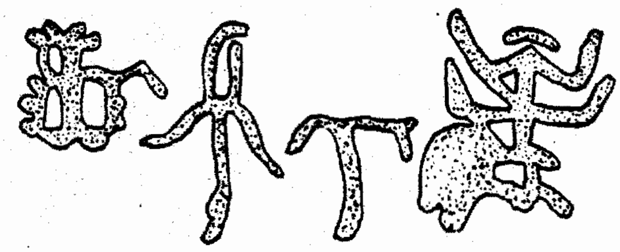
Winkler, Carol J. 1990. Recent Archaeological Investigations in the Fall Creek and Middle Fork Willamette Watersheds, Lowell Ranger District. Current Archaeological Happenings in Oregon, 15(4):12-14.

Winkler, Carol J. 1991. The Middle Fork Willamette River Corridor as Trans-Cascade Travel Route: The Evidence from Obsidian Sourcing. Paper presented at the Northwest Anthropological Conference, Missoula, Montana, March 28, 1991.



Trace Element Composition of Obsidian Artifacts from the Beaverdam Creek Site (35CR29), Central Oregon

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INTRODUCTION

In 1984, an archaeological field school sponsored jointly by Central Oregon Community College, the University of Oregon, and the Ochoco National Forest was held at the Beaverdam Creek site (35CR29) in the Ochoco Mountains of central Oregon (see Erlandson and Moss 1984; Boughton 1989). One of the analyses subsequently conducted on the recovered materials was a trace element study of a sample of obsidian artifacts from the site. This followed submittal by Moss of obsidian nodules from two Central Oregon sources (Dog Hill and Burns Butte) for geochemical characterization (Hughes 1986). After the identification of trace element profiles for the Dog Hill, Burns Butte and other nearby sources, we hoped that many of the obsidian artifacts from the Beaver Creek site would be attributable to known sources.

SAMPLING AND ANALYTICAL METHODS

With funding from the USDA Forest Service, 20 pieces of obsidian debitage from 35CR29 were analyzed by Hughes using a non-destructive energy dispersive x-ray fluorescence (XRF) technique (see Hughes 1986 for a detailed account of the XRF instruments and procedures). Samples were selected from four discrete loci within 35CR29, including two prehistoric components believed to date after about 2500 BP and two components dating between 2500 and 6000 BP (Erlandson and Moss 1984). Samples of visually distinct obsidian types (showing variation in color, translucency, texture, and phenocryst inclusions) were selected in an attempt to determine the range of sources from which the site occupants procured obsidian and if such patterns changed through time.

RESULTS

The primary goals of our obsidian characterization study were foiled when 17 of the 20 samples (85%) submitted could not be matched with any known source (Table 1). Of the three identifiable samples, two (#3 and #21) may have come from Dog Hill and one (#15) from Burns Butte, both sources located in the vicinity of Burns (Hughes 1986). As of June 15, 1991, the other 17 specimens could not be matched with any obsidian standards contained in Hughes' inventory of the region. Based on the limited data available, however, approximately five discrete obsidian sources may be represented by the 17 unidentifiable specimens. According to Hughes' letter report, Group 1 consists of sample #1, Group 2 of sample #2, Group 3 of samples 4-14 and 18-19, Group 4 of sample #16, and Group 5 of sample #20 (Table 1).

An attempt by Erlandson to visually classify the Beaverdam artifacts via macroscopic attributes met with mixed success. Only 10 of the 20 artifacts had distinctive characteristics that allowed classification into three discrete types. The 'Type A" sample consisted of specimens 3, 6, 12, 21. The "Type B" sample included specimens 9, 10, 14, and 18. The "Type C" sample consisted of specimens 1 and 16. Quantitative geochemical analysis confirmed the common origin (Dog Hill) of Type A samples 3 and 21, correctly lumped all Type B samples (the unidentified Group 3 source), and showed Type C samples 1 and 16 to be quite similar. Although this represents a success rate as high as 80%, geochemical data show no apparent association of samples 6 and 12 with Dog Hill, and visual identification did not identify the common origin of many of the artifacts (4,5,6,7,8,11,12,13,19) tentatively associated with Group 3. Microscopic analysis might be more effective at differentiating obsidian from discrete sources, but additional research would be necessary to demonstrate this. With the large number of obsidian sources present in Oregon, geochemical characterization is the only accurate and cost-effective means currently available to identify the origin of obsidian artifacts in archaeological sites.

CONCLUSIONS

Eighty-five percent of the analyzed artifacts from Beaverdam Creek site did not correlate with a known obsidian source. This figure is consistent with obsidian trace element studies conducted for artifacts recovered from the Wind Creek sites located very near Beaverdam Creek (Armitage 1988) and the Indian Grade Spring site located roughly 100 km to the southwest in Harney County (Hughes 1990; Jenkins and Connolly 1990). In fact, many of the obsidian artifacts analyzed from these three sites (or group of sites) may come from one or more common sources (Figure 1). Currently, we are trying to identify, sample, and geochemically characterize these primary sources and to determine the secondary distribution of such obsidians.

The current lack of success in linking obsidian artifacts with known sources in central and eastern Oregon is a direct function of the lack of concerted research to identify, sample, and analyze the large number of obsidian sources located in the region (Skinner 1983; Jenkins and Connolly 1990:112-115). In an area where lithic scatters dominate the archaeological record, trace element composition of obsidian artifacts provides one of the best sources of data on prehistoric human adaptations. Since hydration rates are known to vary significantly in geochemically distinct obsidians, the effective use of obsidian hydration dating is not possible without such data. Via geochemical characterization, obsidian artifacts have the potential to contribute to a better understanding of site chronologies, prehistoric trade and travel patterns, and the economics and logistics of stone raw material procurement and use. Until quantitative trace element profiles are available for more of central and eastern Oregon's obsidian sources, however, the full potential of using obsidian artifacts to address such issues will not be achieved. We hope locating and geochemically "fingerprinting" the many primary and secondary sources of obsidian will be a high priority of archaeologists working in the region.

REFERENCES

Armitage, Charles L. 1988. Obsidian Source and Hydration Analysis for the Wind Creek Archaeological Sites, East-Central Oregon. Ms. on file, Department of Anthropology, University of Oregon, Eugene.

Boughton, John M. 1989. Projectile Points of the Beaverdam Creek Site. Master's paper, Department of Anthropology, University of Oregon, Eugene.

Erlandson, Jon and Madonna Moss. 1984. Investigations at Beaverdam Creek. Current Archaeological Happenings in Oregon 9 (4):5-6.

Hughes, Richard E. 1985. Letter report of April 14 to M. Moss, Mount Baker-Snoqualmie National Forest, on results of X-ray Florescence Analysis of 20 obsidian artifacts from 35CR29. Anthropological Studies Center, Sonoma State University.

Hughes, Richard E. 1986. Energy Dispersive X-Ray Fluorescence Analysis of Obsidian from Dog Hill and Burns Butte. Northwest Science 60(2):73-80.

Hughes, Richard E. 1990. Appendix E: Obsidian Sourcing Analysis. In, Archaeology of Indian Grade Spring: A Special Function Site on Stinkingwater Mountain, Harney County, Oregon. University of Oregon Anthropological Papers 42. Eugene.

Jenkins, Dennis L. and Thomas J. Connolly. 1990. Archaeology of Indian Grade Spring: A Special Function Site on Stinkingwater Mountain, harney County, Oregon. University of Oregon Anthropological Papers 42. Eugene.

Skinner, Craig E. 1983. Obsidian Studies in Oregon: An Introduction to Obsidian and an Investigation of Selected Methods of Obsidian Characterization Utilizing Obsidian Collected at Prehistoric Quarry Sites in Oregon. Masters Project, Interdisciplinary Studies, University of Oregon. Eugene.

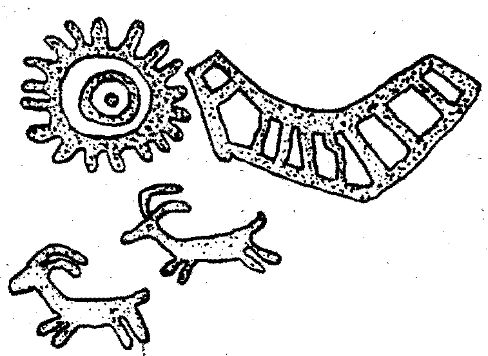

Table 1: Energy Dispersive X-ray Flourescence Data for Obsidian Artifacts from 35-CR-29*

Sample #	Cat # (524-)	Sample Provenience	Trace Element Concentrations PB	TH	RB	SR	Y	ZR	NB
1	250	Locus D: Prof.	27.7	10.4	129.3	2.7	103.6	186.7	30.6
		1, Str. III	±1.9	±3.5	±2.6	±1.6	±2.8	±2.8	±1.9
2	244	" "	23.2	15.7	89.9	19.5	50.1	100.9	16.3
			±2.4	±5.2	±3.5	±2.8	±3.7	±3.5	±2.7
3	249	" "	27.0	0.0	107.7	2.6	75.9	448.1	34.7
			±2.1	±0.0	±2.9	±1.8	±3.2	±4.8	±2.3
4	266	" "	23.0	17.2	126.0	56.9	27.8	117.6	13.9
			±2.0	±4.1	±3.2	±2.6	±2.8	±3.0	±2.2
5	241	" "	16.1	0.0	104.5	79.0	18.3	119.3	13.9
			±1.8	±0.0	±2.7	±2.5	±2.4	±2.8	±1.9
6	283	Locus F: Prof.	18.9	8.3	118.2	64.1	23.0	112.3	12.9
		2, Str. IV	±1.7	±3.4	±2.8	±2.3	±2.4	±2.7	±1.9
7	215	" "	27.3	19.3	110.2	74.0	23.2	124.7	16.0
			±2.3	±4.6	±3.4	±3.2	±3.1	±3.5	±2.5
8	281	" "	20.7	16.2	111.6	77.6	24.4	132.4	12.9
			±1.8	±3.9	±3.0	±2.8	±2.7	±3.1	±2.1
9	279	" "	19.0	8.3	112.8	90.1	23.3	125.6	12.3
			±1.7	±3.4	±2.7	±2.5	±2.4	±2.8	±1.9
10	286	" "	21.5	16.4	118.3	89.9	25.4	145.6	16.4
			±1.6	±3.4	±2.7	±2.5	±2.4	±2.8	±1.9
11	626	Locus C: Unit	22.7	0.0	116.5	88.7	21.6	128.3	14.6
		229S/27E:0-20cm	±2.0	±0.0	±3.2	±3.0	±2.9	±3.3	±2.3
12	626	" "	21.6	17.1	124.3	59.7	27.4	122.6	14.8
			±2.0	±4.2	±3.3	±2.8	±2.9	±3.2	±2.3
13	626	" "	27.0	14.0	130.7	90.5	29.9	139.3	14.1
			±2.3	±4.7	±3.6	±3.3	±3.2	±3.6	±2.5
14	634	": 20-40cm	21.8	18.2	125.3	92.9	24.6	136.1	15.6
			±1.8	±3.8	±3.0	±2.8	±2.7	±3.0	±2.1
15	642	": 40-60cm	29.3	19.1	127.7	24.8	45.3	251.9	26.3
			±1.9	±3.8	±3.0	±2.1	±2.8	±3.6	±2.2
16	313	Locus A: Unit	31.8	19.1	121.1	0.0	88.2	155.0	30.6
		40S/3W: 10-20cm	±3.0	±5.8	±4.2	±0.0	±4.6	±4.5	±3.2
18	313	" "	21.5	14.4	116.7	85.2	24.6	138.3	15.2
			±1.5	±3.1	±2.5	±2.3	±2.2	±2.6	±1.7
19	318	": 20-30cm	22.0	16.1	99.4	61.9	24.5	109.1	0.0
			±2.1	±4.5	±3.3	±3.0	±3.1	±3.3	±0 0
20	318	" "	28.0	14.5	100.5	42.3	30.1	101.6	18 0
			±3.2	±6.0	±4.3	±3.7	±4.1	±4.2	±3 2
21	318	" "	39.7	20.6	111.6	0.0	93.3	566.9	40 0
			±2.3	±4.0	±3.0	±0.0	±3.4	±5.4	±2 4

* Sample #17 was not analyzed; all trace element values in parts per million (ppm); ± = pooled expression (in ppm) of x-ray counting uncertainty and regression fitting error at 200 seconds livetime.

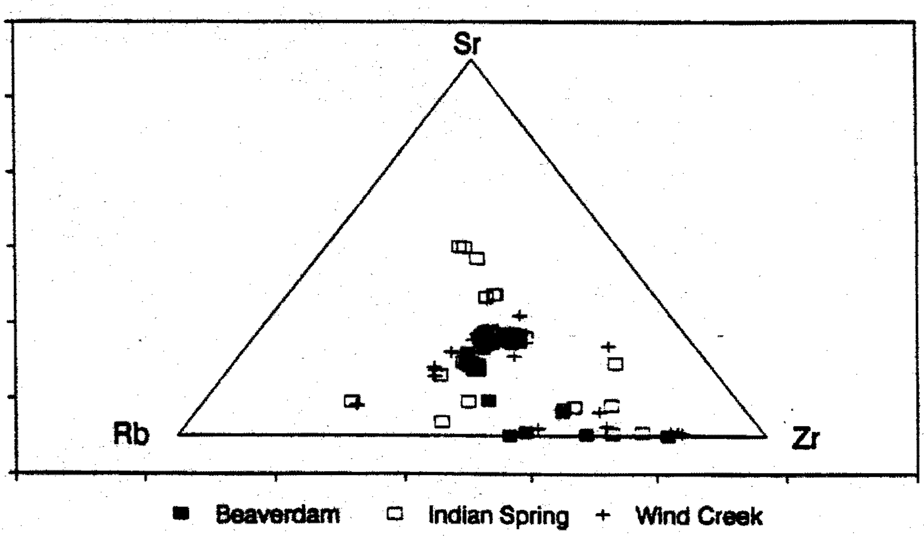

Figure 1: Ternary plot of the geochemical composition of obsidian artifacts from three Central Oregon sites (data from Armitage 1988; Hughes 1985; Jenkins and Connoly 1990).