposefully?) broken and exhibits two cleavage surfaces, both of which have weak conchoidal fracture marks. The rock is a dark red to dark brown color and is highly magnetic.

The stone is a variety of baked shale, common in the Powder River Basin of Wyoming and Montana. Many coal bed outcrops in the basin have burned and the heat from coal fires has baked and fused

Table 2: Atlatl Weights, Provenience and Rock Type.

ROCK TYPE	UNIT	DEPTH	LENGTH	MAX. THICK.	MODIFICATION	COUNT	FIGURE
Amphibolitic basalt	N/A	N/A	71.1	22.9	4 facets with parallel striations, perpendicular incisions on 3 sides at center	1	6b
Igneous dike basalt	0-10N 30-35W	12”	61.1	19.8	4 facets with faint parallel striations	1	6c
Amphibolite dike	N/A	32”	65.9	23.9	5 facets with parallel striations	1	6a
Igneous basalt family	N-S Trench 12S	48”	53.4	17.2	Faint smoothing on two sides, no striations	1	6d

Figure 7: Grooved baked shale artifact.

the overlying clastic rocks into clinkers (Miller 1979:38). When such rocks are heated, they generally turn a shade of red or brown and become more magnetic (Miller 1979:27). The rock is partially silicified and has conchoidal fractures, common characteristics of baked shale (Wayne Sutherland, personal communication, June 3, 2014).

QUARTZ PYRAMIDAL CRYSTALS AND CRYSTALLINE QUARTZ

A discussion of quartz artifacts from the site were previously discussed by Eckles and Guinard (2015) who described 467 quartz artifacts recovered from all depth increments. This includes a large number of flakes and a relatively small number of chipped quartz tools. There are eight modified (flaked) pyramidal crystals, seven unmodified pyramidal crystals (Figure 8a), and three unmodified stream pebbles in the assemblage.

Of the modified pyramidal crystals, one found at 18 inches below surface (Figure 8c) is irregularly oval in shape with the thickest end flaked, exhibiting four flake scars on one side and two on the other. This has formed a 62º angle working edge which shows crushing from use. The opposite (narrower) end has one flake scar and possible polish. Perhaps this crystal was inserted into a bone or antler socket to facilitate its use as a tool.

Figure 8: Quartz pyramidal crystals.

The other seven crystals show one to at most two flakes removed from the apex of the crystal (example shown in Figure 6b). Three small clear quartz flakes retaining one of the crystal facets were also recovered. None of the pyramidal crystals or flakes show any evidence of use wear or further flaking. It would appear the modification of these crystals was for purposes other than producing a functional tool or flake for functional use.

Most of the quartz recovered includes irregular pieces from milky white or vein quartz. These pieces do not appear to be suitable for making functional stone tools, and none show any evidence of use wear.

For the most part, quartz artifacts are present in small numbers more or less evenly distributed across the site in all depth increments. A closer examination of the context of quartz artifacts reveals some units with greater densities, possibly concentration areas (Table 3). While we do not know precisely where these items were found within the units (which include 1, 5, 10 and 25 square foot areas), the data (Table 3) do suggest perhaps in these units at the depths indicated, more concentrated knapping/other use of quartz occurred. Most of these units contain both quartz cores and debitage, and two also contain pyramidal crystals. Three out of the five pyramidal crystals have one or more flakes removed from the apex of the crystal. None of the flakes indicated in the table include any of the flakes removed from the apex of a pyramidal crystal.

Clearly, some of the reduction of quartz raw materials was to produce functional stone tools, given the presence of 23 such tools in the collection. As discussed by Eckles and Guinard (2015), most of the quartz debitage consists of irregular chunks of milk (vein) quartz which do not appear to be useful for use as tools. With one exception, the flaked pyramidal crystals and flakes derived from these crystals show no edge wear. It appears the purpose of reducing many of the quartz cores and the flaking of pyramidal crystals was not to produce functional stone tools.

While large in numbers, the quartz artifact assemblage from the Garrett Allen is not the largest in the state. Site 48NA182 in central Wyoming contains 529 quartz artifacts from a dated component (2610+/-50 B.P.) which also produced Pelican Lake corner-notched dart points. Several dozen other quartz artifacts were recovered from other

Table 3: Possible Concentration Areas of Quartz Artifacts, 48CR301

UNIT	DEPTH IN INCHES	TOTAL SQ. FT.	CORE	PYRAMIDAL CRYSTAL	FLAKES NISP	TOTAL	NUMBER OF ARTIFACTS PER SQ. FT.
10N 35W	8	1	1		5	6	6.0
17N 70-80W	12	10	1		18	19	1.9
E-W Tr. 32W	30	5			18	18	3.4
N-S Tr. N. End	44	25		2 (both flaked)	53	55	2.2
E-W Tr. 45E	48	5	1		13	14	2.8
E-W Tr. E. End	48	25	2	3 (one flaked)	44	49	2.0

components (Goss and Slensker 2002:74). Another site in southeastern Wyoming, 48LA304, contains over 200 quartz artifacts (Reher and Frison 1991). Most of the other sites where quartz artifacts were recovered (Table 4) have relatively few such artifacts compared to the Garret Allen, 48NA182 and 48LA304 sites.

MODIFIED SANDSTONE PEBBLE AND INCISED SANDSTONE SLAB

One small dark brown irregularly shaped sandstone pebble contains a probable bore hole on one side. It appears a natural hole in the rock has been enlarged by drilling or scraping around the edges of the hole which has and made it somewhat wider and deeper. This bore hole reaches about half way through the pebble.

A portion of a rectangular, thin sandstone slab exhibits faint and narrow grooves as well as probable incisions. On one side there are two faint and shallow grooves. On the other side are faint V-shaped incisions resembling a tree. It is possible this specimen was used in a similar fashion as the sandstone shaft abraders although the possible grooves are extremely shallow suggesting it was not extensively used as such, or the grooves represent something else. The tree-like pattern could be the result of random incisions made for an unknown purpose, or perhaps this is an example of portable art.

SMALL STONE MANUPORTS

Several unmodified pebbles and other rock fragments were transported into the site. Some are sedimentary rock pieces, but most are relatively small stream rounded pebbles and wind polished flat pebbles of igneous and metamorphic origin. These are, for the most part, unmodified (or minimally modified) rocks and pebbles exhibit bold colors, including red, white, yellow, purple, black and brown.

Table 4: Selected Wyoming and Colorado Sites with Quartz Artifacts

SITE	LOCATION	PREHISTORIC PERIOD	QUARTZ ARTIFACTS	REFERENCE
48NA202	Central Wyoming	Protohistoric	1 tool	Reher and Frison (1991:388)
48NA326	Central Wyoming	Late Prehistoric	5 flakes	Randall (1963)
48LA302	SE Wyoming	Late Prehistoric	1 projectile point and flakes	Reher (1971:40); Reher and Frison 1991:388)
48AB1	SE Wyoming	Late Prehistoric	10 flakes	Waitkus (2013:7.2)
5WL101	NE Colorado	Late Prehistoric	1 crystal	Steege (1967)
48LN317	SW Wyoming	Late Prehistoric	7 quartz stream cobbles	McGuire (1977)
48LA304	SE Wyoming	Late Prehistoric to late Late Archaic	200+ flakes, 8 tools, 2 unmodified stream pebbles	Reher and Frison (1991:387)
48NA182	Central Wyoming	early Late Archaic	529 quartz artifacts from dated component	Goss and Slensker (2002)
48NA1950	Central Wyoming	Late Archaic	4 crystals	Klemperer (1988)
48WA1	North-central Wyoming	Late Archaic	10 modified crystals	Frison (1965:85-86)
48WA302	North-central Wyoming	Late Archaic	12 modified crystals	Frison (1968:264)
48AB2128	SE Wyoming	Middle Archaic	21 flakes	Ambrose (2009)
48CK7	NE Wyoming	Middle Archaic	5+ flakes	Reher and Frison (1991:388)

SOFT ROCK SPECIMENS

Several rounded to irregularly shaped rocks of sedimentary origin were recovered from various depth increments (Table 5). Red, yellow and brown unconsolidated sandstones are present as well as three white chalk specimens. The parent rock is soft, light, unconsolidated and the grains easily detach. All but the red specimens show rounding of the surfaces which might lead to an inference they were modified in some way for some purpose. Clear evidence of use wear, however, is not apparent. The red sandstone fragments are heavier and more consolidated, but no use wear is apparent. It is possible these are fragments from broken metates, or served some other purpose. Source areas for the soft sandstone manuports are unknown.

The first reference to chalk deposits in Wyoming is found in Hayden (1872:123) who reported on the "Chalk Cliff" in the Laramie Basin, part of the Cretaceous age Niobrara formation. Chalk from this formation has also been reported north of Rock River (Mears et al. 1986:8), Centennial Valley west of Laramie (Atherton 1971:11), the northwestern portion of Shirley Basin (Massington 1996:33-36), and central Wyoming (Pirrson 1915:885).

HARD ROCK PEBBLES

A rather large number of small to medium unmodified stream-rounded igneous and metamorphic pebbles were recovered from most depth increments (Table 6). Twenty-seven items of metaquartzites, orthoquartzites, chert, petrified woods, granites and basalt exhibiting a variety of colors are in the collection with provenience data. Sizes range from 2.0 to 8.5 cm (maximum lengths). Both round to oval and irregular shapes are present (Figure 9). There are another 34 of these pebbles listed in the catalog cards, but are missing from the collection.

These rocks are presumed to be manuports. As far as has been observed, there are no stream worn pebbles or cobbles on or near the site. The gravel layer depicted in one excavation profile (see Eckles 2013:32) at roughly 30-36 inches below surface appears to correspond to a gravel layer noted in the field in 2014. The gravel in this deposit consists of angular sandstone fragments deposited by colluvial action (Casey Dukeman, personal communication, 2014).

Most of the petrified wood pebbles also are unmodified. One of the petrified wood specimens (depth of 48 in) is highly polished with all four of the lateral edges exhibiting noticeable smoothing and rounding. In addition, a single flake was removed

Table 5. Soft Rock Manuports by Depth (inches)

ROCK MATERIAL	TYPE	0-6	7-12	13-18	19-24	43-48
White sandstone	Irregular fragments	1	--	--	2	--
Red sandstone (unburned)	Irregular fragments	1	--	3	--	1
Yellow sandstone	Oval fragments	1	2	--	--	--
Brown sandstone	Rounded fragments	--	--	1	1	--
White chalk	Rounded fragments	--	--	1	2	--

Table 6: Hard Rock Stream Pebbles by Depth (inches)

ROCK MATERIAL	TYPE	7-12	13-18	19-24	25-30	31-36	43-48
Brown metaquartzite	Pebble	--	--	1	--	2	--
Red metaquartzite	Pebble	--	--	--	--	1	--
Gray metaquartzite	Pebble	--	--	--	--	2	--
Yellow metaquartzite	Pebble	--	--	--	1	--	--
Brown orthoquartzite	Pebble	1	--	--	--	--	--
Gray chert, split pebble	Pebble	1	--	--	--	--	--
Gray chert, irregular	Pebble	1	--	--	--	--	--
Red granite	Pebble	--	1	--	--	2	--
Tan granite	Pebble	--	--	--	--	1	--
Purple granite, irregular	Pebble	--	--	--	--	1	--
Black basalt, irregular	Pebble	--	--	1	--	--	--
Petrified wood, irregular	Pebble	--	2	--	--	6	2
Petrified wood, highly polished	Pebble	--	--	--	--	--	1

Figure 9: Examples of unmodified stream worn pebbles and soft rock sandstone specimen (petrified wood upper left; chert middle left; sandstone lower left. All others are granite).

from the dorsal surface of the pebble. One small gray chert pebble was split and the impact scar is visible.

WIND POLISHED PEBBLES

The collection contains 18 small flaked pebbles made on relatively flat, dark brown and gray opaque to moderately translucent cherts and chalcedonies. They retain a wind polished cortex which is almost certainly desert varnish. Most of the modified pebbles are shaped in the form of small triangular bifaces (see Eckles and Guinard 2015). Raw materials are likely from the Eocene age formations of the southwestern and south-central Wyoming basins. An additional eleven unmodified, flat wind polished pebbles were recovered at various depths (Table 7); they were probably intended for reduction into tools, but were left at the site unmodified.

MINERALS SPECULAR HEMATITE AND EARTHY HEMATITE

One specimen of specular hematite and three small fragments of earthy hematite were recovered from the site. The specular hematite specimen is a dark reddish black, irregularly shaped piece measuring 2.3 by 1.8 cm found on the surface of the site. Specular hematite has been found in the Sunrise mining area of east-central Wyoming (Hausel 2005:87; Tankersly et al. 1995). Wayne Sutherland of the Wyoming Geological Survey examined this piece and concluded is probably from the Sunrise Mining Area near Guernsey, Wyoming.

Three small irregular fragments of earthy hematite (red ochre) were recovered at various depths (Table 8). Earthy hematite is also found in the Sunrise area. There is a prehistoric red ochre quarry called the Powers II site dating to Paleoindian times (Frison et al. 2018; Kornfeld et al. 2010:251; Pelton et al. 2022, Tankersly et al. 1995). In the Rawlins Uplift of south-central Wyoming, there are the historic Rawlins paint mines which contain powdery hematite, siliceous nodules, and lenticular hematite masses (Lovering 1929:209-214). The earthy hematite fragments from the Garrett Allen site could have been transported from either source area, or perhaps from another relatively distant location.

MAGNETITE WITH HEMATITE ANGULAR FRAGMENT

The single specimen from the site was found at 6 inches below surface. It is black to dark reddish black and is highly magnetic. Magnetite is one of the most common iron minerals, and can be found in igneous, metamorphic and sedimentary rocks. Much of the magnetite in Wyoming is found in banded iron formations. Sources include the South Pass Area, Copper Mountain and the Seminoe Mountains (Hausel 1982:78). Black magnetite is reported by Lovering (1929:222) from the Seminoe Mountains. South of the Bradley Peak area "…hematite is a late mineral and is largely an oxidation product of earlier

Table 7: Unmodified Wind Polished Pebbles by Depth (inches)

ROCK MATERIAL	TYPE	0-6	7-12	13-18	19-24	43-48
Brown chert	WP pebble	1	1	1	1	--
Brown fossiliferous chert	WP pebble	1	--	1	1	1
Gray chalcedony	WP pebble	1	--	1	1	--

Table 8: Minerals by depth (inches)

ROCK MATERIAL	TYPE	0-6	7-12	13-18	25-30	31-36	43-48
Earthy hematite, dark red	Fragment	1	--	1	--	1	--
Specular hematite, red-black	Rounded piece	1	--	--	--	--	--
Magnetite with hematite, black	Irregular fragment	1	--	--	--	--	--
Concretionary iron, wind polished. Dark greenish brown with yellow streaks	Irregularly shaped	3	1	1	1	--	1
Concretionary iron, red-black	Rounded piece	1	--	--	--	--	--
Concretionary iron, red-black, fossil bone cast	Fragment	--	1	--	--	--	--

magnetite . . .” (Lovering 1929:222). In the Casper Mountain area, magnetite appears to be common and locally is intergrown with or rimmed by hematite (Gable et al. 1988:12). Magnetite can oxidize into hematite and vice versa. The specimen from the site appears to be in a state of transformation into one or the other.

CONCRETIONARY IRON (INCLUDING FOSSIL CAST)

Concretionary iron, including concretions formed around fossils, is common in Upper Cretaceous and Lower Tertiary sedimentary rocks of Mesaverde Group (Gill et al. 1970). Several of these pieces are wind polished and are probably derived from interior basins such as the Hanna/Carbon Basin after having been eroded from geological strata and exposed to weathering. Given the Garrett Allen site is nearly surrounded by strata of the Mesaverde Group, fragments of concretionary iron have likely eroded into and become incorporated into the archaeological deposits. Some of these rocks, especially those not wind polished, may not be cultural items.

The wind polished concretionary iron pebbles are likely manuports and exhibit a dull greenish brown color superimposed on a tan/yellow background of the parent sandstone. Most appear to be unmodified in any way. However, one of these specimens found at a depth of 6 inches (Figure 10, left) appears to be highly polished as if from rubbing in the hands or fingers.

MAMMALIAN FOSSILS

Three fossil mandible fragments (Figure 11b-d), one of which retained well preserved teeth, were found at the site. All were recovered from the ground surface. They are identified as belonging to the Order Condylarthra, small to medium sized ungulates from the Paleocene to Eocene eras (Kelli Trujillo, Uinta Paleontological Associates, personal communication, May 5, 2014). In Wyoming, condylarth fossils can be found in the Hanna formation, which outcrops to the east and northeast of the site at the eastern edge of the Hanna/Carbon Basin.

Also recovered from the surface are a probable fossil turtle carapace fragment (Figure 11a), and a fossil carpal and phalanx (Figure 11e-f) appearing to be from a medium sized ungulate, similar to condylarth taxa from the Paleocene to Eocene Hanna formation (see Secord 1998). The condylarths of the Order Condylarthra are described as ungulates of a primitive character (Romer 1966), which appear ancestral to several ungulate orders such as the Artiodactyla (modern deer, pronghorn, bison, etc.), Perissodactyla (horses, rhinoceroses, tapirs), Proboscidea (elephants), Cetacea (whales, dolphins, etc.) and others (Rose 2006). Fossil turtles have also been found in the Hanna formation (Bowen 1918:231).

Figure 10: Wind polished concretionary iron (specimen on left is highly polished, perhaps from purposeful rubbing).

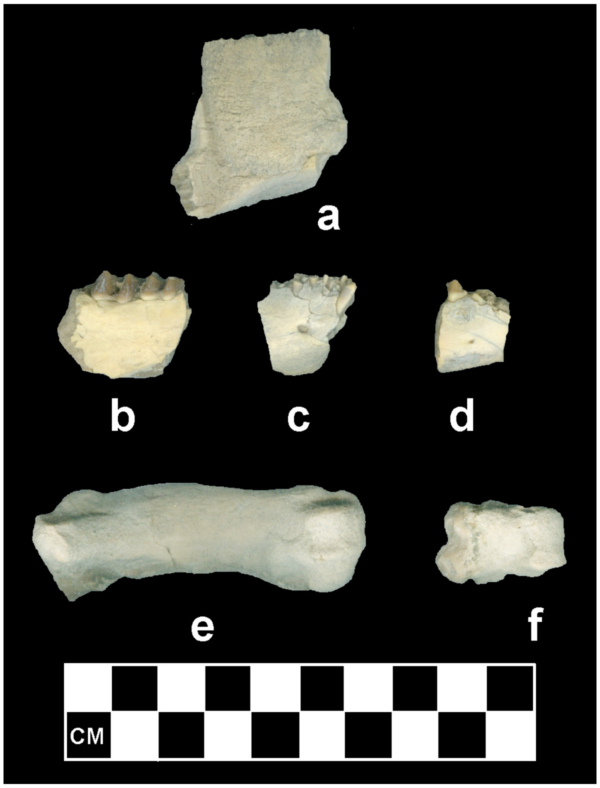

Figure 11: Fossil bone fragments.

A small amount of the original matrix still adheres to these fossils. It consists of white unconsolidated fine-grained sandstone. A nearly identical white sandstone irregularly shaped rock containing what appear to be fossil bone fragments was also recovered from the surface of the site.

The Mesa Verde Group of rocks surrounding the Garrett Allen site is of marine origin and contains only marine fossils (Bowen 1918). The mammalian fossils collected from the site were brought in by human agency from other locations, possibly from Hanna formation outcrops in the Hanna/Carbon Basin area.

A single fragment of fossilized bone was found at a depth of 8-12 inches below surface in one of the units excavated by Hayter (1981) for his soils analysis. It is considerably eroded, but retains some of the cortical bone and spongy interior. It appears to be a fragment of long bone of a medium to large sized animal but there are insufficient characteristics to determine if it is mammalian, reptilian, or other animal type. This fossil also appears to be a manuport. It is unclear if it has been modified, but there may be some smoothing/abrasion on its ends.

FOSSIL WOOD

One gray-blue mudstone fragment of possible fossil wood was found at 24 inches below surface. This is possibly from mudstone facies containing peat-like deposits within the sequence of Mesaverde group of marine sedimentary rocks, including the Allen Ridge, Pine Ridge Sandstone and Almond formations (Dereume 2010:66). The Pine Ridge sandstone nearly surrounds the site (Hayter 1981). The fossil wood fragment may, therefore, be locally derived from the sedimentary rocks surrounding the site.

One angular specimen of poor grade subbituminous coal which is almost certainly a fragment of fossil wood was found at 44 inches below surface. Bituminous and subbituminous coal deposits are present in the Paleocene age portions of the Ferris and Hanna formations in the Hanna and Carbon basins (Dobbin et al. 1929; Flores et al. 1999). These deposits are relatively close to the site, although coal deposits are found throughout Wyoming.

DISCUSSION

As with the chipped stone raw materials (Eckles and Guinard 2015), the rock specimens presented here could have been derived from several sources both relatively near and considerably distant from the Garrett Allen site. A few of the items discussed above were likely tools of various kinds (e.g. the corner tang bifaces, atlatl weights, some of the quartz artifacts), or possible decorative items (baked shale pendant, bored sandstone rock, incised sandstone slab). The soft sedimentary rocks and hematites could have been acquired to produce colorings for paints or other purposes.

The presence of what appears to be an unusually large number of quartz artifacts, quite a few small unmodified rounded and irregularly shaped stream pebbles, irregularly shaped petrified wood and concretionary iron rocks, minerals, fossils, and the large notched biface and conch shell (assuming their association with a burial) could be argued to be associated with ritual activities. Data on certain small stones and fossils compiled from ethnographic studies of Plains and Rocky Mountain groups is presented (Table 9). Many of these groups prepared ritual bundles of various kinds which often included the kinds of stones found at the Garrett Allen site. An archaeological example of a possible shaman's

Table 9: Selected Plains and Rocky Mountain Ethnographic Data on Ritual Use of Rocks and Fossils.

GROUP	MEDICINE OR OTHER BUNDLE	OTHER*	ROCK/FOSSIL TYPE	REFERENCE
Arapaho	X	X	Quartz	Gill (1983)
			Irregular pebbles	Kroeber (1983:440-443)
Kiowa	X		Quartz	McAllister (1965)
	X		Rocks (unspecified)	Hanson (1980:203)
Crow	X		Irregularly shaped rocks and fossils,	Hanson (1980:203); Wildschut (1975)
	X		Round stream cobble	Wildschut (1975)
Cheyenne	X		Quartz	Grinnell (1926:179)
	X		Rocks (unspecified)	Hanson (1980:203)
		X	Minerals and quartz	Albers (2003:941-943)
Shoshone		X	Fossil shells	Shimkin (1947)
Blackfoot	X		Ammonites and baculites	Wissler (1912:243)
Nez Perce		X	Irregularly shaped rocks in bold colors	Spinden (1908:260)
Piegan	X	X	Fossil shell, coral, ammonites, baculites;	Curtis (1911:60); Mayor (2005)
			Minerals	Mayor (2005:291)
Teton Sioux (Lakota)	X		Round stream cobble and quartz rocks	Densmore (1992:206)
		X	Minerals and quartz	Albers (2003:941-942)
Gros Ventre	X		Rocks (unspecified)	Hanson (1980:203)
Mandan/Hidatsa	X		Fossil cephalopod, Baculites	Pepper and Wilson (1908:304); Wood (1971)
Arikara	X		Rocks (unspecified)	Hanson (1980:203)
Plains Cree	X		Rocks (unspecified)	Hanson (1980:203)
Pawnee	X		Smooth rocks	Linton (1923)

*Other uses include personal spiritual items, decorative items, and other ritual use not associated with bundles.

bundle from northeastern Utah dated to 400-600 years before present contained small stones and red ochre among a variety of floral and faunal remains (Gough 2002:4).

Quartz has been referenced often and widely in the New World as both a source for tool stone and for ritual use. As Whitley et al. (1999:221) have stated, "… quartz, the most common mineral on earth, is almost universally associated with shamans…" Throughout the Americas, shamans carried prismatic quartz crystals (Miller 1983:81). Perhaps the most extensive research on quartz artifacts is from California archaeological sites dating from about 6500-1500 years before present (Gibbon 1998:697). Elasser (1961:41) discusses quartz crystals as well as minerals and oddly shaped pebbles found in California, Nevada and Utah sites thought to be evidence of shamanism. There are also ethnographic accounts of the ritual use of quartz in the California literature (e.g. Hohenthal 1950; Hopkins et al. 2012; Levi 1978; Miller 1983; Sapir 1908, Whitley et al. 1999). Compared to the California evidence, little has been written about quartz use among Plains or Rocky Mountains prehistoric groups.

Reher and Frison (1991) summarized the data on quartz artifacts from Wyoming sites and discussed the use of quartz as tools and ritual items. They mention the few Plains ethnographic sources and detail the numbers of quartz artifacts in the Wyoming sites. Clearly, quartz was sought out by prehistoric Wyoming groups and throughout the Americas for both ritual use and tool manufacture.

References to the use of minerals in prehistory has often been in regard to the extraction and use of hematite. Both earthy hematite (red ochre) and specular hematite have been found in Wyoming Paleoindian sites which include probable residential locations, caches and burials (Stafford 1990; Stafford et al. 2003) and one site from which the mineral was mined (Tankersly et al. 1995; Frison et al. 2018; Pelton et al 2022). Several Wyoming and adjacent states Paleoindian sites contained various amounts of the mineral which has been associated with possible ritual (Stafford 1990:9). Its use in later periods was apparently not as extensive as in the Paleoindian period and is often associated with burials (Stafford 1990:11). Stafford (1990:12-18) presents an extended discussion of the ritual uses of hematite both ethnographically and archaeologically. It possible the Garrett Allen site specimens of earthy hematite, specular hematite, and possibly magnetite with hematite were brought into the site for ritual purposes.

Small stones of both rounded and irregular shapes, fossils, minerals, concretions and other chipped stone artifacts (e. g. projectile points) have been mentioned in some ethnographic studies. They were collected and kept in personal and group bundles or pouches, possessing spiritual qualities attractive to the individual or group.

> …the attention to and esteem of fossil bones would appear to be behavior comparable to that involved in the placing of various unusual and mysterious objects such as crinoids and other fossils, concretions, petrified wood, and other such items in medicine bundles. The practice has, of course, been recorded for many tribes, and for some archaeological cultures the placing of such objects in burials has been noted … (Jones 1942:163).

Nearly all of the fossils collected by the groups listed (Table 9) are invertebrates. The use of vertebrate fossils is not as well represented in the literature although Mayor (2005) discusses a small number of mammalian taxa collected for medicinal and ritual use. The Garrett Allen site fossils include only vertebrate specimens and fossil wood.

An artifact cache containing large flakes and large minimally chipped tools was discussed in Eckles and Guinard (2015). Source areas of the lithic raw materials include southwestern and east-central Wyoming. This cache may have been created with the idea of returning to the site to retrieve high quality raw materials for processing at a later time. Given its location near the site's spring, it could have been intended as a ritual offering. Claassen (2015:168-169) details the possibilities some stone tool caches, especially those placed in rocky outcrops, elevated places and springs, were most likely ritual offerings.

The exotic ceremonial biface and marine shell suggest exchange far from Wyoming.

The presence of quartz crystals, small rounded and irregularly shaped stones, fossils, concretions, unmodified petrified wood rocks, minerals, etc. at the Garrett Allen site is suggestive of their use in ritual activities. The numbers of these artifacts, especially quartz, is further suggestive of more than the "usual" amount of ritual activities could have been carried out at the site. This could have to do with the number of participants gathered at the site, or because the site was by itself a location of special ritual significance.

Likely source locations for the rock specimens discussed here include the areas near the Garrett Allen site such as the Saratoga Valley, Hanna/Carbon Basin, North Platte River drainage, and Medicine Bow Mountains. At greater distances from the site, likely sources for specific rocks include the Powder River Basin, Laramie Basin, south-central and southwestern Wyoming basins, central, southeastern and north-central Wyoming mountain ranges, and the Hartville Uplift of east-central Wyoming. The diversity of source areas represented by the rocks discussed here mirror those of the chipped stone raw materials (Eckles and Guinard 2015). There is a high diversity of stone raw materials which entered the site from several directions, many relatively near and some from quite far away. These data support the idea the site represented a special place gathering for interaction, exchange and ritual activity.

ACKNOWLEDGMENTS

Many thanks to Jody Clauter and Mark Lane of the University of Wyoming Archaeological Repository who were of great assistance with the 48CR301 collections and associated field and lab documents. Jody also contacted colleagues in Ohio and Wisconsin regarding the large notched biface. Kelly Trujillo of the University of the Wyoming Geology Museum (currently with Uinta Paleontological Associates) identified the mammalian fossil remains. Wayne Sutherland of the Wyoming State Geological Survey identified the rock types of the mineral specimens, atlatl weights, baked shale pendant, concretionary iron specimens, and wind polished (desert varnished) rocks. Richard Adams of the University of Wyoming Anthropology Department examined the steatite artifact and suggested its function and possible source areas. George Frison and Mark Miller provided their recollections of the context of the two corner tang bifaces and large notched biface. Thanks to John Laughlin of the Wyoming SHPO for directing the author to references on the "gray ghost" phenomenon. Funding for one radiocarbon date was provided by the Office of the Wyoming State Archaeologist.

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