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Chipped stone crescents from America's Far West: Descriptive and geochemical analyses from the Northern Great Basin

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Abstract

Chipped stone crescents, Terminal Pleistocene and Early Holocene artifacts from North America's Far West, are often found in surficial contexts as isolated finds, with many currently residing in private or museum collections with limited provenience information. Such collections have the potential to reveal metric and morphological data, and contribute to our understanding of the distribution and material source

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locations for this unique artifact type. We describe 43 chipped stone crescentic artifacts from two collections curated at the University of Oregon's Museum of Natural and Cultural History. The Calvin Schmidt Collection contains crescents recovered from southeast Oregon and northwest Nevada, and the Alvord Basin Survey Collection contains crescents from southeast Oregon. We provide detailed descriptions, including material type and extensive metrical measurements, to define the shape and form of these crescentic artifacts. Seven obsidian crescents were quantitatively analyzed using x-ray fluorescence to identify their geological sources. We discuss general morphological characteristics of crescents in the region and compare the trace element signatures of the obsidian artifacts to known sources.

Keywords

Great Basin, lithics, geochemical sourcing, crescents, museum collections

Introduction

Chipped stone crescents have been found across North America's Far West including California, Oregon, Washington, Nevada, Idaho, Utah, and Colorado (Moss and Erlandson, 2013). Important temporal markers for Terminal Pleistocene and Early Holocene occupations, crescents are often associated with western stemmed tradition (WST), (see Beck and Jones, 2010) and Paleocoastal sites (see Erlandson et al., 2011). Crescentic artifacts have been found in assemblages dated between ~12,200 and 8000 cal BP (Erlandson et al., 2011; Moss and Erlandson, 2013; Smith et al., 2014) spanning at least 4000 years and encompassing a variety of ecological contexts.

While the function of crescents is still debated (e.g. Fenenga, 2010; Hattori, 2008; Justice, 2002; Mohr and Fenenga, 2010), their spatial association with existing or former lakes, marshes, estuaries, and other water sources has led many archaeologists (see Clewlow, 1968; Davis, 1978; Moss and Erlandson, 2013; Tadlock, 1966) to suggest that crescents were primarily used as hafted transverse projectile points for bird hunting. On California's Northern Channel Islands, this idea has been supported by the discovery of crescents in stratified site contexts associated with numerous bones of waterfowl and seabirds (Erlandson et al., 2011). Moss and Erlandson (2013) noted that in addition to this primary function, crescentics (including crescent preforms and crescent fragments) may have had multiple use-lives, being employed in a variety of other tasks, including processing plants and game, or even ritual activities.

In this paper, we describe 43 crescentic artifacts from two collections housed at the University of Oregon Museum of Natural and Cultural History

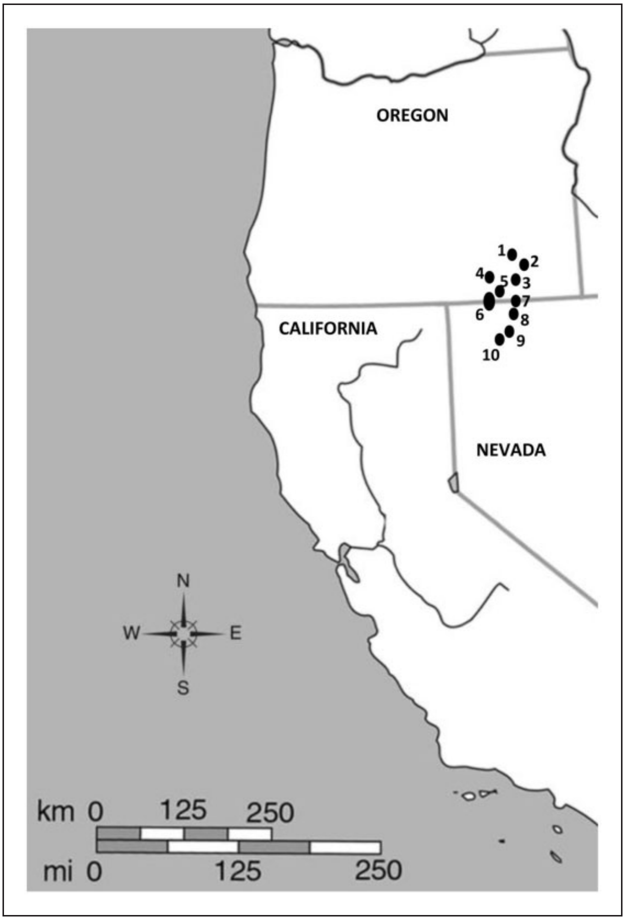

Figure 1. Map showing approximate locations of chipped stone crescents mentioned in this report: (1) Alvord Area; (2) Buckbrush Spring; (3) Borax Lake; (4) Guano; (5) Lone Mountain; (6) Hawksy-Walksy; (7) Denio; (8) Continental Lake; (9) Gridley Lake; and (10) Onion Lake. Several crescents were donated in framed sets attributed to multiple localities, making assignment to a specific source impossible. All potential collection areas are included in this map; Table 1 provides more detailed information.

(UOMNCH). The Alvord Basin Survey Collection contains a variety of chipped and flaked stone artifacts, including 15 crescents, surface-collected in 1975 during scientific archaeological investigations in southeast Oregon (Pettigrew, 1975). The Calvin Schmidt Collection includes crescents and other lithic artifacts recovered by a private collector from at least 10 general localities in southeast Oregon and northwest Nevada (Figure 1).

Until recently, we knew relatively little regarding the variability and distribution of crescentic artifacts found in these regions, or the geochemical composition of obsidian crescents in relation to known sources in western North America. In this study, we classify crescentic artifacts by material type and present dimensions and additional characterizations including descriptions of axial blades, notches, lateral projections, and overall shape. Seven obsidian crescents were geochemically tested and compared to known sources. Based on our results, we discuss crescent variability in the region and obsidian procurement from local sources for crescent manufacture, as well as demonstrate the utility of analyzing museum collections.

Archaeological, geographic, and collection backgrounds

Calvin Schmidt collection

In 2012, Mr Calvin Schmidt was introduced to MNCH archaeologist Dennis Jenkins. On a visit to Schmidt's home, Jenkins realized the extent of his private collection, which included artifacts from Hawksy-Walksy Valley, Guano Valley, and other dry lake locations in the Northern Great Basin. With Jenkins' encouragement, Mr Schmidt decided to donate his collection to the MNCH. In the spring of 2013, the artifacts arrived in 27 neatly arranged frames labeled with general provenience information and a box containing 46 loose items of unknown provenience, and Schmidt's maps of collection localities. A preliminary inventory of the collection was prepared for the museum's records, but a detailed characterization of the larger assemblage has yet to be completed. Approximately 80% of the 617 items in the collection consist of projectile points ranging from Terminal Pleistocene and Early Holocene styles (including a single Clovis point, cf. Spencer and Schmidt, 1989) to such hallmarks of the Late Holocene as Desert Side-Notched points. The remaining artifacts are comprised of chipped stone bifaces (12%), a smaller number of unifaces, drills/gravers, cores and net weights, and a few bone tools and implements.

As is common for assemblages from the Northern Great Basin, most of the lithic artifacts were manufactured from obsidian (77%), followed by chert (cryptocrystalline silicates) (16%), and basalt (7%). This overall composition differs from the crescents, which are primarily manufactured from chert. Like the rest of the collection, frames containing crescents were attributed to one or more general localities. The major exception is a group of lithic artifacts from Frame #8 attributed to "Alvord Area, Ridgeline." This frame contained 31 flaked stone artifacts, 28 of which are crescents described in this study. Due to the uniqueness of this assemblage, Mr Schmidt clearly recalled that it came from a ridge extending approximately north-northwest from the dunes below Tule Springs into the Alvord Basin.

Alvord Basin collection

The second assemblage of chipped stone crescents is derived from Alvord Basin archaeological surveys conducted by University of Oregon archaeologists during 1975 under contract with the Bureau of Land Management (Pettigrew, 1975). Combining random sampling with a smaller proportion of nonrandom parcels, the field crew examined 179-1/16 square miles of Bureau of Land Management (BLM) land, including the Mickey and Alvord Desert basins and the northern Pueblo Valley in Harney County, southeast Oregon. The survey identified 224 prehistoric sites in a variety of settings, with diagnostic artifacts reflecting a continuous record of habitation from Paleoindian to late prehistoric times. Of the 211 diagnostic artifacts recovered, 15 were chipped stone crescents. Twelve of the crescents were manufactured from chert and three from obsidian. The survey covered areas ranging in altitude from the paleo-playa margin (~4000 ft) to over 4750 ft, but crescents clustered between 4016 and 4085 ft, with only two recovered from above 4650 ft (Pettigrew, 1975: 25).

Pettigrew expanded upon his initial findings in a later publication (Pettigrew, 1984), in which he combined his 1975 Alvord Basin materials with a collection borrowed from Tom Newman, who at the time was on the faculty at Portland State University. This increased the total sample size to 326 projectile points and 31 (9.6%) crescents. Based on co-occurrence analyses for horizontal and vertical distributions, Pettigrew (1984) charted the distribution of projectile points across the landscape and proposed an interpretive model of aboriginal Alvord Basin land use. While details are beyond the scope of this paper, Pettigrew's conclusions are of interest. Horizontally, crescents generally cluster with other early point styles, especially Black Rock Concave Base and Clovis points ($n = 31$), but their distribution, limited almost exclusively to the southern and southeastern portions of the Alvord Basin, is more constrained than that of various large stemmed point types ($n = 42$). Early points cluster vertically as well, occurring predominantly between 4000 and 4100 ft. Pettigrew (1984: 86) attributed this to their specialized usage along the margins of lakes and marshes, as part of a Western Pluvial Lakes Tradition adaptive strategy of "collectors concentrating on the wet bottomlands, depending to a great extent on waterfowl and the remaining species of large herd animals, as well as an undetermined variety of other wetland resources." Although Pettigrew's survey did not include the precise area where the Schmidt collection crescents were found, most of these came from the southeast end of the Alvord Basin at an elevation of ~4100 ft, consistent with Pettigrew's sample.

Methods

We analyzed 43 crescentic chipped stone artifacts, 28 from the Schmidt Collection (Figure 2) and 15 from the Alvord Basin Survey

Figure 2. Crescentic artifacts from the Calvin Schmidt Collection. From top-down left column: 2-18500, 1-47514, 2-18614, 1-47613, 1-47614, 1-47619, 1-47849, 2-18598, 2-18611, 1-47784, center column: 1-47675, 1-47757, 1-47606, 1-47758, 1-47628, 1-47621, 1-47620, 2-18506, 1-47779, right column: 1-47616, 1-47617, 1-47615, 1-47760, 1-47608, 1-47759, 1-47609, 1-47607, 1-47610 (scale in cm).

Collection (Figure 3). Based on the degree of finishing and symmetry, each artifact was classified as a crescent or preform (or fragments thereof), then described by material type, noting color and the presence of inclusions or

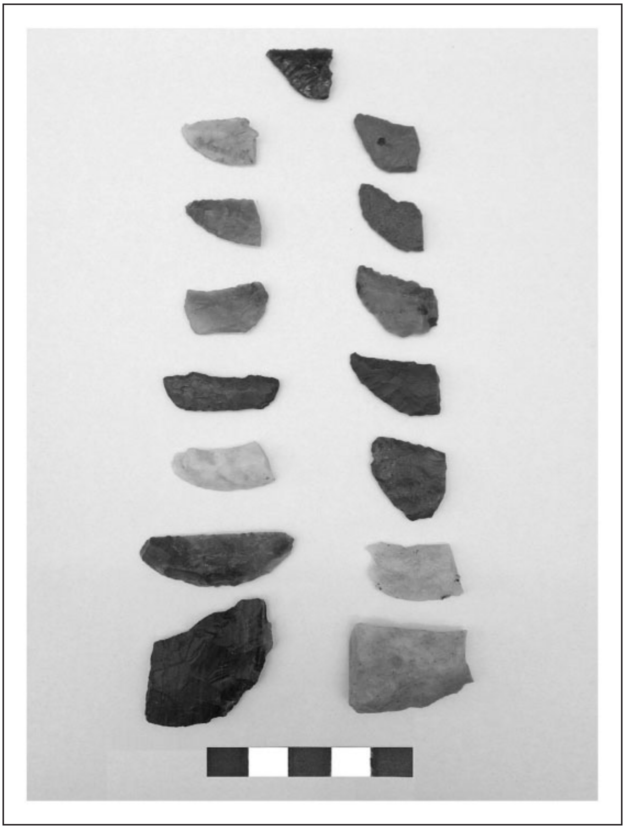

Figure 3. Crescentic artifacts from the Alvord Basin Collection: From top-down: top: 35HA152-2, left column: 35HA215-1, 35HA-276, 35HA176-1, AP-6-4-30-1, AP-7-3-6-1, AP-6-4-19-1, AP-9-4-21-1, right column: AP-6-4-20-4, AP-7-4-7-1, AP-7-3-13-1, AP-6-4-28-1, 35HA167-1, 35HA201-1, 35HA198-3 (scale in cm).

striations. Artifacts were measured, weighed, and characterized following terminology by Fenenga (2010) and Erlandson and Braje (2008: 39, see Figure 4). Crescents are described by curvature (i.e. pronounced, moderate, or slight) of the axial blade and notch, followed by description and number of lateral notches, projections, and general shape. Each artifact was also inspected under a low-power ($\times$ 10) microscope for evidence of grinding, retouch, or heat fractures (i.e. pot-lids or heat crazing). Measurements were recorded and averaged, providing maximum, minimum, mean, standard deviations, and overall percentages for weight, thickness, length, and width of all crescents. Measurements and descriptions are used to discuss variability of crescentic artifacts found in the sample from southeast Oregon and northwest Nevada.

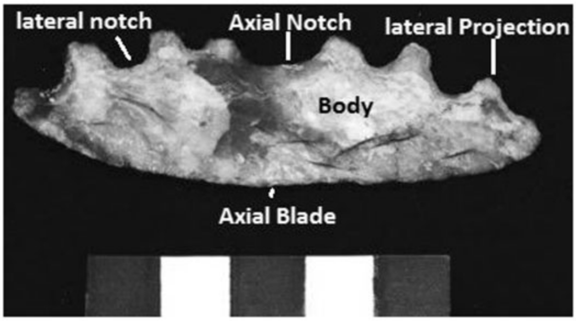

Figure 4. A crescent from CA-SMI-679 (not part of this study), showing terms used in characterization and description (scale in cm).

Seven obsidian crescents were submitted for geochemical analysis at 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), titanium (Ti), manganese (Mn), and barium (Ba), which are reported in parts per million (ppm). These results were then compared to obsidian sources with known geochemical signatures in the region (Skinner, 2013).

Results

Crescentic artifacts from both collections include a variety of preforms, fragments, and complete or nearly complete crescents (Table 1). Approximately 81% ($n = 35$) of the artifacts are manufactured from chert, varying in color and quality, followed by obsidian (16%, $n = 7$) and basalt (2%, $n = 1$). Eighteen percent have a moderate to pronounced axial notch and 33% are fractured, incomplete, or broken along one or both edges of the body. Mean length for all crescents is 21.87 mm (±6.9) with a range of 12.03–49.4 mm, although estimates are biased by 14 (33%) partial specimens, where less than 50% of the crescent is present. Mean thickness is 6.79 mm (±2.43) with a range of 3.66–13.22 mm. Mean width is 36.62 mm (±10.69) with a range of 20.66–64.24 mm. Generally speaking, the larger specimens were classified as preforms that were also less symmetrical, flat, and finished. Quarter-moon crescents comprise more than half of both assemblages (65%, $n = 28$), followed by half-moon shaped crescents (33%, $n = 14$), and one possible eccentric crescent (2-18500).

Two crescents display visible evidence of heat damage. Obsidian crescent 1-47849 has heat damage along both sides of the body, including five pot-lids

Table 1. Summary of measurements and descriptions for crescentic artifacts from Schmidt (catalog identification 1-#, 2-#) and Alvord Basin Collection (catalog identification AP-#, 35-#) collections.

Catalog #	Locality or area	Artifact type	Material	Present (%)	Th. (mm)	L (mm)	W (mm)	Wt. (g)	Description
1-47514	Guano	Crescent	Chert, pink/orange	>90	5.14	30.9	14.59	1.85	Pronounced axial notch, no axial blade projections, lateral notches or projections. Small narrow, pronounced quarter-moon shape. Grinding present on axial blade.
1-47606	Alvord Area, Ridge Line	Crescent	Chert, banded black/brown	>99	7.31	44.95	20.12	7.01	No axial notch, axial blade projections, lateral notches or projections. Wide, thick body with slightly defined legs. Slight squared-off axial blade, half-moon shape.
1-47607	Alvord Area, Ridge Line	Crescent	Chert, opaque white	90	6.81	42.54	19.83	5.92	Moderate-pronounced axial notch, no axial blade projections, lateral notches or projections. Narrow body with well-defined legs. Quarter-moon shape.
1-47608	Alvord Area, Ridge Line	Crescent fragment	Obsidian	50	5.68	32.06	26.1	3.94	Pronounced axial notch, one broad notch, flat axial blade projections, no lateral notches or projections. Medium body width, with defined legs and squared-off axial blade. Quarter-moon shape.
1-47609	Alvord Area, Ridge Line	Crescent fragment	Chert opaque dark brown chert.	50	5.62	36.93	23.65	5.11	Slight axial notch, no axial blade projections, lateral notches or projections. Wide, thinned body with only slightly defined legs. Quarter-moon shape. Possible heat treatment.
1-47610	Alvord Area, Ridge Line	Crescent frag or preform	Chert, orange/ brown	60	5.17	29.18	27	4.27	Pronounced axial notch, no axial blade projections, lateral notches or projections. Medium body width, irregular and twisted,

(continued)

Table 1. Continued.

Catalog #	Locality or area	Artifact type	Material	Present (%)	Th. (mm)	L (mm)	W (mm)	Wt. (g)	Description
									with pronounced leg. Snapped in the middle. Quarter-moon shape.
1-47613	Alvord Area, Ridge Line	Crescent	Chert, gray	100	4.92	35.21	14.57	2.45	Moderate axial notch, no axial blade projections, lateral notches or projections. Small narrow, thin body, rounded legs. Quarter-moon shape.
1-47614	Alvord Area, Ridge Line	Crescent	Chert, greenish gray	100	4.83	34.24	14.4	2.6	No axial notch, axial blade projections, lateral notches or projections. Small with narrow, thin, nearly undefined legs. Half-moon shape. Grinding present on axial blade and notch.
1-47615	Alvord Area, Ridge Line	Crescent	Chert, opaque green	75	6.33	31.41	17.38	3.88	No axial notch, axial blade projections, lateral notches or projections. Small narrow, thick body. Rounded, undefined legs. Half-moon shape. Grinding present on axial blade.
1-47616	Alvord Area, Ridge Line	Crescent fragment	Chert, opaque white, red inclusions	50	6.25	24.58	14.74	1.88	Slight axial notch, no axial blade projections, lateral notches or projections. Small, thick body, with moderately defined leg. Quarter-moon shape.
1-47617	Alvord Area, Ridge Line	Crescent fragment	Chert, opaque white	50	4.65	20.66	12.22	1.23	No axial notch, axial blade projections, lateral notches or projections. Small narrow, thin body with defined, pointed legs. Half-moon shape.
1-47619	Alvord Area, Ridge Line	Crescent	Chert, translucent,	100	5.52	40.52	22.88	4.92	Pronounced axial notch, two axial blade projections that define a flat, broad axial blade, no lateral notches or projections.

(continued)

Table 1. Continued.

Catalog #	Locality or area	Artifact type	Material	Present (%)	Th. (mm)	L (mm)	W (mm)	Wt. (g)	Description
			brown/red inclusions						Medium sized wide, thin body and well defined legs. Quarter-moon Shape
1-47620	Alvord Area, Ridge Line	Crescent preform	Chert, opaque white	>95	9.52	55.58	25.81	14.39	Slight axial notch, no axial blade projections, lateral notches or projections. Large wide, thick body, with slightly defined leg. Quarter-moon shape.
1-47621	Alvord Area, Ridge Line	Crescent preform	Chert, translucent grayish white	>99	12.07	57.1	29.92	17.96	Moderate axial notch, no axial blade projections, lateral notches or projections. Large wide, thick body, one well-defined leg. Quarter-moon shape.
1-47628	Alvord Area, Ridge Line	Crescent preform	Chert, opaque white red inclusions	100	11.12	47.74	27.34	13.99	No axial notch, axial blade projections, lateral notches or projections. Large wide, thick body and undefined legs. Half-moon shape.
1-47675	Long Mountain area, Southeast corner of Oregon	Crescent preform	Chert, light brown, orange	>95	4.84	44.82	21.38	5.95	No axial notch, axial blade projections, lateral notches or projections. Medium size, wide, thin body. Cortex present on both sides. Undefined legs, half-moon shape.
1-47757	Alvord Wave Terraces, Hawksy-Walksy	Crescent	Chert, opaque brown/yellow.	>95	5.34	40.88	15.97	3.86	No axial notch, axial blade projections, lateral notches or projections. Small thin narrow body, undefined legs. Nearly unifacial, bulb of percussion present, retouch on axial blade. Half-moon shape.
1-47758	Alvord Wave Terraces, Hawksy-Walksy	Crescent preform	Chert, brown/yellow	>75	11.89	46.8	27.9	12.85	Slight-moderate broad axial notch, three possible axial blade projections/two notches, no lateral notches or

(continued)

Table 1. Continued.

Catalog #	Locality or area	Artifact type	Material	Present (%)	Th. (mm)	L (mm)	W (mm)	Wt. (g)	Description
									projections. Large wide, thick body, defined leg. Weathering on the leg/axial blade. Irregular quarter-moon shape.
1-47759	Alvord Wave Terraces, Hawksy-Walksy	Crescent	Chert, reddish/gray	75	7.64	41	18.08	5.13	Slight-moderate broad axial notch, no axial blade projections, lateral notches or projections. Medium thick body, defined leg. Slight quarter-moon shape.
1-47760	Alvord Wave Terraces, Hawksy-Walksy	Crescent	Chert, opaque red	>60	6.72	38.58	14.52	3.23	Slightest axial notch, no axial blade projections, lateral notches or projections. Long, narrow, thinned body with defined leg. Possible weathering on axial blade. Slight quarter-moon shape.
1-47779	Hawksy-Walksy	Crescent preform	Chert, opaque, banded red/yellow	100	9.57	64.42	28.27	17.62	No axial notch, axial blade projections, lateral notches or projections. Large wide, thick body and undefined legs. Half-moon shape.
1-47784	Hawksy-Walksy	Crescent preform	Chert, black	100	6	47.99	12.03	4.17	Slight, broad axial notch, no axial blade projections, lateral notches or projections. Long narrow, thick body. Nearly unifacial retouch on axial blade. Quarter-moon shape.
1-47849	Hawksy-Walksy and Alvord	Crescent	Obsidian	>90	6.07	44.65	16.81	4.41	Slight axial notch, no axial blade projections, lateral notches or projections. Medium size thin body and moderately defined leg. Heat damage on both

(continued)

Table 1. Continued.

Catalog #	Locality or area	Artifact type	Material	Present (%)	Th. (mm)	L (mm)	W (mm)	Wt. (g)	Description
									sides—five potlids on one side, two on the other. Slight quarter-moon shape.
2-18500	Denio, Continental Lake, Onion Lake, Nevada	Eccentric Crescent?	Obsidian, translucent dark gray	>90	3.66	25.65	21.91	1.2	Very deep axial notch separating two prominent lateral projections, three quarter-moon smaller axial blade projections, two axial blade notches, one small projection on center of axial blade. Small very thin body, very eccentric. One leg snapped. Weathering on one side.
2-18506	Denio, Continental Lake, Onion Lake, Nevada	Crescent Preform	Basalt, opaque black	100	13.22	55.85	31.33	21.25	No axial notch, axial blade projections, lateral notches or projections. Large wide, thick body. Quarter-moon shape. Probable weathering on one side.
2-18598	Hawksy-Walksy, Gridley Lake	Crescent	Obsidian translucent, grey obsidian, black striations	>90	7.58	41.67	22.65	5.7	Pronounced axial notch, two axial blade projections that define a flat, broad axial blade, no lateral notches or projections. Medium fairly thick body with rounded legs. Quarter-moon shape.
2-18611	Hawksy-Walksy, Gridley Lake	Crescent	Obsidian	>90	8.04	39.79	19.22	5.65	Slight-moderate axial notch, no axial blade projections, lateral notches or projections. Medium sized fairly thick body and undefined leg. Slight quarter-moon shaped.
2-18614	Hawksy-Walksy, Gridley Lake	Crescent preform	Obsidian, translucent cloudy gray	100	5.54	31.6	16	2.92	Beginning of an axial notch present, no axial blade projections, lateral notches or projections. Small wide,

(continued)

Table 1. Continued.

Catalog #	Locality or area	Artifact type	Material	Present (%)	Th. (mm)	L (mm)	W (mm)	Wt. (g)	Description
									thinned body and one defined leg. Irregular quarter-moon shape.
AP-6-4-19-1	Alvord Area	Crescent	Chert, opaque yellow/red	100	10.59	50.02	20.18	9.99	No axial notch, axial blade projections, lateral notches or projections. Medium size, with thick body and rounded legs. Half-moon shape.
AP-6-4-20-4	Alvord Area	Crescent fragment	Chert, yellow/brown, red tint	<50	4.74	21.74	20.56	2.19	Moderate to pronounced axial notch, no axial blade projection, lateral notches or projections. Half of a small, narrow thin body, with squared-off axial blade, and well-defined leg. Quarter-moon shape.
AP-6-4-21-1	Alvord Area	Crescent preform	Chert, brown, yellow banded	<50	8.76	37.89	49.4	17.43	Moderate axial notch, no axial blade projections, lateral notches or projections. Large, wide thick body with well-defined leg. Quarter-moon shape.
AP-6-4-28-1	Alvord Area	Crescent fragment	Chert, opaque brown/black	<50	5.65	28.69	25.35	3.35	Slight axial notch, no axial blade projection, lateral notches or projections. Wide, thin body, with well-defined, slightly hooked leg. Squared-off axial blade. Quarter-moon. Grinding present on axial notch.
AP-6-4-30-1	Alvord Area	Crescent	Chert, opaque yellow/ brown	>90	5.41	37.12	14.88	3.48	Very slight axial notch, no axial blade projections, lateral notches or projections. Long narrow thin body, with rounded off legs and slightly squared axial blade. Slight half-moon

(continued)

Table 1. Continued.

Catalog #	Locality or area	Artifact type	Material	Present (%)	Th. (mm)	L (mm)	W (mm)	Wt. (g)	Description
									shape. Grinding present on axial blade and notch. Very weathered.
AP-7-3-13-1	Alvord Area	Crescent fragment	Chert, yellow, dark inclusions	<50	5.11	26.68	28.73	3.22	Pronounced axial notch, no axial blade projections, lateral notches or projections. Wide, thin body with well-defined leg. Potentially squared-off axial blade. Slight quarter-moon shape.
AP-7-3-6-1	Alvord Area	Crescent	Chert, opaque, white	75	6.69	30.35	20.22	4.07	Pronounced axial notch, no axial blade projections, lateral notches or projections. Mid-section of narrow, thick body. Quarter-moon shape.
AP-7-4-7-1	Alvord Area	Crescent fragment	Chert, red/brown, small black inclusions	<50	4.25	22.22	26.73	1.98	Pronounced axial notch, no axial blade projections, lateral notches or projections. Narrow, thin body. One well-defined, leg. Distinct quarter-moon shape.
35HA152-2	Alvord Area	Crescent fragment	Obsidian, translucent dark gray	~25	4.39	21.34	20.65	1.55	No axial notch, axial blade projections, lateral notches or projections. Peaked axial blade, wide body and well-defined thin leg. Half-moon shape.
35HA167-1	Alvord Area	Crescent fragment	Chert, opaque gray	~25	5.26	26.26	28.17	4.17	No axial notch, axial blade projections, lateral notches or projections. Wide, thin body, with peaked axial blade. Half-moon shape.
35HA176-1	Alvord Area	Crescent	Chert, cloudy yellow	>75	5.54	27.03	19.09	3	Moderate axial notch, two slight axial blade projections, no lateral notches or projections. Two slight axial blade projections and squared-off axial blade.

(continued)

Table 1. Continued.

Catalog #	Locality or area	Artifact type	Material	Present (%)	Th. (mm)	L (mm)	W (mm)	Wt. (g)	Description
									Small, narrow and thin body. Quarter-moon shape.
35HA198-3	Alvord Area	Crescent preform	Chert, opaque yellow	~50	12.05	39.36	32.26	17.43	Slight axial notch, no axial blade projection, lateral notches or projections. Wide, thick body. Slight quarter-moon shape.
35HA201-1	Alvord Area	Crescent fragment	Chert, opaque cloudy white	<50	6.19	28.24	23.24	4.77	Moderate axial notch, no axial blade projections, lateral notches or projections. Wide, narrow body. Quarter-moon shape.
35HA215-1	Alvord Area	Crescent fragment	Chert, cloudy brown striations	<50	5.03	25.05	17.08	2.17	No axial notch, axial blade projections, lateral notches or projections. Narrow, thin body. Half-moon shape.
35HA276	Alvord Area	Crescent fragment	Chert, opaque yellow/red	<50	5.68	25.66	17.64	2.37	No axial notch, axial blade projections, lateral notches or projections. Small, narrow and thin body. Half-moon shape. Grinding on axial blade.

(semicircular depressions) on one side and two on the other. Chert crescent 1-47610 has deep depressions lined with heat crazing along both sides of the body. As evidence for heat damage appears random and is distributed across most of the artifacts' surface, thermal damage to these artifacts was likely induced by incidental wildfire exposure.

Sixty percent ($n = 25$) of the crescents possess fractures along one side of the body, or contain a snapped or fractured end portion; these breakage patterns are consistent with use as hafted transverse projectile points (Clewlow, 1968). Several are extremely abraded or weathered; only 15 remain sufficiently intact or well preserved to allow examination of axial blades and lateral projections for evidence of possible edge grinding or damage. Forty percent ($n = 6$) of these crescents show evidence of possible edge grinding along the middle of the axial blade or notch, patterns that seem consistent with hafting across the mid-section of the artifact to prevent the retouched edge from cutting through the hafting material (Moss and Erlandson, 2013: 186).

Geochemically, the seven obsidian artifacts correspond to several sources (Table 2), including the Hawks Valley source near the Oregon-Nevada border in the Hawksy-Walksy area and the Massacre Lake/Guano Valley, which is found widely distributed throughout the region. Beatys Butte and Indian Creek Buttes sources are located at the northern end of the Alvord Basin. Of the four obsidian specimens collected from Hawksy-Walksy, three match local sources in Hawks Valley, and one is traced to Beatys Butte; where sources are located between 20 and 100 km from where these artifacts were recovered (Figure 1). Two specimens, one from the Denio area and the other from the Alvord area, are chemically similar to the Massacre Lake/Guano Valley obsidian sources, which are spread throughout the area. The last specimen from the Alvord area is chemically similar to the Indian Creek Buttes Variety B source. For the small sample of obsidian crescents analyzed here, the focus appears to be on relatively local procurement of toolstone in the northern Great Basin region, with only limited evidence of long distance transport or trade.

Discussion and conclusions

Across North America's Far West, the morphology of crescents is highly variable (see Moss and Erlandson, 2013; Tadlock, 1966). This is particularly true in California, where Mohr and Fenenga (2010) identified 18 different types of crescents ranging from lunate (quarter-moon, half-moon) to trapezoidal, butterfly, and more eccentric zoomorphic and other varieties. Great Basin crescents are generally less variable, with the vast majority of specimens falling within lunate or butterfly types (Tadlock, 1966) and "eccentric" specimens being rare (Amick, 2007; Beck and Jones, 2009; Justice, 2002; Plew, 2012; Smith, 2008). A study of crescent distributions in the Far West suggests that lunate crescents are indeed

Table 2. Results of XRF studies for Obsidian crescents from Southeast Oregon and Northwest Nevada. For locality, HW=Hawksy-Walksy.

Specimen identifications			Trace element concentrations						
Id#1	No.	Catalog	Rb	Sr	Y	Zr	Nb	Ba	Geochemical source
Alvord	1	1-47608	178 ± 2	10 ± 1	56 ± 2	131 ± 2	36 ± 2	0 ± 23	Indian Creek Buttes Variety B
HW	2	1-47784	213 ± 2	17 ± 1	43 ± 2	133 ± 2	26 ± 2	0 ± 25	Hawks Valley
Denio	3	2-18500	193 ± 3	4 ± 1	90 ± 2	568 ± 3	35 ± 2	0 ± 0	Massacre Lake/Guano Valley
HW	4	2-18598	218 ± 3	16 ± 1	43 ± 2	136 ± 2	29 ± 2	0 ± 21	Hawks Valley
HW	5	2-18611	108 ± 2	159 ± 2	12 ± 1	152 ± 2	8 ± 1	952 ± 30	Beatys Butte
HW	6	2-18614	207 ± 3	15 ± 1	43 ± 2	128 ± 2	27 ± 2	0 ± 22	Hawks Valley
Alvord	7	35HA152	215 ± 3	4 ± 1	88 ± 2	580 ± 3	32 ± 2	0 ± 0	Massacre Lake/Guano Valley
–	8	–	143 ± 2	104 ± 2	26 ± 1	220 ± 2	8 ± 1	743 ± 31	RGM-1 Reference Standard

the most common form found in the Great Basin, Columbia Plateau, and California (Justice, 2002: 119–120).

The chipped stone crescents discussed here are mostly lunate in form, lacking marked lateral projections or notches, and containing a slight to prominent axial notch or blade. The Schmidt collection contained one very thin and delicate artifact that may be an eccentric crescent (2-18500), but it does not fit well within any previously defined typology for crescents. Finished crescents from both assemblages are relatively thin and small—similar to other crescents believed to have been transversely hafted on darts used in bird hunting (see Erlandson et al., 2011; Moss and Erlandson, 2013). At least 40% of the 15 crescents examined for evidence of edge grinding display grinding along the axial blade, which may be related to hafting (Beck and Jones, 2009; Moss and Erlandson, 2013: 186).

Numerous studies have found cherts to be the most common material used to manufacture crescents (e.g. Beck and Jones, 2009, 2010; Jew et al., 2013), though some assemblages are dominated by obsidian crescents (see Moss and Erlandson, 2013: 186 and references therein). Cherts dominate both collections we analyzed, ranging in quality from fine-grained to coarser-grained with small mineral inclusions or thin quartz veins. The wide variety of colors, from opaque to translucent oranges, browns, reds, whites, tans, and grays, may suggest material procurement from multiple sources. Despite proximity to several obsidian sources—and the fact that most other projectile points in the collections were made from obsidian—chert was the material preferred in these areas for making crescents. As a result, geochemical sourcing of crescentic artifacts in the Great Basin and Far West is rare, limiting our understanding of procurement patterns. However, petrographic similarities between crescents recovered from Terminal Pleistocene quarry workshops adjacent to chert deposits on California's Northern Channel Islands suggest local lithic materials were used to manufacture crescentic artifacts (see Erlandson et al., 2011; Jew et al., 2013). Further sourcing studies are required to better address broad patterns in the procurement of lithic materials used in the production of chipped stone crescents in the Far West. Given the nature of prehistoric toolstone use, however, it seems likely that people used both local and distant (exotic) lithic materials in the production of these specialized artifacts.

As is the case throughout the Far West, the crescents discussed in this study were found in localities closely associated with former lake or marsh habitats. The edge grinding and breakage patterns observed seem consistent with hafting and use as transverse projectile points, but some of the crescentic artifacts probably served other functions as well.

Our study demonstrates the value of museum collections for addressing a broad range of archaeological questions. Despite the lack of specific provenience for some of the crescents—and associated faunal remains with either collection—these diagnostic artifacts provide information regarding the distribution of early lithic technologies in North America's Far West. The crescents we described were distributed widely in southeast Oregon and northwest Nevada, where relatively few crescents have been previously reported. Our descriptive and geochemical analysis of crescents helps define the spatial distribution of these enigmatic artifacts, as well as variability in their shape, form, and the materials they were made from.

In closing, we note that numerous crescents remain undescribed in local, regional, and national museum collections. As we have shown in this paper, further research on museum collections that contain these distinctive Terminal Pleistocene and Early Holocene artifacts can contribute to a better understanding of one of the earliest cultural traditions in North America.

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