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# Analyses of Household Artifacts from Rattlesnake Cave (35LK1295), A Site in the Chewaucan Basin of Southeast Oregon

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*Rattlesnake Cave is located on the western shore of Lake Abert in the northern Great Basin of southeast Oregon, one of hundreds of archaeological sites in the Lake Abert/Chewaucan Basin. The site was dug by collectors in the 1950s, and recovered materials were donated to the Fort Rock Valley Historical Society and Homestead Museum in the early 1990s. We analyze 77 artifacts in the assemblage, which includes cordage, basketry, moccasins, as well as wood, bone, and stone tools. We report new radiocarbon ( $^{14}\text{C}$ ) dates for the site, and the results of energy dispersive x-ray fluorescence (EDXRF) on one basalt and nine obsidian bifaces, matching their chemical signatures to regional geologic sources. We discuss the place of Rattlesnake Cave in the broader context of the northern Great Basin while demonstrating how museum collections may contribute to addressing anthropological research questions.*

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**N**G. SEAMAN, A PROLIFIC ARTIFACT COLLECTOR and author of *Indian Relics of the Pacific Northwest*, visited a small rockshelter in the 1940s on the west side of Lake Abert in southeast Oregon that he called Rattlesnake Cave (Fig. 1; Seaman 1946:143). He did not dig at the site, but found a wrapped twig artifact that was later donated, with the rest of his vast collection, to the State Museum of Anthropology at the University of Oregon (Fig. 2).

During the summer of 1950, while on a family artifact-collecting vacation, Theodore (Ted) and Willamina (Willi) Weld noted this small cave on the west shore of Lake Abert, and in a short hand-written memoir, recalled that “we decided to work the cave a little while” (Weld and Weld n.d.). They excavated the cave interior, then returned to the site (35LK1295) in 1958 to excavate the boulder-enclosed platform in front

of the cave. Excavation of the cave interior in 1950 was apparently uncontrolled (the memoir that accompanied the collection reported that “the deposits were not removed by layers, nor were artifacts cataloged by depth or location”); although “more detailed records [were] made” during the 1958 visit, these records did not accompany the donated materials.

In 1997, Suzanne Orr, the Weld’s daughter, donated the Rattlesnake Cave materials to the Fort Rock Homestead Museum in Lake County, Oregon. The Welds provided a written recollection of the 1950 and 1958 visits to the site; mention was made in this document of field notes written at the time of the excavation, but these notes did not accompany the collection.

The materials were originally taken from land administered by the Bureau of Land Management (BLM), which elected to maintain the collection at the

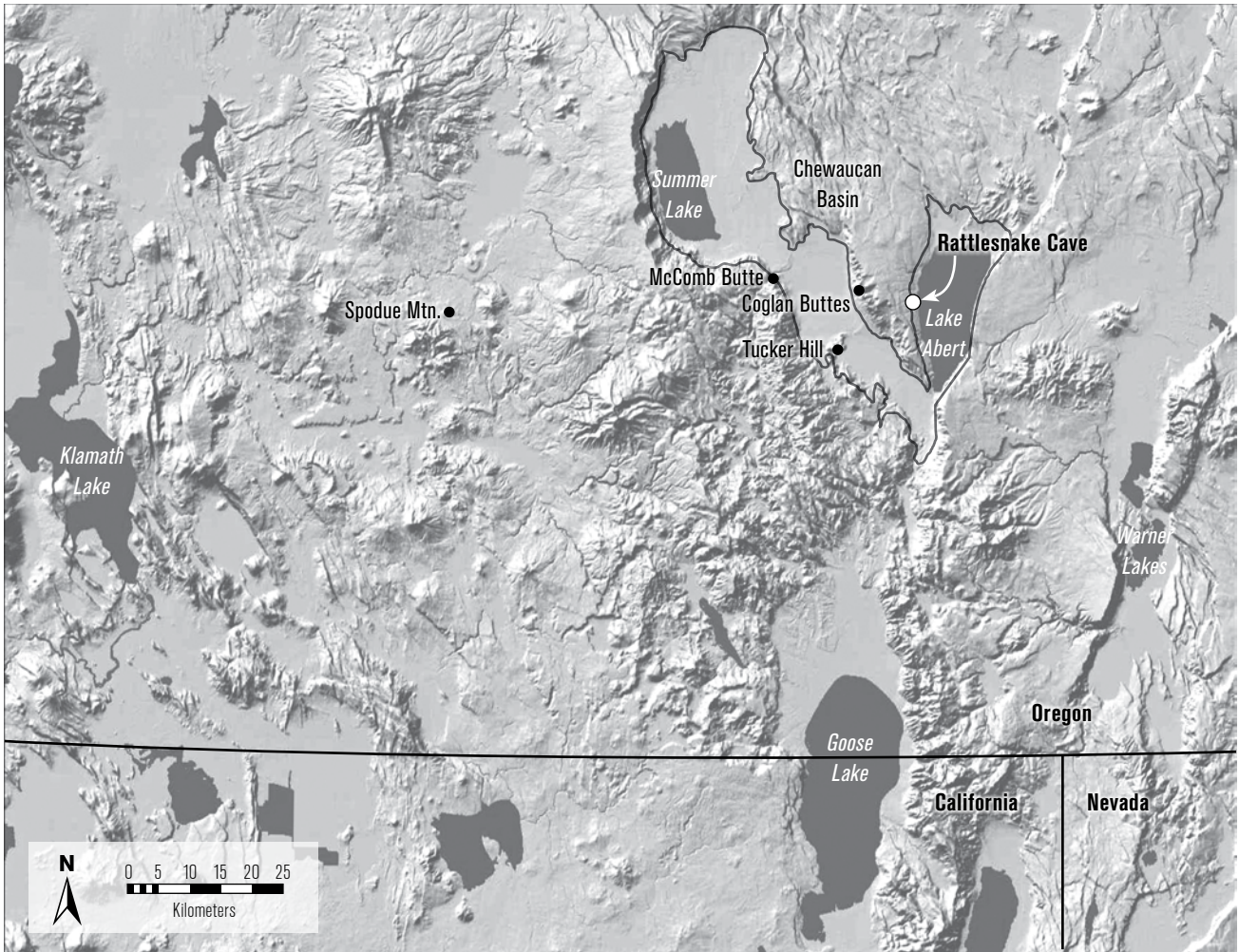


Figure 1. The approximate location of Rattlesnake Cave and known obsidian sources.



Figure 2. The wrapped twig artifact recovered by N. G. Seaman (which he called a “seed beater”) in the 1940s (UOMNCH).

Fort Rock Museum, and provided a secure display case to house it. The donated collection consists of 77 bone, antler, basalt, marine shell, obsidian, wood, leather, tule, and grass artifacts. Perishables are the major constituent of the assemblage, with 50 basketry fragments, two leather footwear fragments, and seven wooden artifacts. There was no inventory made of the original collections,

but it is certain that items are missing; for example, the notes mention 61 projectile points, while the donated materials include just eleven chipped stone artifacts of all types, only three of which can be classified as projectile points. Despite the missing artifacts, the analyzed collection provides significant information regarding the cave’s occupation.

We describe the site and the donated lithic and fiber artifacts currently held at the Fort Rock Museum. We also provide four  $^{14}\text{C}$  dates for the site, as well as geochemical analyses for 10 of the lithic artifacts. We then discuss the site's significance within the context of northern Great Basin anthropology.

### CULTURAL CONTEXT

The northwest Great Basin has been inhabited by humans for over 14,000 years (Gilbert et al. 2008; Jenkins et al. 2013). The Lake Abert-Chewaucan Marsh Basin has a record of occupation spanning the Holocene, and—primarily during the late Holocene—supported a large and sedentary population (Oetting 1988, 1989; Pettigrew 1980, 1985). Pettigrew (1980, 1985) reported previous research conducted along twelve miles of Abert's east shore that identified 21 village sites with housepit depressions (up to 390 individual dwellings) and 51 circular rock-walled houses. Cannon (1977) reported an additional nine sites with at least 20 house depressions and 13 rock-ring houses along the lake's west shore. Surveys of the Chewaucan Marsh Basin identified 43 more sites with 168 house depressions and nine rock-ringed houses (Oetting 1988, 1989; Oetting and Pettigrew 1985, 1987). Oetting (1989:Appendix A) also described a previously unreported excavation conducted by Luther Cressman in 1939 of three housepits and several burials on the edge of Chewaucan Marsh. A great range of chipped stone tools, fragments of bucket-shaped stone mortars, portable and bedrock metates and mortars, bone and shell beads, and common rock art, is associated with the Chewaucan Basin sites, indicating the presence of a substantial, sedentary population. The archaeological complex resulting from this significant concentration of home sites and larger village communities located in an area that was only ephemerally occupied at the time of Euroamerican contact was named the Chewaucan Culture by Pettigrew (1980, 1985). While several small caves and rockshelters are present on the lake's east side (Connolly 1988; a fragment of netting from one dates to ca. 1,500 years ago, and a Catlow Twine basketry fragment from the other dates to ca. 600 years ago), Rattlesnake Cave is the only reported rockshelter on the lake's western shore.

Oetting's chronological analysis (1988, 1989) indicated that residential structures were present throughout

the basin during at least the last 4,000 years, and were most abundant during the last ca. 2,000 years. The archaeological record for the Chewaucan Basin parallels evidence from other northwestern Great Basin sub-basins where substantial sedentary village communities have been described in extant or former lake-marsh settings (Jenkins 1994; O'Connell 1975; Oetting, 1990, 1999; Weide 1968). Based on habitation structure forms and diagnostic artifacts, the Chewaucanians and their neighbors in adjacent basins are thought to be ancestral to the lake-side dwelling Klamath of historic times (Cressman 1942; Eiselt 1997; Oetting 1989, 1990; Pettigrew 1980; Weide 1968). The Klamath are thought to have retreated to the better-watered Klamath Basin during late pre-contact times (Connolly and Jenkins 1997).

### ENVIRONMENTAL SETTING

The Lake Abert Basin exhibits classic basin and range physiography, formed by the tilting of massive fault blocks with a steep escarpment on the upthrust side and a gentle backslope to the basin sink (Grayson 1993). The Abert Rim escarpment borders the east side of Lake Abert, rising to as much as 2,285 m. (7,500 ft.) from the floor of Lake Abert at about 1,294 m. (4,244 ft.). The toe of the Coglan Butte backslope borders the west shore where Rattlesnake Cave is located.

Lake Abert, Summer Lake, and the now-drained Upper and Lower Chewaucan marshes constitute the remnants of pluvial Lake Chewaucan, which reached its Pleistocene maximum level at ca. 1,378 m. (4,520 ft.). This formed a lake ca. 114 m. (375 ft.) deep, and covering 772 km.<sup>2</sup> (480 m.<sup>2</sup>) of the Abert and Summer Lake basins. The lake level dropped rapidly during the late Pleistocene, falling below the gravel ridge that separates what Allison (1982) called Winter Lake in the Summer Lake basin and ZX Lake in the Lake Abert-Chewaucan Basin. About 13,800 years ago (11,900 RCYBP) water in these basins again rose and coalesced into a single large lake at about 1,335 m. (4,380 ft.), then dropped rapidly to the 1,318 m. (4,324 ft.) and 1,310 m. (4,298 ft.) levels (Allison 1982; Bartruff 2013; Freidel 1993; Liccardi 2001).

Lying within a closed basin, depth and salinity levels have fluctuated throughout the Holocene. In the Neopluvial, corresponding to Neoglaciation in the mountains (perhaps 4,500–2,000 years ago), new and



**Figure 3. View of Rattlesnake Cave to the north-northwest, showing boulder ring at front.**

relatively deep lakes developed in the Summer and Lake Abert basins (Allison 1982). During the twentieth century, the level of Lake Abert has varied dramatically; the Welds reported that in the 1950s the cave was located about 150 m. from the edge of the lake; recent aerial imagery indicates that while there are clear shoreline features near the site, the water's edge is now over four miles distant, due to recent years of low precipitation.

It is likely that such dramatic short term events have occurred many times in the past. During events of low water, a series of fresh water springs are exposed along the edges of the lakebed. These springs will produce small streams flowing out onto the dry lakebed and create small marshy corridors that attract game. There are Tui chub populations at a spring at the north end of the lake and in the Chewaucan River that feeds the south end of the lake, but the lake itself is too alkaline to support fish. When the lake is high enough to cover the springs, waterfowl congregate at the spring outlets.

Rattlesnake Cave is a shallow cavity in the east face of a tufa dome (porous calcium carbonate,  $\text{CaCO}_3$ ) on the west shore of Lake Abert (Fig. 3). Exposed rocks along

the lakeshore are encrusted with relatively thick deposits of  $\text{CaCO}_3$ , resulting from its precipitation in the highly saline lake (Kalf 2002), where warm water discharged from vents in the regional fault system formed mounds of tufa upon mixing with cooler lake waters (Bartruff 2013).

Bartruff (2013) found that tufa mounds at the north end of Lake Abert appear to be mostly associated with a terminal Pleistocene 1,310 m. (4,298 ft.) shore; a smaller set (Group A1) appears to relate to a higher 1,318 m. (4,324 ft.) lake stand. The Rattlesnake Cave tufa mound (not included in Bartruff's study) appears to be associated with the higher shoreline. Group A1 mounds are generally large (4–10 m. in diameter, 2–3 m. high) ridges that overlie a low, gently sloping travertine (dense, hard carbonate) platform that was likely part of an earlier mound-building phase. All Group A1 mounds have relatively flat tops with locally overhanging steep sides, possibly due to subsequent undercutting by erosional processes. The Group A1 mounds were formed subaqueously, and would have required a lake stand above about 1,318 m. (4,324 ft.). Based on morphology and geochemistry, Bartruff (2013) concludes that Group A1 mounds probably formed



**Table 1**  
**RADIOCARBON AGES FROM RATTLESNAKE CAVE**

<sup>14</sup> C Age	Lab No.	δ <sup>13</sup> C	Cal. Age B.P. <sup>a</sup>	Dated Item	Specimen No.
395 ± 50	AA-30373	-26.1‰	495 – 350	Catlow Twine with overlay	RS10
620 ± 50	AA-30374	-25.0‰	650 – 565	Leather moccasin fragment	RS52
1,655 ± 45	AA-30372	-26.3‰	1,620 – 1,495	Multiple Warp sandal	RS51
2,128 ± 27	DAMS-7239	-29.8‰	2,145 – 2,065	Open twining, Zss cord warp & weft	RS1

<sup>a</sup>Calibration using the Cologne Radiocarbon Calibration Research Package, showing 1σ error range.

under highly evaporative conditions during a relatively rapid lake regression. He concludes that the Group A1 mounds were probably formed when the gravel ridge between the Summer Lake and Chewaucan basins was breached between ca. 13,900 and 13,600 cal B.P. (Friedel 1993; Licciardi 2001), which lowered water in the Lake Abert Basin to the 1,310 m. (4,298 ft.) lake stand.

#### SITE DESCRIPTION

Rattlesnake Cave, facing Lake Abert to the east, measures about four meters across at the mouth and is about 3.5 m. deep. The roof is only about 1.2 m. high at the mouth. The front of the small cave is surrounded by a perimeter semi-circular wall of stone, the inside of which is about 2.5 m. from the front of the cave and about 5.5 m. from side to side. The perimeter wall contains some bedrock outcrops, but consists primarily of placed boulders. Additional cobbles and boulders are present on the ground along the perimeter, both inside and outside the ring, suggesting they were toppled from their perimeter position. More than 70 stone-ringed house features have been recorded in the Lake Abert/Chewaucan Basin (Cannon 1977; Oetting 1988, 1989; Oetting and Pettigrew 1985, 1987; Pettigrew 1980, 1985). The stone rampart in front of Rattlesnake Cave appears to represent such a house wall, with the distinction being that it was built to incorporate the Rattlesnake Cave tufa cavity as part of the structure.

The Welds reported that in the 1950s the cave was located about 150 m. from the edge of the lake; recent aerial imagery indicates that while there are recent shoreline features within 200 m. of the site, the water's edge is now over four miles distant, due to low precipitation in recent years.

During their 1950 excavation, the Welds found the bedrock floor of the cave to be up to 1.5 m. deep. All materials were screened using quarter-inch hardware cloth; the matrix included mostly vegetable material, with smaller percentages of artifacts and a few hearthstones. Artifacts tended to concentrate around the several hearths noted inside the cave.

#### THE RATTLESNAKE CAVE ARTIFACTS

We catalogued the 77 artifacts in the extant collection, including well-preserved cordage, basketry, bone, leather, marine shell, and lithic artifacts. Four Rattlesnake Cave artifacts have been directly <sup>14</sup>C dated (Table 1). Three <sup>14</sup>C dates were produced in the 1990s including 620 ± 50 RCYBP on a leather moccasin fragment, 1,655 ± 45 RCYBP on a multiple warp sandal made of tule stems, and 395 ± 50 RCYBP on a decorated twined basketry fragment. In 2014, we dated one additional basketry artifact from the site, producing an accelerator mass spectrometry (AMS) <sup>14</sup>C date of 2,128 ± 27 RCYBP. The calibrated age ranges of these artifacts are between 2,145 and 350 cal B.P.

#### Cordage

The fiber assemblage includes 28 s-spun, Z-twist (counter-clockwise) cordage fragments made from split tule stems; these are typically short, ranging from 3.5 to 11.2 cm. long (Fig. 4). All are probably warp trimmings from basket-making. The most common type of basketry in the region is a strong and flexible form made of Zss tule cord warps and Z-twined wefts ("Catlow Twine;" see Cressman 1942:33). Warps radiate from the basket start and are trimmed to the basket rim upon completion. The cordage fragments vary in diameter (ca. 2.0 to 5.0 mm.),



**Figure 4. Cordage. (a) lightly s-spun split tule, bundled with loose Z-twist, probably stored weft fibers; (b–h) Zss split tule, probable basket warp trimmings (RS25–RS32).**

suggesting multiple trimming episodes from baskets of different scale and fineness.

One cordage specimen (RS32) consists of two s-spun split tule strands folded double and slightly Z-twisted to form a loose four strand bundle (Fig. 4a). The looseness of the twist suggests that these strands had been stored for use as weft elements for future basket-making.

Three specimens (RS43, RS45, and RS47) are s-spun, Z-twist cords of whole tule stems, and are therefore more robust (6.3–8.2 mm. diameter) than the more common split-stem cords (Fig. 5c–e). These elements could have been trimmings from robust utility baskets or matting, or cords used for bundle ties or other uses. Specimen RS45 is loosely knotted on itself, in what appears to be a half-hitch type knot.

Two cords (RS20 and RS23) are Szz cords of processed bast, probably either *Apocynum* (Indian

hemp) or *Urtica* (stinging nettle), which were commonly used in the area for strong, flexible fiber, most commonly used for netting (Fig. 5a–b).

This pattern—Zss cordage for basketry and matting, and Szz cordage for fine string used for netting—is characteristic of the northwestern Great Basin (Connolly 1994; Connolly et al. 2014). The pattern is noteworthy and remarkable in its consistency, and suggests possible gender traditions in the production of these different functional classes (cf. Fowler 1992).

### *Basketry*

Sixteen fragments of twined basketry, representing baskets, matting, and a single sandal, can be grouped into five structural types.

*Type I: Open twining with cord warps and wefts.* Specimens RS1, RS2, and RS3 are open-twined basketry



**Figure 5. Fine Szz cords of processed fiber bast, probably *Apocynum* or *Urtica*; (a: RS23; b: RS20). Robust Zss cords of whole tulle stems (c: R43; d: R45; e: R47).**

fragments made with relatively robust tulle Zss cord warps and pairs of Zss tulle cords for wefts (Fig. 6). This makes for a relatively coarse structure that was probably large, flexible, and sturdy.

Fragments RS2 and RS3 appear to be from near basket bases, as in both pieces additional warps have been added to accommodate the expanding diameter. On average, wefts are spaced at 1.1 to 1.2 cm. (from weft center to weft center), and warps are typically spaced at 0.6 to 0.7 cm. (about 14–17 per 10 cm.). Specimen RS2 is slightly more robust than RS3, suggesting that they are not from the same basket.

Specimen RS1 is slightly more robust than RS2 or RS3; it has been blackened by charring. Part of this fragment is simple twined, like RS2 and RS3, and part is diagonally twined. This is a basket wall fragment, as warps are not being added to expand the basket diameter. The diagonal twining may be a decorative band added near the basket's upper rim. To produce the diagonal twining, warp cords were added along the top weft row of the simple twining, and the Zss cord warp pairs were Z-twisted together; at the next weft row the two Zss cords were separated, twined separately into the

weft row, and then recombined with adjacent warp cords using a Z-twist. This specimen was radiocarbon dated to ca. 2,100 cal B.P. ( $2,128 \pm 27$ ; DAMS-7239;  $\delta^{13}\text{C} = -29.8\text{‰}$ ).

*Type II: Fine open simple twining.* This type is represented by a single specimen, RS4. It is about two centimeters wide and six long, using small diameter reeds (sedges). The warps appear to be trimmed along the outer weft rows, suggesting that this may be a fragment of a long narrow structure, such as a carrying strap or belt (Fig. 7a). Wefts are spaced at 0.7–0.8 cm., and warps average 16 per 3 cm.

*Type III: Close diagonal twining.* Three specimens of this type are represented, RS5, RS6, and RS12 (Figs. 7b–d). These are probably basket wall fragments. Warps and wefts are split tulle stems. At each weft row, paired warps are split and each element is rejoined with adjacent elements. For RS5 and RS6, wefts occur at about 0.5 cm. intervals, warps average eight per 3 cm. Specimen RS12 is finer, with wefts at about 0.2 cm. intervals and an average of 15 warps per 3 cm.

*Type IV: Catlow Twine.* This distinctive northern Great Basin basketry type was initially described by Cressman (1942:33). This strong and flexible simple



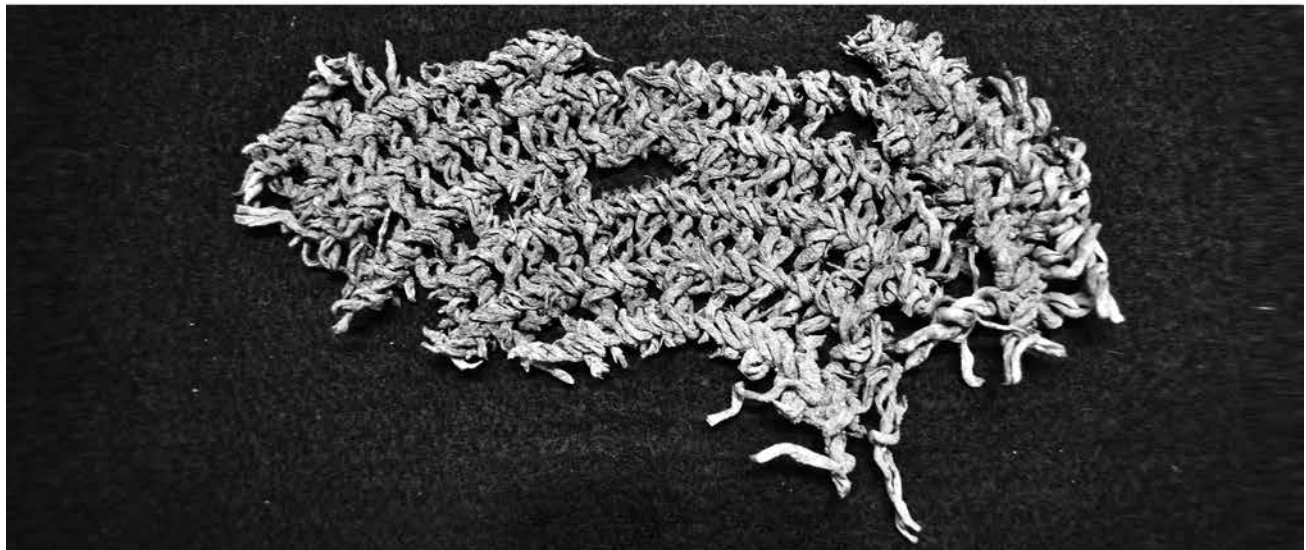
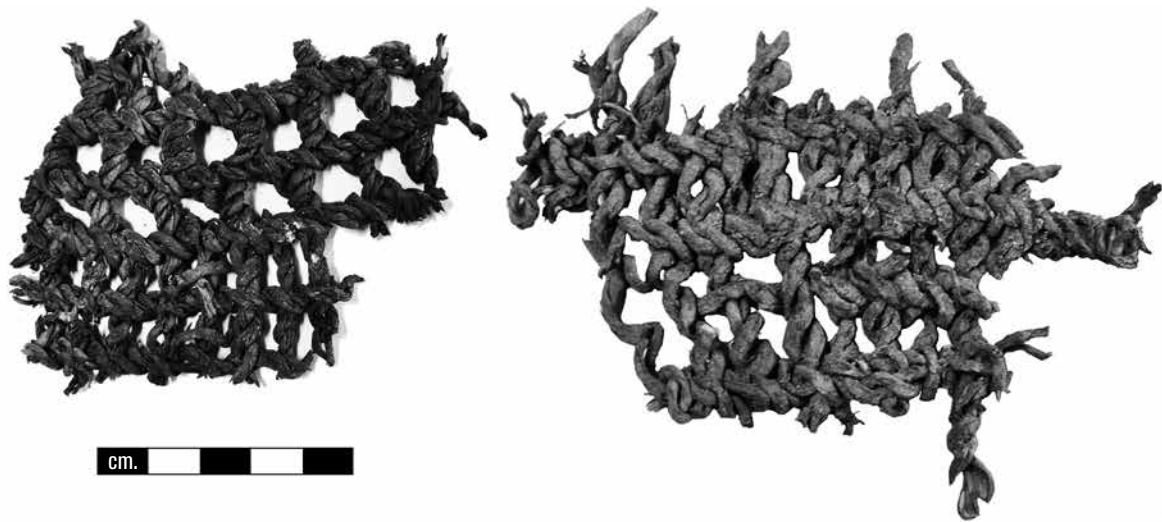


Figure 6. Rattlesnake Cave Type I basketry; clockwise from upper left: RS1, RS2, RS3.

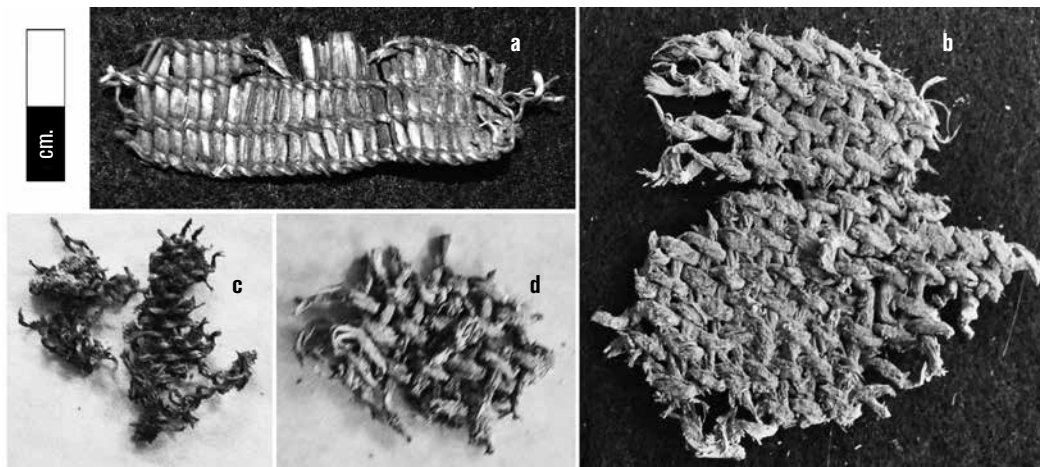
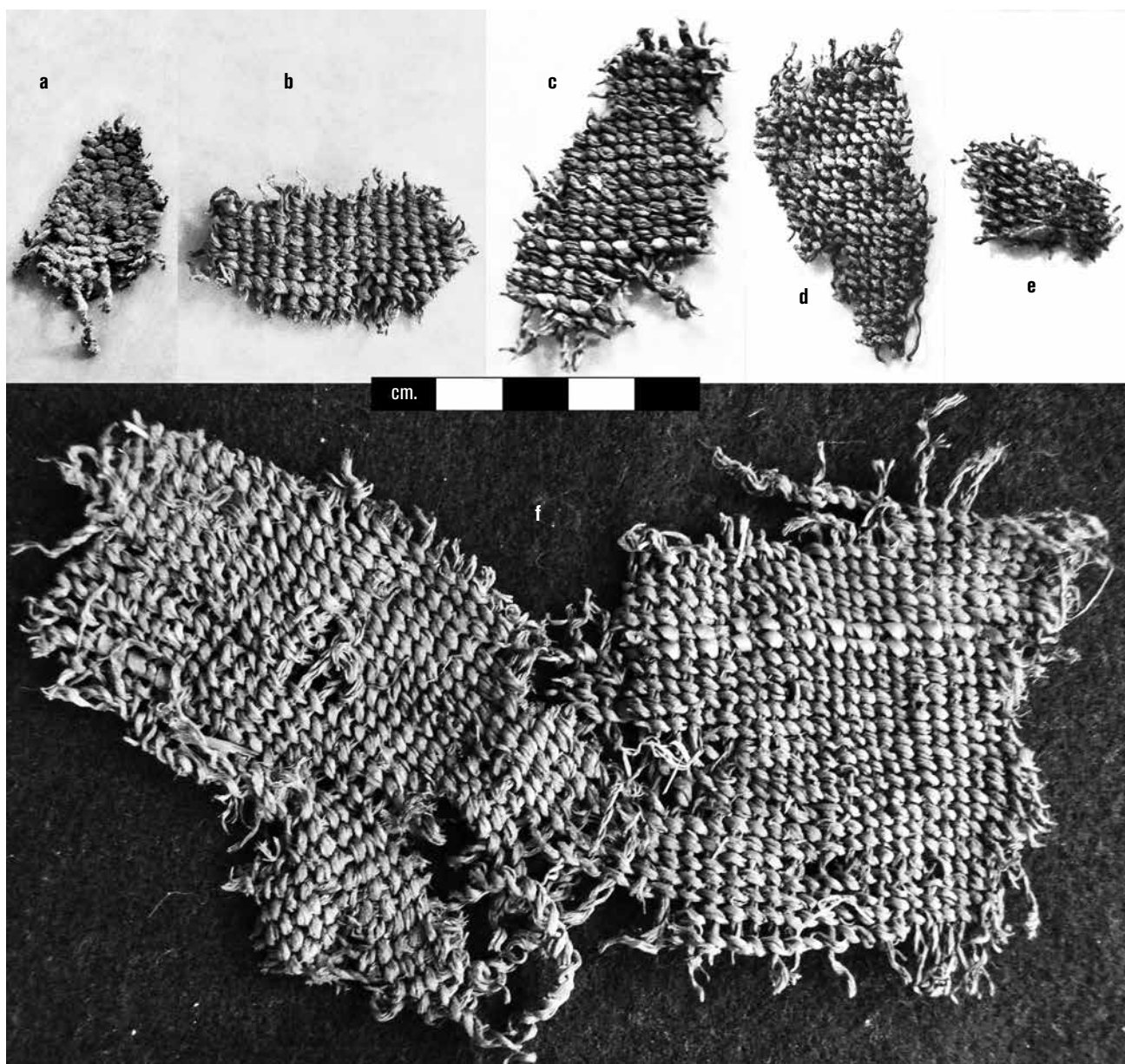


Figure 7. Type II (a: RS4) and Type III (b: RS12; c: RS6; d: RS5) basketry fragments.



**Figure 8. Catlow Twine fragments from Rattlesnake Cave (clockwise from upper left: RS7, RS8, RS9, RS11, RS13, and RS10). Specimens RS8, RS9, and RS10 have decorative overlay.**

close-twined basketry is easily the most common in the region (Fig. 8). Warps and wefts are of split tule stems; warps are Zss cords, and weft is Z-twisted (pitch of weft stitch down to the right). Catlow Twine may be decorated, typically by the addition of overlay or false embroidery fibers.

The Rattlesnake Cave assemblage includes six Catlow Twine fragments. Gauge varies slightly, with warp spacing ranging from 10 to 15 per 3 cm., and weft density ranging from 13 to 19 rows per 3 cm. Specimen RS7 (Fig. 8a) is

probably from near a basket base, as it expands with added warps from one end to the other. The others all appear to be basket wall fragments. Three (SR8, SR9, and SR10) have overlay fibers as decorative additions (Figs. 8b,c,f). One of the decorated fragments (probably RS10; the original submission record has been lost) was <sup>14</sup>C dated to ca. 425 cal B.P. (395 ± 50; AA-30373; δ<sup>13</sup>C = -26.1).

*Type V: Open simple twine matting.* The Rattlesnake Cave collection includes five open-twined matting fragments. Matting could be used for floor coverings and

bedding, space dividers and lodge coverings, wrapping covers for transported bundles, and for clothing such as leggings, skirts, and shawls. All are Z-twined (counter-clockwise twist, with stitches slanting down to the right). Two (RS48 and RS49) are made with whole tule stems, three (RS50, RS75, and RS76) are made with bundled grass.

RS48 is made of whole reed stems (well worn) that are twined with pairs of Zss tule cords. Four weft rows are spaced at 7–10 cm. intervals. It is about 41 cm. long by 21 cm. wide (warp length). It may be incomplete in the long dimension, but the width may be intentional; at one edge, stems are folded to create warp pairs, and the opposite edge appears to have been intentionally trimmed to size.

Like RS48, RS49 is made of whole tule stems (usually paired), and is twined with pairs of Zss cords. Warps have been trimmed at both ends and measure about 28 cm. long. Width is about 22 cm., secured by five weft rows spaced at 8–10 cm. intervals. At the end of each weft row, warp cords were run up the edge, then run up the opposite edge at the end of the next weft row in a continuous back-and-forth run.

RS50 is made of bundled grass warps and bundled grass wefts. Two weft rows are present, about 12 cm. apart; at the end of one weft row the weft cords continue along the edge as a Zss cord, before continuing with the second weft row. Warp length is about 33 cm., and mat width is about 22 cm. One edge of the piece has been charred.

RS75 is also made of bundled grass warps and bundled grass wefts. Warp length is about 40 cm., and warps are trimmed at both ends. Overall length is about 47 cm.; four weft rows are spaced at 9–14 cm. The weft pairs along the top and bottom continue as Zss cords well beyond the edge of the matting, possibly to serve as ties.

RS76 has bundled grass warps and bundled grass wefts. Warp lengths are about 37 cm., secured by four weft rows and a partial fifth; weft rows are spaced at 6 to 8 cm. Overall length is ca. 55 cm.

#### *Multiple Warp Sandal*

One Multiple Warp sandal (RS51) was recovered from the cave (Fig. 9). Initially defined by Cressman (1942; cf. Connolly and Barker 2004, 2008), Multiple Warp sandals have from eight to more than a dozen warps, folded as

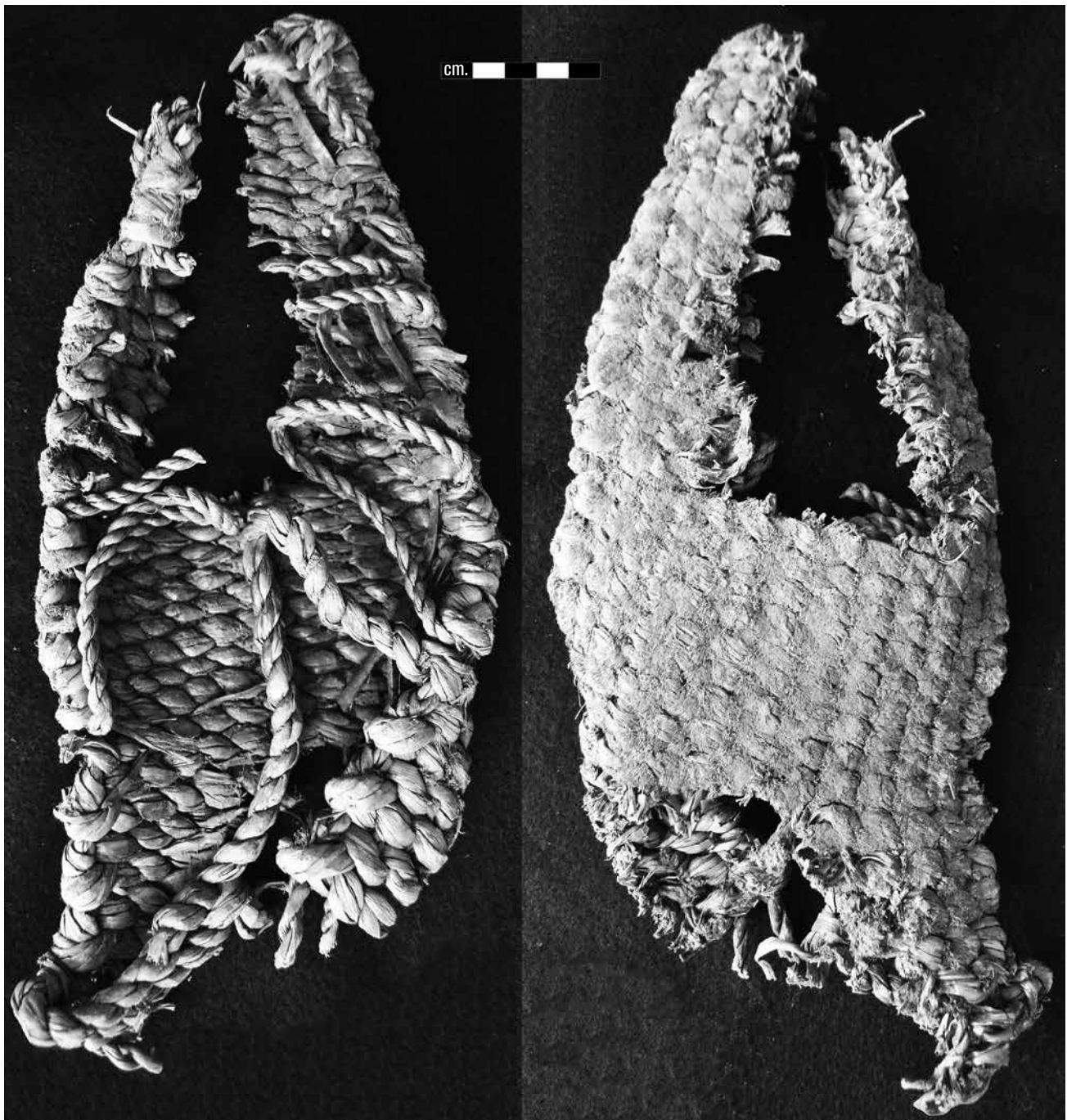
parabolas around the heel to form a heel pocket, and then twined back and forth across the sole to the toe. Tie loops were built into the edge of the sole. Loose warps at the toe were bent back over the top of the foot. A separate cord was then run through the loops and tied across the top of the foot; this pulled the edges of the sole up around the sides of the foot, and secured the loose warp foot cover.

The Rattlesnake Cave specimen has 14 Zss cord warps, and whole tule stem wefts. It measures about 30 cm. long and 13 cm. wide. Edge loops for securing the sandal to the foot are present; as is typical of Multiple Warp sandals, edge loops are formed by extending wefts beyond the edge of the sole, and making a two-ply cord loop before being twined back into the sole; several additional non-weft cord loop ties appear to have been added. Multiple Warp sandals generally have a heel pocket, which is missing on this incomplete example. This sandal was previously <sup>14</sup>C dated to ca. 1,555 cal B.P. (1,655 ± 45; AA-30372; δ<sup>13</sup>C = -26.3).

#### *Leather Moccasins*

Hundreds of fiber sandals, made of woven sagebrush bark or tule, have been found in southeast Oregon caves (Andrews et al. 1986; Connolly 1994; Connolly and Barker 2004, 2008; Cowles 1959; Cressman 1942), but footwear of hide or skin is rare among southeast Oregon artifacts. Beyond the two fragments from Rattlesnake Cave (Fig. 10), the only others reported from an archeological context in this region are described by Cressman (1942), who recovered a hide moccasin and a moccasin fragment from Roaring Spring Cave, about 100 km. northeast of Rattlesnake Cave.

Fragment 1 (RS53) is a repaired moccasin fragment, apparently constructed from five small pieces of leather with the hair left on the interior surface. Only the toe portion remains, but there is enough to indicate that it was stitched up the top of the foot. The thickness of the leathers range from 0.6 to 1.0 mm. Holes are 1.5 to 3.3 mm. in diameter, round to oval in shape, with smooth edges. Spacing between holes varies from 3.2 to 3.4 mm. Leather strips are run through the holes with a flat or running-stitch style. One strip is 2.8 mm. wide and 1.3 mm. thick. Another is 1.1 mm. wide and about the same thickness. A third is 1.8 mm. wide and 0.3 mm. thick. When a thong ends, an overhand knot secures it on the



**Figure 9. Multiple Warp sandal (RS51), top (left) and bottom (right) views.**

outside of the moccasin. A new piece of thong is begun with this same knot. Stitching is missing from about half the holes.

Fragment 2 (RS52) is a repaired front portion of a moccasin consisting of ca. two dozen pieces of leather; one fragment has the hair left on, the rest have no hair. The structure appears to be one that folds around the

sides of the foot with the meeting edges stitched up the top of the foot. Thickness of leather varies from 0.9 to 1.9 mm. Holes are 2.0 to 3.9 mm. in diameter, round, oval, or slit-shaped, with smooth edges. Spacing between holes varies from 4.2 to 5.3 mm. Leather strips are run through the holes to bind the moccasin together. The stitches are flat or running-stitch style. The largest strip is 4.9 mm. wide





**Figure 10. Leather moccasin fragments (RS52 left; both sides of RS53 right).**

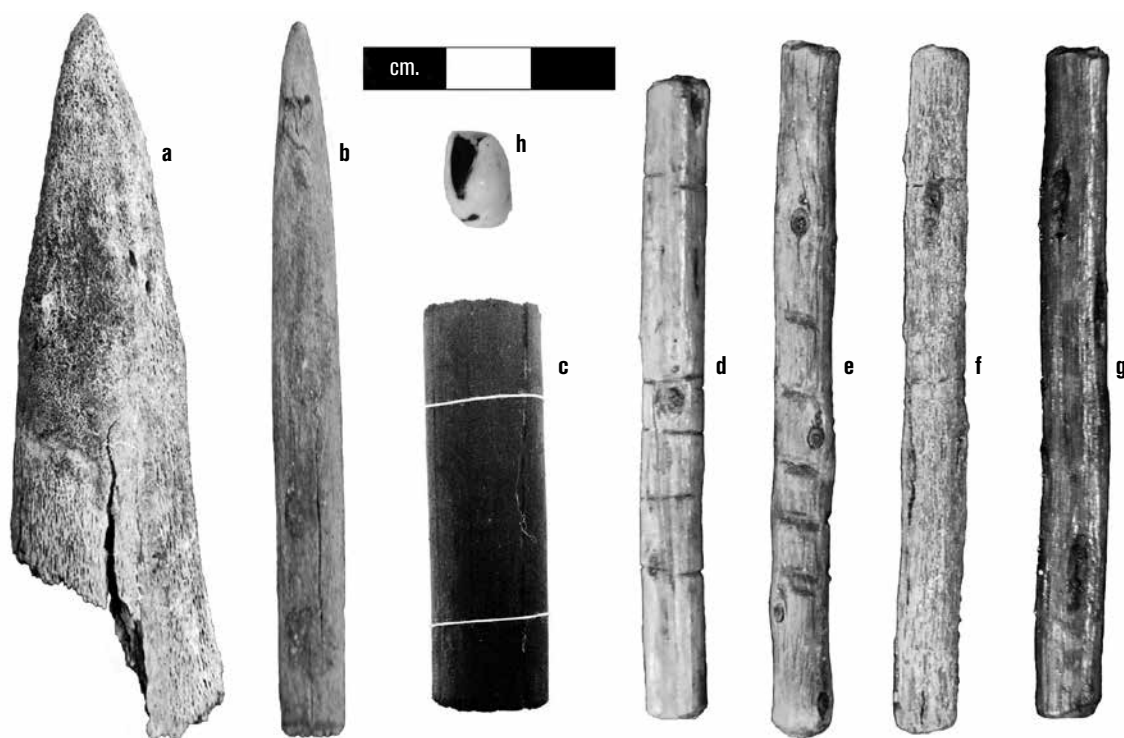
and 1.3 mm. thick. The smallest strip might be sinew and is 1.3 mm. wide and about the same in thickness. It is tied with an overhand knot to another piece that has a similar appearance, and these two elements meet at a 90-degree corner where separate running stitches meet for a repair to the surface of the moccasin. Either at least six leather pieces were stacked to form the sole, or the original sole was repaired five times. Based on a consistent degree of wear among all the visible layers of leather, it appears this moccasin was made with a multi-layered sole. This specimen returned a  $^{14}\text{C}$  date of  $620 \pm 50$  (AA-30374; 1 sigma error/intercept: 650–565 cal B.P.).

#### *Wood, Bone, and Shell Artifacts*

Four wood sticks of essentially uniform size (7.6 to 8.1 cm. long, 0.7 to 0.8 cm. in diameter) in the collection are likely gaming pieces (specimens RS67–RS70; Fig.11d–g). All have been cut to length at both ends. Three are of light-colored wood incised with decorative lines, either encircling rings or slashes on one surface. One stick is of a contrasting reddish wood, lacking decorative incisions.

The tip of a sharpened stick (RS65) in the collection was broken from a larger artifact; this could have been a digging stick tip or some other pointed tool (Fig. 11b).





**Figure 11. Bone, wood, and shell artifacts: a: bone point (RS66); b: wood tool tip (RS65); c: split wood; d–g: gaming sticks (RS70-67); h: Olivella shell bead (RS73).**

Another pointed implement is bone or antler, 8.8 cm. long and about 0.8 cm. wide (RS66).

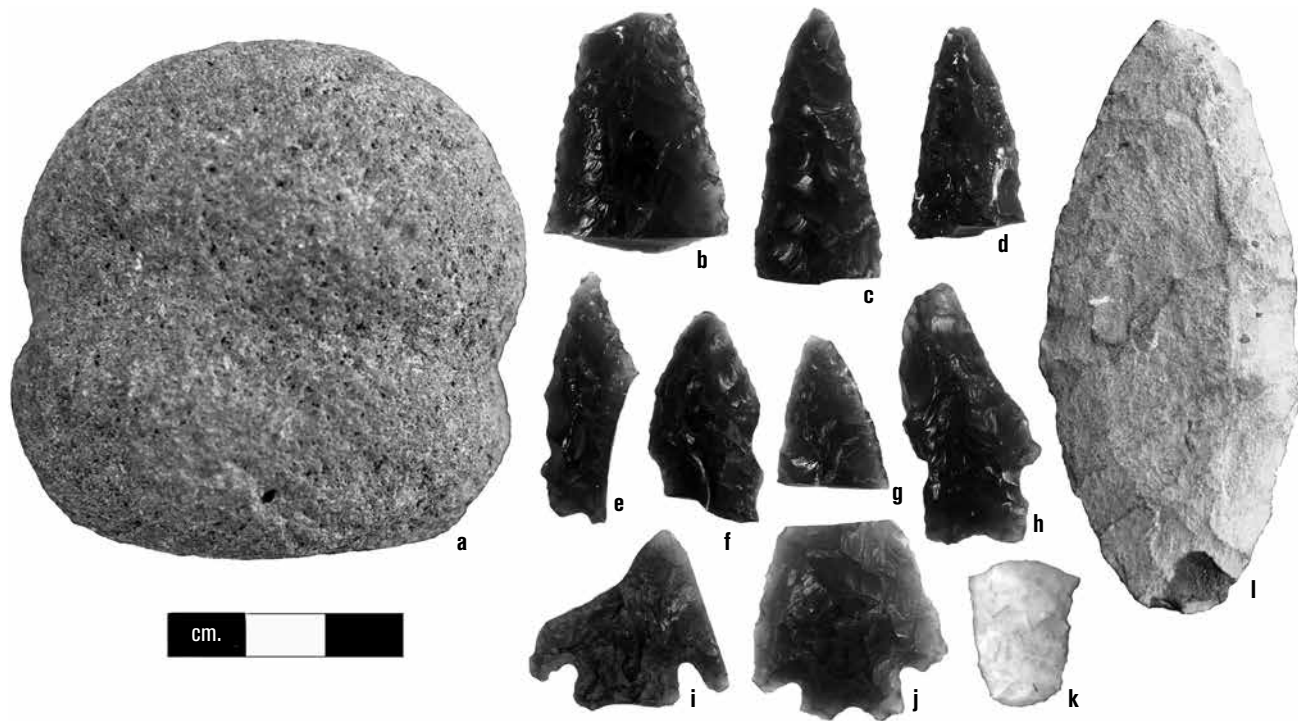
Also present is a single spire-topped *Olivella* shell bead (RS73; Fig. 11h), a mid-sized specimen classed by Bennyhoff and Hughes (1987) as type A1b (6.51–9.5 mm. in width). *Olivella* shell beads occur regularly in the Klamath Basin and adjacent portions of the northern Great Basin, most commonly associated with house floors and burials (Jenkins et al. 2004; Sampson 1985; Tasa and Connolly 1997; Wingard 2001).

#### *Lithic Artifacts and Geochemical Analysis*

The collection includes 13 lithic artifacts, including 11 bifaces (9 obsidian, 1 chert, 1 basalt) and 2 basalt cobble tools (Fig. 12). There are three diagnostic projectile points in the collection, including two Elko Corner-notched and one Large Side-notched point. These points suggest middle Holocene use of the cave. Notably absent are the Desert Side-notched and Rosegate points that—according to the Weld’s notes—were the most common types recovered from the site. The two basalt cobbles include a net weight with girdled mid-section (Fig. 12a) and a modified cobble with two drilled holes

7 and 10 mm. in diameter. This stone shows no other modification or use-wear (pecking or grinding), and may also have served as a net weight.

Ten lithic artifacts, nine obsidian and one basalt, were submitted for geochemical analysis to the Northwest Research Obsidian Studies Laboratory (NROSL) in Corvallis, where they were tested using nondestructive energy dispersive x-ray fluorescence (EDXRF). Each specimen was analyzed using Spectrace 5000 and QuanX ECEDXRF spectrometers to quantitatively analyze several elemental compounds, including zirconium (Zr), rubidium (Rb), strontium (Sr), yttrium (Y), niobium (Nb), and barium (Ba), which are reported in parts per million (ppm). These results were then compared to sources with known geochemical signatures in the region (Skinner 2014). Matched obsidian sources to lithic artifact compositions include Spodue Mountain (n=3), Tucker Hill (n=2), Coglán Buttes (=2), McComb Butte (n=1), and Sugar Hill (n=1). The basalt artifact was from a currently unknown source. With the one exception from Sugar Hill, located in the adjacent Goose Lake Basin to the south, all known sources lie to the west, extending into the Klamath Basin.



**Figure 12. Lithic artifacts: a: Girdled net weight (RS64), b–l: projectile point fragments and other bifaces (b: RS54, c: RS61, d: RS57, e: RS56, f: RS62, g: RS55, h: RS63, i: RS59, j: RS60, k: FS58, l: RS77).**

## DISCUSSION

The Rattlesnake Cave cultural materials were collected during several visits to the site in the 1940s and 1950s, and at least a portion of the recovered materials was subsequently donated to museums. A primary goal of the present study was to make a contribution to anthropological research in the northern Great Basin through analysis of the collection; a secondary goal was to demonstrate the research potential in analyzes of museum collections. Cultural museums are libraries for the preservation of the human heritage; they not only serve as venues for the safe-keeping of the residues of the human endeavor, they also offer much untapped potential for researchers. This study provides a model for giving value to a looted site, and demonstrates the research potential of other poorly-provenienced collections that are presently in museums, or that will find their way to museums in years to come.

The donated Rattlesnake Cave assemblage is small, but is notable for its diversity. In addition to the ubiquitous chipped stone tools, the collection includes both leather and fiber footwear, basketry, net weights,

formed bone tools, gaming sticks, and an *Olivella* shell bead; it is an assemblage that is consistent with a sedentary household. The cave appears to have served as part of a house; although incorporation of a small cave into a domestic structure is unusual for the area, the stone-ringed house form is locally familiar and relatively common in the Lake Abert/Chewaucan Basin and in other nearby basins (Cannon 1977; Oetting 1988, 1989; Oetting and Pettigrew 1985, 1987; Pettigrew 1980, 1985; Weide 1968; Wingard 2001).

The common occurrence of house features in the basin signals a relatively large and sedentary human presence during the late Holocene. The large resident population suggested by the archaeological record did not persist in post-contact times, although regular use of the basin did; John C. Frémont (1970:593) found no resident Indians in the basin in 1843, but observed that “large patches of ground had been turned up by the squaws in digging for roots, as if a farmer had been preparing the land for grain.” The name Chewaucan derives from the Klamath word čwa-ksi, meaning ‘wild potato (*Sagittaria latifolia*) place’ (Barker 1963).

Radiocarbon dates suggest that the site was occupied at least from 2,150 to 350 years ago, a period largely consistent with the predominantly Rosegate point assemblage reported by Weld (but not included in the donated collection). Based on extensive survey and limited excavations throughout the Chewaucan Basin, Oetting (1988) found that most assemblages he analyzed dated within the last 2,000 years, a time consistent with the most visible occupation of Rattlesnake Cave. The presence of a Large Side-notched point, and other “possibly early” points referenced in Weld’s notes, suggests that earlier occupations likely also occurred.

The lithic artifact assemblage is small, but diverse; the broken projectile points suggest hunting, and the net weights indicate fishing. Geochemical analyses indicate that one specimen sourced to Sugar Hill, about 95 km. to the south. All other analyzed pieces were from sources to the west of Rattlesnake Cave, ranging from Coglan Buttes a few kilometers distant to Spodue Mountain about 75 km. away. Although the sample is very small, Spodue Mountain, located in the Klamath Basin, was the most common source.

The Rattlesnake Cave assemblage of fiber artifacts is entirely consistent with others from the northern Great Basin (cf. Connolly 1994; Connolly and Barker 2004; Connolly et al. 1998; Cressman 1942; Eiselt 1997). The most abundant structural type is Catlow Twine basketry; the tule cordage specimens appear to be Zss warp trimmings and a bundle of weft material is consistent construction material for this basketry type. Catlow Twine basketry is characteristic of the baskets made by the Klamath and Modoc into post-contact times.

Other cordage fragments include larger diameter tule Zss cords, possibly tie ropes, and Szz fine string of processed bast fibers, likely either the *Apocynum* (Indian hemp) or *Urtica* (stinging nettle) fibers commonly used for netting. The pattern of Zss cordage for basketry and matting and Szz cordage for netting is characteristic of the northwestern Great Basin (Connolly 1994), and is thought likely to be indicative of gender traditions in the production of these different functional classes (cf. Fowler 1992).

The close diagonal twined basketry fragments (Type III) and the open simple twined matting (Type V) are basketry types well known in the region. The Type I basketry, open-twining made with relatively robust tule

Zss cord warps and pairs of Zss tule cord wefts, is not a common basket form, but the elements of the structure (open simple and diagonal twining, Z-twist wefts, cord warps and wefts) are ubiquitous in the region. A Type III fragment produced the oldest radiocarbon age of the assemblage.

Multiple Warp sandals occur throughout the northern Great Basin, and as far south as the Pyramid/Winnemucca Lake area of western Nevada (Connolly and Barker 2008); they are most similar to ethnographic sandals made by the Klamath (Eiselt 1997).

Most pre-contact footwear reported from southeast Oregon was made of tule or sagebrush bark. Hide moccasins are rare in archaeological contexts in the northern Great Basin; indeed, the two Rattlesnake Cave specimens exactly double the number of moccasins known from Oregon cave sites. Based on his work on materials from southeast Oregon caves, Cressman (1940:14) concluded that “the technology of the region was based upon the utilization of sagebrush bark, probably *Apocynum*, tule, wood, and bone, but not leather.” This point is repeated in reference to Fort Rock and the Paisley Caves: “It should be remarked that the occupants of both caves depended on bark and tule rather than leather, as the almost complete absence of leather in both caves testifies” (Cressman and Williams 1940:70).

Nonetheless, the use of leather moccasins was recorded by ethnographers. Ray (1963:164–165) reported that tule, grasses, and sagebrush bark were used extensively for clothing, while “buckskin was only meagerly exploited.” He suggests that hide was used more extensively in recent times than in the distant past as a result of Plains influences in peri-contact times, accompanied by the spread of “firearms, steel axes, steel needles, and the like.”

Klamath and Modoc hide moccasins were primarily summer wear; woven fiber sandals were used in winter (Barrett 1910:255; Ray 1963:166; Spier 1930:208). Hide moccasins were made from a folded piece that was sewn with a seam up the top of the foot from the toe and another up the heel. This contrasts with the style reported by Kelly (1932:110) and Fowler (1992:144) for the Northern Paiute, who made moccasins with a seam along the outer edge of the foot, then cut a strip on the top to form a long tongue and an opening to insert the foot. According to Kelly (1932:110), her Surprise Valley

Paiutes “deny having made a front-seamed moccasin.” The Rattlesnake Cave moccasins appear to be most consistent with the top-seam style reported for the Klamath and Modoc.

Ethnographic sources suggest that the Klamath formerly occupied portions of the northern Great Basin east of their historic homeland (Fowler and Liljeblad 1986:464; Kelly 1932:72), but withdrew to the Klamath Basin in late pre-contact times. Archaeological evidence supports this scenario (Connolly and Jenkins 1997; Eiselt 1997), and numerous studies have noted the close similarity between Klamath material culture and the archaeological remains throughout the northern Great Basin far to the east of the Klamath Basin (Connolly 1994; Cressman 1942; Eiselt 1997; Oetting 1989). A congruence of evidence from Rattlesnake Cave, including Klamath Basin obsidian, Klamath style moccasins, Catlow Twine basketry, and Multiple Warp sandals is consistent with this interpretation.

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