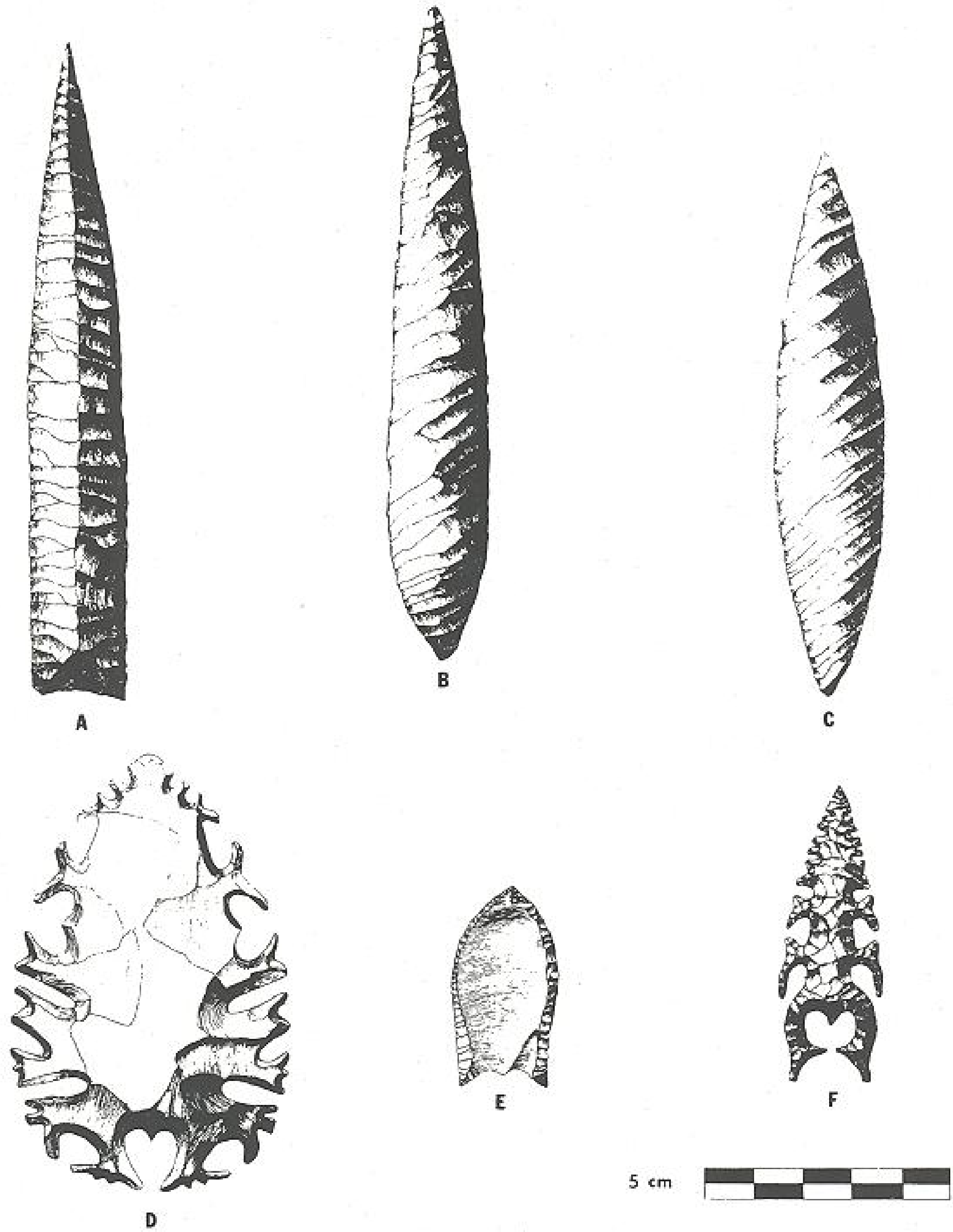
IDAHO ARCHAEOLOGIST



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NOTICE TO AUTHORS

All manuscripts should conform as nearly as possible with the style established by the Society for American Archaeology. (See page 13, Vol. III, No. 1 and page 1, Vol. II, No. 2, *Idaho Archaeologist).* Manuscripts should be typed double-spaced with 1½-inch margins and submitted in the original and two copies. The *Idaho Archaeologist* will publish articles concerning archaeology in Idaho and those parts of abutting states and provinces included in the Columbia drainage and the Great Basin.

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DON E. CRABTREE (1912 - 1980)

by

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The end of 1980 saw the death of one of Idaho's most celebrated professional archaeologists, Dr. Don E. Crabtree. In addition to his internationally recognized achievements in stone-tool technology, his contributions provided a tremendous boost to Idaho archaeology and, in a sense, brought Idaho to the attention of the international archaeological community.

He was always an Idahoan at heart. Born in Heyburn in 1912 and raised in Salmon, he possessed a devotion to his home territory; and, although numerous opportunities for permanent relocation presented themselves, he resided in Idaho until his death on November 17, 1980.

From studying the list of his publications, one can see that his professional career spanned almost five decades. His earliest professional activities were in the 1930s when he was the supervisor of the vertebrate and invertebrate laboratory at the University of California at Berkeley working under Charles Camp and Ruben Stirton. Near this time he began working as a laboratory technician in anthropology with Alfred L. Kroeber and E. W. Gifford. He returned to Twin Falls in 1939 after being stricken with cancer and in 1941 gave his first major flintworking demonstration at the American Association of Museums Conference in Ohio. He soon secured a temporary position at the Ohio State Museum working with Henry C. Shethrone and H. Holmes Ellis replicating eastern United States stone tools.

After being interrupted by wartime duties he returned to his professional career when introduced to Earl H. Swanson, Jr., director of the Idaho State University Museum. In 1962 he opened the First Conference for Western Archaeologists on Problems of Point Typology held in Pocatello. It was here that Don's abilities as a stone-tool technician became nationally known. He achieved international recognition when he became a featured discussant and demonstrator with Francois Bordes and Jacques Tixier at the Les Eyzies Conference on Lithic Technology held in Paris in 1964.

For the next eleven years he held a position as Research Associate in Lithic Technology at Idaho State University. Dr. Crabtree began directing Idaho State University and National Science Foundation flintknapping field schools in 1969, and for five consecutive years this provided an opportunity for students to be formally trained in stone-tool manufacturing and analysis. The tradition of the field school was perpetuated through the Washington State University Lithics Laboratory where Don continued to be an invited lecturer. In 1975 he became Research Associate at the University of Idaho and was awarded an honorary Doctor of Science degree in 1979 by the university, an event that he considered to be the most important of his career.

It was apprpriate that an Idaho school chose to bestow on him the honorary Doctor of Science degree. The same coming from an out-of-state institution would have lacked the importance to Don that this honor carried.

Don's reputation brought many notable anthropologists to Idaho to consult with him, and he traveled to numerous sites in North America, Central America, and Europe. His interest in worldwide technologies is evident from his publications and the amount of time he spent replicating stone-tool manufacturing techniques of the Old World. Even with the wide diversity of data to study, he remained primarily interested in Idaho pre-history. One of his favorite possessions was a small plastic bag containing fragments of projectile points collected during his lifetime in southern Idaho. The contents of this bag provided the models upon which he based much of his research. When accused of surpassing the skills of the prehistoric stone-tool producer, his reply was a modest statement that he needed another lifetime of practice before he could approach the skill of the craftsmen who manufactured the contents of the bag.

Don's major contribution to archaeology was that he brought to the attention of professionals the idea that there were many distinct variations in stone-tool technologies above and beyond tool morphology. As Francois Bordes noted in an interview with a Twin Falls Newspaper, there could be a "pre-Crabtree era" and a "post-Crabtree era" in American archaeology. Prior to his contributions, stone tools were classified by either shape or assumed function. Today, few would consider classifying stone tools without taking into consideration the character of the flake scars, features of the margins, and other technical attributes that remained, for the most part, unrecognized prior to the Crabtree era.

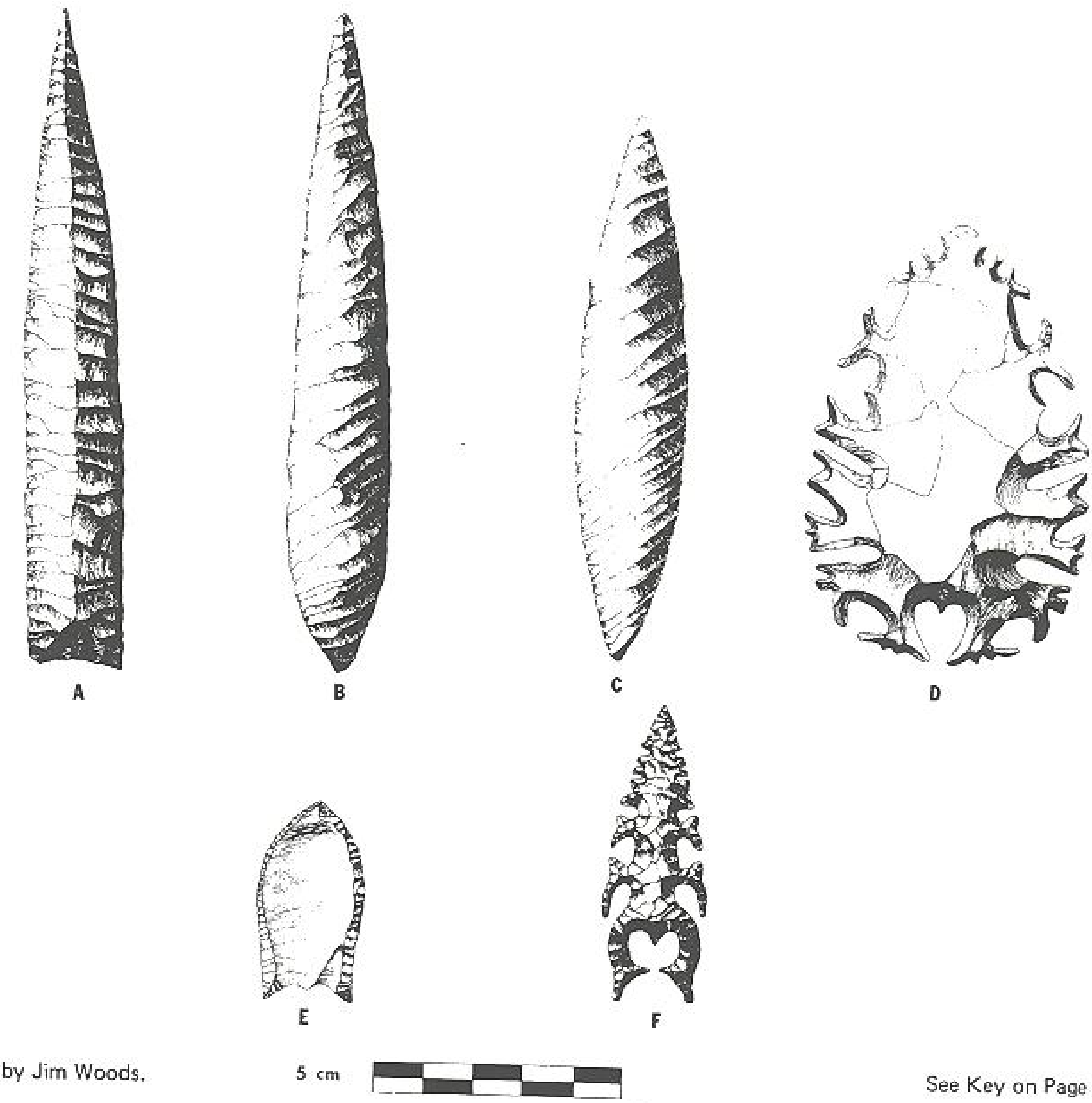
The practice of heat treating silicious materials was documented for the first time in a series of articles in *Tebiwa*, The Journal of the Idaho State University Museum (Crabtree and Butler, 1964). Subsequent articles provided a technical analysis of raw materials utilized by stone-tool makers (Crabtree, 1967a), and tools used in manufacturing chipped stone artifacts (Crabtree, 1967b). His experimental approach went beyond tool fabrication and included research into the function of various stone tools. He studied the utility of stone tools in manufacturing wood implements (Crabtree and Davis, 1968), and he introduced the concept that acute angles were not the only functional portion of stone artifacts (Crabtree, 1973b). Additional papers summarized experimental replication of specific tool types. Folsom Points (Crabtree, 1966), Meso-American Pressure Blades (Crabtree, 1968), Corbiac Blades (Bordes and Crabtree, 1969), and Hohokam Points (Crabtree, 1973) received individual attention, and although many others were replicated, the results of much of his research were not published. His best known publication is probably *An Introduction ot Flintworking* (Crabtree, 1972) which provided a substantial glossary of terms now common in archaeological literature.

Don was pleased to observe his students continue research in lithic technology. His later publications seem to echo his content and provide insight into what he deemed necessary for consideration of future stoneworkers (Crabtree, 1975 a,b).

Don was featured in five films that were produced in 1968 and 1969. These include: *The Shadow of Man, The Alchemy of Time, The Hunters Edge, The Flintworker,* and *Blades and Pressure Flaking.* He collaborated with authors such as Francois Bordes, Jacques Bordaz, and James Michener and served as a grant reviewer for the National Science Foundation. He was a member of the Society for American Archaeology, the Explorers Club, and the Sigma Xi. Although he considered himself officially retired, he continued to devote his time to students of archaeology. His last two years saw him travel to the Colha site in Belize, a knap-in in Casper, the University of Lethbridge, Washington State University, the Washington State University Flintknapping Field School in Stanley, Idaho, and the Idaho State University Field School in the Pahsimeroi Valley.

There is no denying the impact he had on contemporary archaeology. His students are too numerous to mention, and their impact can be seen worldwide. The publications pertaining to lithic technology become increasingly difficult to keep current with, and yet one is pressed to find references to technological attributes of stone tools prior to the Crabtree era.

Those who came to know Don Crabtree will probably remember him not as much for his academic reputation, but as a man who possessed expertise with humbleness, humor with dignity, and a contagious enthusiasm for his profession.



Drawing by Jim Woods.

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Figure 1. Samples of Dr. Crabtree's work. (Drawings by Jim Woods.)

A. Lanceolate Point. Black Glass Butte Obsidian. Collateral pressure flaking terminating along a well-defined ridge.

B. Lanceolate Point. Red Glass Butte Obsidian. Parallel diagonal pressure flaking using the "Titmus" technique of finger holding.

C. Lanceolate Point. Black Glass Butte Obsidian. Parallel diagonal pressure flaking using the "Titmus" technique. Most flakes run the full width of the point terminating on the opposite margin.

D. Eccentric. Brown Texas Chert. Thinned by percussion and finished by pressure retouch.

E. Folsom Point Replica. Tan Oakley Chalcedony.

F. Eccentric. White construction glass.

A PROGRESS REPORT ON THE OBSIDIAN AND VITORPHYRE SOURCING PROJECT

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ABSTRACT

Obsidian and vitrophyre artifacts are frequently recovered from archaeological sites in Idaho and elsewhere across western North America. These lithic materials appear in the earliest contexts and remained popular into the ethnohistoric period. Sources for these materials are limited by geological processes and the use of x-ray fluorescence makes it possible to correlate artifacts with their areas of origin. Such correlations enable archaeologists to reconstruct aboriginal patterns of procurement, production, and exchange networks.

INTRODUCTION

Obsidian and vitrophyre (sometimes referred to as ignimbrite) are frequently recovered from archaeological sites in Idaho and elsewhere across western North America. Artifacts made from these lithic materials are associated with radiocarbon dates of 10,000 BP at several of the oldest sites in the state, including Wasden-Owl Cave (Butler 1978:60-61, Knudson and Sappington nd.), Redfish Overhang (Gallagher, Sappington, and Wylie 1978; Sargeant 1973), and Hatwai (Ames and Green 1980). These materials remained in use as late as the 1830s in southern Idaho (Irving 1977:160) and they were the lithic materials preferred by the aboriginal groups who occupied central and southern Idaho: the Northern Shoshoni (Liljeblad 1958:30, Lowie 1909:173); the Northern Paiute (Kelly 1932:41), and the Nez Perce (Spinden 1908:184). Consequently, sources for these materials are often associated with quarries and workshops and archaeologists are quite interested in locating these areas.

A number of obsidian and vitrophyre sources in western North America have been described and the information is available in published form for the following: California (Ericson, Hagan, and Chesterman 1976; Jack 1976; Jack and Carmichael 1969; Jackson 1974); Utah (Nelson and Holmes 1979); British Columbia (Apland 1979; Nelson, D'Auria, and Bennett 1975; Nelson and Will 1976; Wilmeth 1973) and the northwestern Plains (Davis 1972a, 1972b; Frison, Wright, Griffin, and Gordus 1968; Love 1977; Murray, Keyser, and Sharrock 1977). However, little comparable research exists for Idaho and the available information is usually quite vague and of relatively little use. For example, the Timber Butte source was reported as two sources, and the material was described as occurring "only in small pieces unacceptable for tool making" (Davis 1972a:42). A more recent description of Timber Butte scarcely sounds like the same place, with the author stating that it is "a major obsidian outcrop adequate to meet industrial needs for all the Indians of this region and some other regions as well" (Wells 1980:3).

Prior to the initiation of the present study, only two attempts to correlate samples from Idaho sites had been conducted. The first of these compared samples from Veratic Rockshelter with sources in Yellowstone Park, Big Southern Butte, and others in Oregon and elsewhere across western North America (Wright, Griffin, and Gordus 1969). These authors correlated most of the Veratic collection with Yellowstone sources and suggested that one of the minor sources might be Silver Lake, Oregon (Wright, Griffin, and Gordus 1969:28). Because most of the Idaho sources were unknown at that time, those authors missed dozens of deposits closer to Veratic Rockshelter than Silver Lake and consequently their study is probably no longer valid. The second study was concerned with a sample from Redfish Overhang (Gallagher 1975:Appendix I) and is significant because it provided the first compilation of obsidian and vitrophyre sources in Idaho. Gallagher, however, omitted locational information for each source.

Despite their shortcomings, these studies are important because they demonstrate that: (1) sourcing projects could be applied to Idaho archaeology, (2) Idaho sources had indeed been used aboriginally, and (3) multiple sources were present in archaeological collections so that a prerequisite for subseqent studies would be locating and characterizing all known quarries.

This report represents the culmination of a project conducted from 1978 to the present which was supported in part by grants to the author from the Idaho State Historical Society and the Idaho Bureau of Mines and Geology. This project had two objectives (Sappington, Knudson, and Sprague 1979). The first involved the location, description, and chemical characterization of obsidian and vitrophyre sources in Idaho and adjacent states and provinces. Due to the cooperation of scores of archaeologists and geologists across the region, this objective has been achieved and we are now able to differentiate between sources with considerable reliability. The second objective was the determination of the significance of the various sources within the aboriginal economy. It has now become possible to reconstruct aspects of procurement and production for portions

TABLE 1

CLASSIFICATION RESULTS FOR THE SOURCE GROUPS AND ARTIFACTS FROM GIVENS HOT SPRINGS

SOURCE (CODE NO.)	NO. CASES	PREDICTED GROUP MEMBERSHIP 255	260	261	262	264	267	269	290	291	292	293	294	295	296	297	298
Whitehorse (255)	142	138 97.2%			3 2.1%	1 0.7%											
Coyote Wells (260)	10		8 80.0%	1 10.0%		1 10.0%											
Buckboard (261)	10		4 40.0%	5 50.0%		1 10.0%											
Petroglyphs (262)	20				20 100.0%												
Mesa (264)	8					8 100.0%											
Gregory Creek (267)	20						18 90.0%								2 10.0%		
F''rley Creek (269)	20					2 10.0%		18 90.0%									
Timber Butte (290)	55								55 100.0%								
Owyhee (291)	85							1 1.2%	1 1.2%	83 97.6%							
Camas Prairie 1 (292)	16										16 100.0%						
Camas Prairie 2 (293)	34	1 2.9%										27 79.4%				5 14.7%	1 2.9%
Paradise Valley (294)	29												29 100.0%				
Walcott (295)	20													20 100.0%			
Oneida (296)	30														30 100.0%		
Brown's Bench (297)	39					1 2.6%						6 15.4%				32 82.1%	
Big Southern Butte (298)	32																32 100.0%

SAMPLES CORRECTLY CLASSIFIED = 94.56%

TABLE 2

DISTRIBUTION OF OBSIDIAN ITEMS FROM GIVENS HOT SPRINGS

SITE	ITEM NO.		SOURCE GROUP	PROBABILITY OF THE CORRELATION P(G/X)
10-OE-60	79-80.6		Whitehorse	0.9998
	79-80.10		Timber Butte	0.7687
	79-80.12		Petroglyphs	0.6629*
	TP A	1	Timber Butte	0.7284
	"	2	Petroglyphs	0.9056
	"	3	Timber Butte	0.4572*
	"	4	Timber Butte	0.7755
	"	5	Timber Butte	0.9176
	"	6	Timber Butte	0.8256
	"	7	Timber Butte	0.6819
	"	8	Timber Butte	0.5191*
	"	9	Petroglyphs	0.9977
		10	Timber Butte	0.6686*
10-OE-1689	79-76.396		Coyote Wells	0.5841*
	79-76.89		Timber Butte	0.5293*
	79-76.350		Petroglyphs	0.6850
	79-76.199		Timber Butte	0.9962
	79-76.88		Owyhee	0.6454*
	79-76.215		Timber Butte	0.7032
	79-76.77		Timber Butte	0.7686
	79-76.15		Timber Butte	0.8327
	79-76.284		Mesa	0.6537*
	Feature 4	1	Timber Butte	0.9847
	"	2	Petroglyphs	0.9847
	"	3	Timber Butte	0.8758
	"	4	Owyhee	0.9664
	"	5	Timber Butte	0.9731
	"	6	Timber Butte	0.9731
	"	7	Timber Butte	0.8562
	"	8	Hurley Creek	1.0000
	"	9	Mesa	0.9025
	"	10	Petroglyphs	0.9025
	"	11	Timber Butte	0.8879

* Items with a probability of less than one standard deviation, 0.6800, are not accepted and are regarded as being from an unknown source.

of the region, especially in southwestern and central Idaho. Beyond that area, samples from fewer sites have been analyzed and consequently conclusions are more difficult to draw.

THE SOURCES

The formation of obsidian and vitrophyre is associated with the extrusion of igneous material from a silica rich, acidic magma pool. Because obsidian is formed as a viscous lava flow, it generally covers only a limited area, e.g. Glass Buttes in central Oregon (Alt and Hyndman 1978:188). The formation of vitrophyre is the result of ash flows which can spread across much greater areas quite rapidly, reaching distances of 162 km (100 mi) and covering areas as large as 26,244 km^2 (10,000 mi^2) (Cook 1962:15). Consequently, vitrophyre flows are much more problematical to delineate and samples collected at some distance from one another may represent different exposures of the same material. For example, samples collected near American Falls and Idaho Falls, some 113 km (70 mi) apart, were originally thought to represent two sources (Sappington 1978) but chemical similarities and geological studies (Trimble and Carr 1976:50) indicate that they represent the same formation.

In some areas, recent geological events have led to the extrusion of obsidian at, for example, Medicine Lake, in north central California, which is radiocarbon dated some 1100 years BP (Jack 1976:185). Where artifacts of Medicine Lake obsidian appear in archaeological contexts, they provide extremely reliable relative time markers and it was hoped that a similar situation would be found in Idaho. However, sources in Idaho date from 9,000,000 to 300,000 years BP (Bennett 1976:Fig. 4; Kuntz 1978) and it may be assumed that all sources in Idaho predate human occupation and were all equally available for aboriginal use. Subsequent erosion of the Idaho sources has redistributed material across broad areas so that intact formations are virtually absent and the material generally appears mixed with gravel. As a result, most source areas are far from impressive and in general they are concentrations of nodules rather than discrete formations. Parenthetically, many of the sources discussed here have not been previously reported, and in those cases the names employed here reflect the most prominent geographical landmark.

THE METHOD

Each obsidian and vitrophyre source has a distinctive chemical composition because each is extruded from a different magma pool. As a result, the trace elements present in each source are unique and it is possible to obtain a characteristic "fingerprint" for every source. X-ray fluorescence was selected as the method for this analysis because it is non-destructive and provides rapid results. The system employed consists of a Tracor Northern NS-880 instrument, a Nuclear semiconductor, a silicon (lithium) detector with an americium radioactive source and a dysprosium target, attached to a PDP 11/05 computer and a Decwriter II printer. Each item is analyzed for a 300 second counting period in free air. The intensities of ten trace elements—iron (Fe), rubidium (Rb), strontium (Sr), yttrium (Y), zirconium (Zr), niobium (Nb), tin (Sn), barium (Ba), lanthanum (La), and cerium (Ce)—are recorded on printouts for each sample. Conversion of the intensities of Rb, Zr, and Ba and Rb, Zr, and Sr to ratios provides data used for ternary plotting. Direct comparison between the graphs for sources with graphs for samples from archaeological sites provides a rapid and relatively reliable means of assigning artifacts to their sources. The large number of sources characterized to date, however, has resulted in some overlapping on the ternary graphs. Therefore, a much more positive statistical method has been recently devised. The application of the Statistical Package for the Social Sciences (SPSS) DISCRIMINANT subprogram (Nie, Hull, Jenkins, Steinbrenner, and Bent 1975) and MAHAL stepwise method enables the use of all elements to characterize sources and for the correlation of artifacts with them. The test case compared 16 sources in southwestern Idaho, eastern Oregon, and northern Nevada (Figure 1 and Table 1) with a sample from two sites at Givens Hot Springs (Figure 2).

THE RESULTS

Several extremely important results were produced by this analysis. First, the source groups were compared with one another and the various elements were ranked by their degree of discriminating power. The element responsible for the most variability was Zr (38.06%), followed by Rb (27.48%), Ba (22.62%), Y (6.97%), Fe (2.38%), Ce (4.49%), Sn (0.64%), La (0.24%), Sr (0.11%), and Nb (0.01%). The elements are grouped in a stepwise manner in an increasing number of combinations so that Zr alone accounts for slightly over 38% of all intersource variability, while in combination with Rb the two elements account for nearly 66% of all variance and so forth. The relative discriminating power of the various elements is dependent on the particular sources being analyzed and cannot be considered a constant. In a similar study of Utah obsidian that used five elements in common with this project, the most useful one was Fe, followed by Ba, Rb, Zr, and Sr (Nelson and Holmes 1979:Table IV).

A second major result of this analysis was that nearly 95% of all samples could be classed according to source and only slightly over 5% were incorrectly classified. Nearly all the overlap between the sources resulted from the inclusion of samples from adjacent areas initially regarded as individual sources. The discriminant analysis demonstrated that four areas in east central Oregon—Mesa, Coyote Wells, Buckboard and Hurley Creek—chemically overlap with one another (Table 1) and apparently represent different locations for similar material, rather than four distinct sources. The remaining overlap between the sources is probably due to the inclusion of intrusive artifacts within the source samples, and also probably does reflect a slight degree of chemical similarity between different sources.

Each of the artifacts from Givens Hot Springs was assigned to a source group and the probability of the correlation is listed in the right-hand column of Table 2 under the heading P(G/X). Because discriminant analysis assigns all ungrouped items to source groups, it is possible that artifacts from sources not known or not included in this analysis have been assigned to improper groups. Therefore, those items with a probability of less than one standard

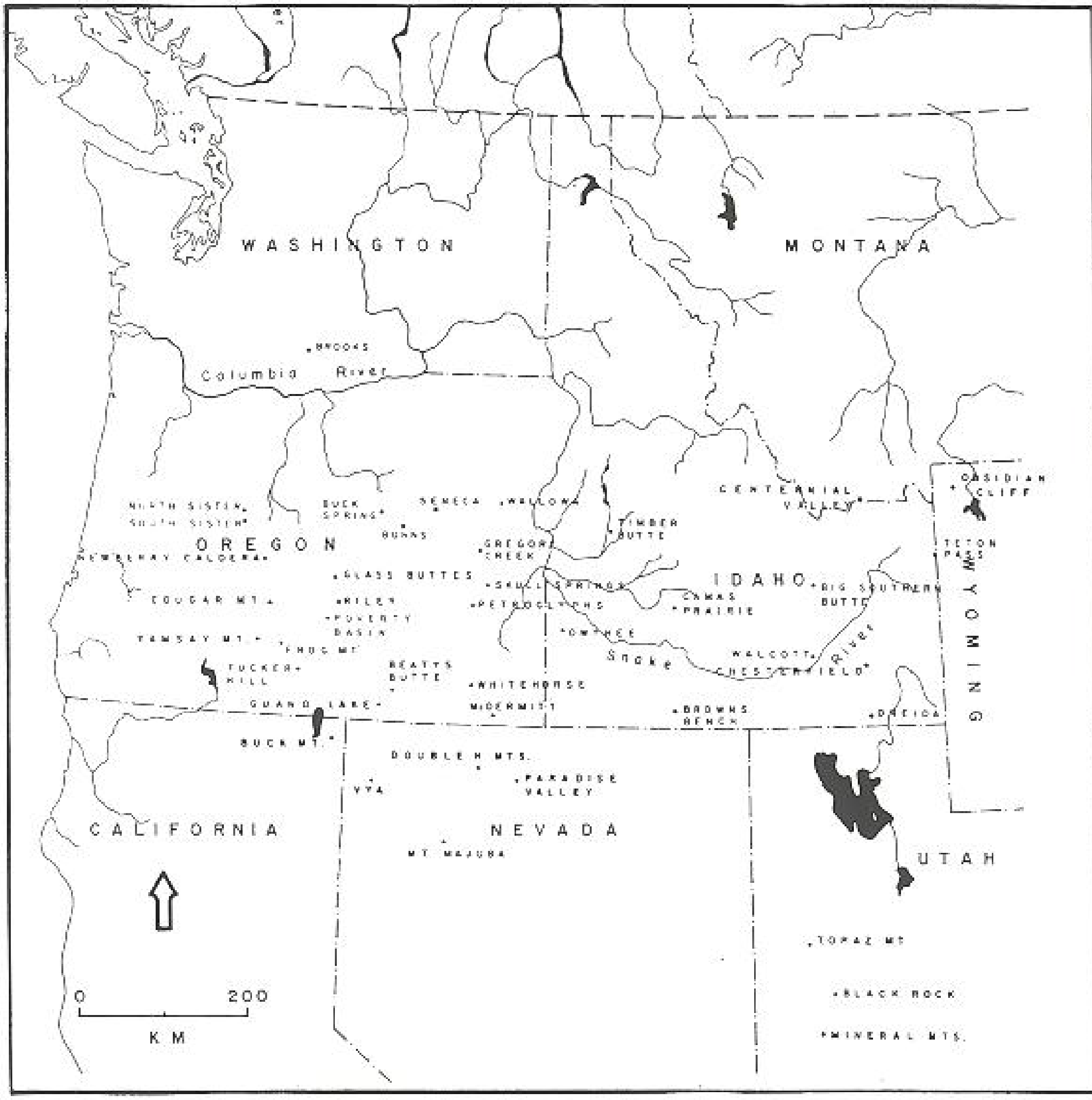

Figure1. Obsidian and vitrophyre sources characterized across the region.

deviation, 0.6800, are considered as unacceptable and are not included in the following observations.

There are a total of five sources included in the collection from Givens Hot Springs with multiple sources present in both components. The earlier component from 10-OE-1689 is associated with a series of radiocarbon dates between 5120 ± 100 (TX 3653) and 4060 ± 100 (TX 3655) (Thomas J. Green: personal communication). The most frequent source is Timber Butte (62.5%), followed by Petroglyphs (19%), Hurley Creek and Mesa (12.5%), and the nearest source, Owyhee (6%). The small collection from the later component at 10-OE-60 is dated typologically to within 1000 BP (Thomas J. Green: personal communication). The results from this site are similar to the earlier one, with Timber Butte again most frequent (66.7%), followed by Petroglyphs (22.2%) and a single point from Whitehorse (11.1%). Perhaps the most striking conclusion from this analysis is the virtual absence of the semi-local Owyhee source at these sites. Only a single item is present in the earlier component while it is absent in the later one, and overall represents only 5% of the total. Obviously, the occupants of the sites at Givens Hot Springs procured their obsidian from sources other than the local Owyhee material.

The success of the Givens test case indicates that discriminant analysis should be applied to other collections across the region. However, at this time only the data provided by the ternary graph method is available. The Givens analysis shows that for sources in southern Idaho, eastern Oregon, and northern Nevada, the elements Rb, Zr, and Ba account for 88% of intergroup variability. Supplemented by Rb, Zr, and Sr which together account for 66% of intersource variability, the ternary graph method remains relatively reliable and has the definite advantage of being much more rapid to conduct. The applicability of these two suites of elements to sources in other parts of the region may not be as reliable.

The preliminary results presented below are included

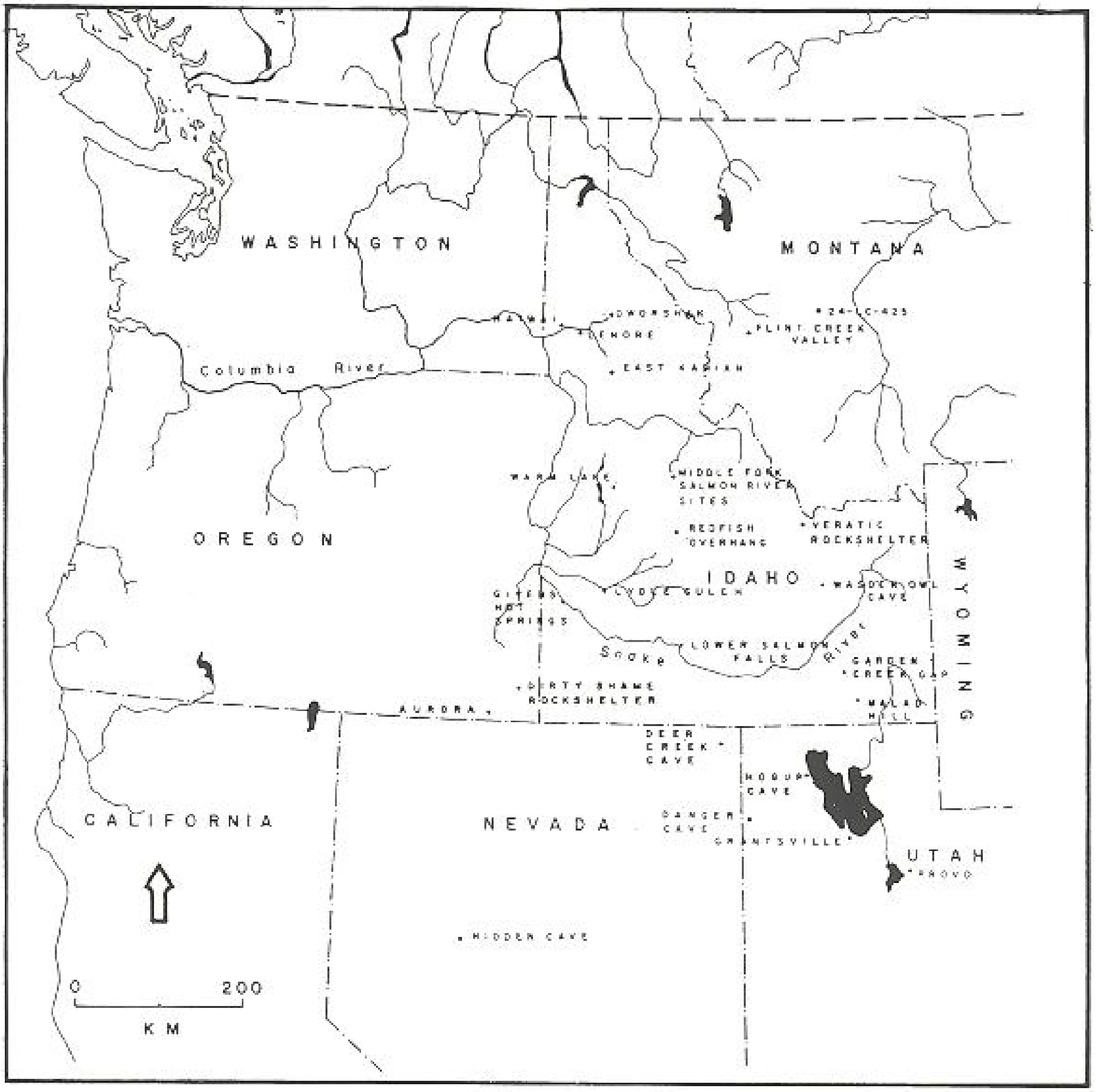

Figure 2. Archaeological sites mentioned in the text.

here because they represent a major portion of this project, but the results should be regarded as tentative until they can be cross-checked by discriminant analysis.

The largest body of data on aboriginal procurement of obsidian and vitrophyre sources has been accumulated from sites in southwestern Idaho. At the Lydle Gulch site 13 km (8 mi) east of Boise on the Boise River, a collection of 782 items has been analyzed. This site was occupied from approximately 4500 BP until just prior to the protohistoric period, and the six natural strata include two components (Sappington n.d.a.). The nearest source, Timber Butte, dominates in all strata while the various secondary sources fluctuate considerably through time. The Camas Prairie sources are present in all strata, but they continually decrease in frequency throughout time while the Owyhee source, which represents 11% of the total in the next to oldest stratum, steadily increases to 23% of the uppermost stratum. Minor sources present in both components include Big Southern Butte and Brown's Bench from south central Idaho, and the Skull Springs and Wallowa sources from eastern Oregon.

Another large but undated collection was obtained from the surface of one of the ethnographically most important fishery sites in the area, Lower Salmon Falls. Here the nearest geographic source, Brown's Bench, again predominated, followed by several secondary sources including Camas Prairie, Walcott, Big Southern Butte, and Paradise Valley, Nevada. The ethnohistoric record clearly emphasizes the importance of this fishery to visitors from eastern Idaho and northern Nevada (Steward 1938:166-169) and the x-ray fluorescence data support that model archaeologically (Moe, Sappington, and Eckerle 1980).

In central Idaho, the oldest collection analyzed is from the Haskett component at Redfish Overhang associated with radiocarbon dates of 10,100±300 BP and 9860±300 BP (WSU 1396, WSU, 1395; Sargeant 1973). A cache of 13 obsidian and vitrophyre items as well as several isolated artifacts were among the material recovered. The x-ray fluorescence analysis indicates that the cache items were made from Camas Prairie material, while the sources for the remaining items include Timber Butte and an unknown source (Gallagher, Sappington, and Wylie 1979). Among a surface sample of items collected at 55 sites along the Middle Fork of the Salmon River (Sappington n.d.b.), Timber Butte was the major source accounting for 83% of the total of 260 items. Several secondary sources also present include Centennial (14.5%), Big Southern Butte and Obsidian Cliff in Yellowstone Park (each accounting for 1%), and a single item from Camas Prairie (0.38%). Timber Butte was the exclusive source among a collection of 20 items from Warm Lake (Sappington 1979) as well as at East Kamiah (Waldbauer, Knudson, Fuhrman, and Dechert 1981). Several sources were represented in collections from a number of sites along the Clearwater River drainage. The major source at the Hatwai and Lenore sites (Ames and Green 1980) and at a number of sites now under Dworshak Reservoir (Mattson, Knudson, Sappington, and Pfeiffer n.d.) was Timber Butte, with minor sources including Wallowa in northeastern Oregon and possibly Obsidian Cliff in Yellowstone Park. At Hatwai, a Hasket point base from Timber Butte was associated with a radiocarbon date of 9850±870 BP (Tx 3158) which corroborates the early procurement from that source as indicated by the Redfish Overhang analysis.

The archaeological record for aboriginal obsidian and vitrophyre procurement in eastern Idaho is not yet well known. Analysis of items from the 12,000 BP (Butler 1978:60-61) Folsom component from Owl Cave at the Wasden site indicates that the major source was Big Southern Butte, followed by several as yet unidentified minor sources (Knudson and Sappington n.d.). At two sites at Malad Hill near the Utah border (Swanson and Dayley 1968), the semi-local Oneida source was the major one, although Brown's Bench, Big Southern Butte, and an unknown source were also represented (Green n.d.). At the nearby Garden Creek Gap site, the Oneida source accounted for all 39 items analyzed (Green n.d.).

Samples from several sites in western Montana have also been analyzed. Material from the Centennial source predominates at several sites in the Flint Creek Valley, followed by material from Yellowstone Park and Timber Butte (Flint and Sappington n.d.). A large biface fragment from 24-LC-425 was also correlated with the Centennial source. Preliminary indications for western Montana suggest that the Centennial source will be the major resource for sites in that area (Murray, Keyser, and Sharrock 1977).

In Utah, other researchers (Nelson and Holmes 1979) have recently demonstrated that the Oneida source was important at sites in the Provo and Grantsville areas. Their results are supported by recent analysis of samples from Hogup and Danger Caves as part of this project (Green n.d.). Future work should detail the extent of the Oneida source in Utah as well as the northern appearance of the Utah sources.

Several sites in Nevada have also been analyzed. At Deer Creek Cave (Shutler and Shutler 1963), x-ray fluorescence indicates that the nearby Brown's Bench source was most popular, with supplemental material being obtained at other Nevada sources including Paradise Valley (Green n.d.). Preliminary results from the analysis of samples from Hidden Cave in central Nevada suggest that a minor amount of material from Paradise Valley may appear in that area, although the predominance of unknown sources may indicate procurement from sources in California (David H. Thomas:personal communication). Additional work is necessary before we will be able to assess the extent to which the inhabitants of Utah and Nevada used the sources in southern Idaho.

Finally, several sites in southeastern Oregon have been included in this project. The results indicate that a limited degree of interaction occurred between the aboriginal inhabitants of that area and southwestern Idaho. At Dirty Shame Rockshelter, obsidian and vitrophyre artifacts were recovered from a series of zones associated with radiocarbon dates between 9500-400 BP (Aikens, Cole, and Stuckenrath 1977). The Whitehorse source was the major one here, followed by Paradise Valley, but the Owyhee source was also present in four zones that spanned the occupation sequence (Hanes 1980; Sappington 1980a). The information from Dirty Shame suggests that, at least with regard to the procurement of obsidian and vitrophyre, the aboriginal occupants of southeastern Oregon obtained most of their material from areas to the west and south. This model is also supported by the analysis of samples collected from several other sites southwest of Dirty Shame Rockshelter (Minor 1980). Material from these sites was obtained from the same sources present at Dirty Shame, with a single point correlated with the Owyhee source (Sappington 1980b). Apparently, the abundance of sources in eastern Oregon and northern Nevada negated the procurement of material from the Idaho sources.

CONCLUSIONS

At this point the dual objectives presented in the original proposal, the identification of the obsidian and vitrophyre sources and a determination of their archaeological significance, have been realized. Samples from nearly all known sources in Idaho and adjacent states and provinces have been obtained and analyzed. However, standard procedure in projects like this one usually requires a minimum of 20 samples per source in order to account for intraflow variability and therefore only one of the Utah sources has been adequately characterized, while none of those in British Columbia have been. In addition, several sources in Nevada have been recently reported from which no samples have yet been obtained. So, this report represents a phase of this project, but certainly not a final report. It is quite probable that other sources will continue to be discovered intermittently into the forseeable future.

Similarly, while thousands of samples from hundreds of sites have now been analyzed, the only portion of the region where these samples have been concentrated in sufficient number to provide a large data base is in southwestern and central Idaho. In this area, we are beginning to be able to draw fairly specific conclusions. For example, at Lower Salmon Falls the presence of obsidian from northern Nevada and eastern Idaho provides physical documentation of the ethnohistoric pattern and suggests that the situation encountered by the first Euroamericans had been in effect for some time well prior to their arrival. Similarly, the presence of Oregon obsidian at Givens Hot

Springs and Lydle Gulch coincides with historic reports of people from southeastern Oregon in those vicinities. As a corollary, the absence of Idaho obsidian in Oregon may reflect the relative sedentarism afforded these people by the local salmon fisheries. Shoshoni informants referred to their relatives in western Idaho as "those who do not roam" (Hoebel 1938:412).

Another aspect of aboriginal lithic procurement which we are beginning to reconstruct is concerned with production at the source areas. On-site analysis of quarry/workshop material has been done at only a few sites, such as at Brown's Bench, where numerous bifaces were fabricated from the abundant supply of large nodules (Barnes 1964; Bowers and Savage 1962). X-ray fluorescence has correlated artifacts from numerous sites such as Lydle Gulch, Malad Hills, and Deer Creek Cave with the Brown's Bench source. This information adds another dimension to our understanding of that resource by demonstrating that it functioned as an important lithic material on a regional scale.

Analysis of materials correlated with other sources indicated that another much different production strategy may have been in effect elsewhere. For example, on-site investigations at Timber Butte reveal little evidence of production, although this material was in widespread use across most of central and eastern Idaho. It appears that at this source, the material was collected and transported to habitation sites where it was later reduced as the need for tools arose. Much more analysis at the source(s) and in archaeological collections will be required before a reconstruction of the various production systems is available, but x-ray fluorescence demonstrates that the potential for such research certainly exists.

It is generally well known that the majority of the aboriginal inhabitants of Idaho and the surrounding region were highly mobile people who employed a number of dynamic procurement strategies in order to obtain seasonally abundant resources such as salmon and camas, as well as spatially restricted ones such as lithic materials. Although evidence for most of these activities does not survive in the archaeological record, it is fortunate that aspects of lithic procurement and production are available. X-ray fluorescence analysis provides evidence to support the ethnohistoric patterns to a considerable degree and demonstrates that at least a portion of the situation recorded in the 19th century was part of a continuum that extended back some 10,000 years into prehistory.

EDITOR'S NOTE:

We are extremely gratified to be able to publish the foregoing article by Lee Sappington. It represents an important step forward in the capability to determine trade and migration patterns of the past. It is anticipated that these analytical procedures, or something akin to them, can be extended to other lithic materials.

Mr. Sappington indicated during a recent conversation that, although his study grant has expired, he is still desirous of receiving samples of obsidian or other vitrophyres from new or suspected new quarries or sources. Such samples will be welcomed from any reader and should be collected and sent to him in care of: The Laboratory of Anthropology, University of Idaho, Moscow, ID 83843. Samples may also be delivered or sent to the State Archaeologist, 210 Main Street, Boise, ID 83702.

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APPENDIX

THE SOURCE DESCRIPTIONS

IDAHO

BIG SOUTHERN BUTTE
Butte County

An obsidian flow on this prominent landmark is dated at 300,000 years BP (Kuntz 1978). Bands of obsidian are reported near the summit (Asher 1965:48) and it occurs occasionally as very large cobbles some 50 cm in diameter (James P. Green 1979: personal communication). The samples employed to characterize this source were collected by Green from the vicinity of Webb Spring in T1N, R29E, sec. 1. Big Southern Butte obsidian is quite variable in appearance ranging from a translucent black to nearly transparent. This source is well characterized, with more than 20 samples having been analyzed.

BROWN'S BENCH
Twin Falls and Cassia Counties

This vitrophyre source covers extensive portions of south central Idaho in Twin Falls and Cassia Counties. A series of ignimbrite flows cap many of the peaks in the Cassia Mountains and several dates in the range of 9185-9.3 million years BP have been reported (Bennett 1975:Fig. 4). This material has been eroded and transported considerable distances and occurs as far north as the vicinity of Hollister in T13S, R17E, west 1/2 sec. 6 (Asher 1965:31). Samples collected by the author from the vicinity of Roseworth, in the gravels of Rock Creek in the Sawtooth National Forest, and on Brown's Bench itself correlate closely with samples provided by Joseph G. Gallagher from Mahogany Butte. Portions of an area of some 2600 km^2 (1000 mi^2) may therefore be considered within the source area. Brown's Bench vitrophyre is universally opaque and generally free of visible phenocrysts and is variable in color, ranging from black to brownish red to lavender. This source is well characterized.

CAMAS PRAIRIE
Camas County

Two chemically quite different and distinctive sources co-occur near Fairfield in T2S, R15E, sec. 36. One source is apparently obsidian and referred to in this project as Camas Prairie #1, while the other may be a vitrophyre and is referred to here as Camas Prairie #2. A K-Ar date of 10.7 million years BP has been determined from the silicic volcanic events in the Mount Bennett Hills located southwest of Fairfield (Bennett 1975:Fig. 4). Subsequent glaciation and other geological activities have affected these flows considerably so that two discrete source areas may no longer exist. Recent archaeological reconnaissance in the area has located macroscopically different vitrophyre quarries to the east in Blaine County (Warburton and Hanson 1980) and other quarries have been reported to the south (Cinadr 1976). Further work is necessary in this area to discern whether or not the two Camas Prairie sources can be better differentiated.

CENTENNIAL
Clark, Fremont, Jefferson, and Teton Counties in Idaho
Beaverhead County, Montana

The Centennial source is distributed across the north and south flanks of the Centennial Mountains. This material has been variously reported as an obsidian welded tuff (Murray and others 1977) as well as an ignimbrite (Kimball 1976) but it appears best to refer to it as a vitrophyre. The related rhyolite intrusions in the Centennial flows are early to late Pliocene in age (Hamilton 1975:C2) and have been associated with a date of 1.03 million years BP (Bennett 1976:Fig. 4). This source area has been reported in several contexts by various names. It was reported as the first obsidian source in Montana (Murray and others 1977) while in Idaho it has been reported as both the West Camas Creek source and the Spring Creek source(Gallagher 1975:Appendix I) and a quarry area of this material provided a thesis project (Kimball 1976). This source is very well characterized with samples provided from sites 24-BE-33, 24-BE-58, and 24-BE-64 in Montana and from Bear Gulch T12N, R38E, NE 1/4 sec. 16, Spring Creek T13N, R38E, SE 1/4 sec. 15, Reas Pass T14N, R45E, center sec. 2. Several other locations apparently also represent the same source.

CHESTERFIELD
Caribou County

This obsidian source was recently reported by David Corliss in T6S, R38E, sec. 9 and 10 and additional samples were collected across a broader area in T6S, R37E and R38E by James P. Green. Rhyolite flows in the area to the east date from the Miocene-Pliocene periods (Asher 1965:47-48) and may provide a bedrock source for the float material collected by Corliss and Green. Further reconnaissance in the area may be necessary before we can consider this source to be well characterized although the samples provided have been adequate.

ONEIDA
Oneida and Bannock Counties

This obsidian source occurs in pumice and perlite deposits at a number of locations. Its distribution has resulted in its being assigned a number of names with the earliest known report referring to it as the Oneida source (Frison and others 1968) and more recently as the Malad source with samples collected in Elk Horn Canyon (Nelson and Holmes 1979). This source has also received considerable attention in the geological literature because it is the largest known perlite deposit in Idaho (Staley 1962). It has been dated as Late Tertiary (Asher 1965:Fig. 1). The most accessible deposit of the Oneida source is in the pumice deposits mined by the Hess Pumice Company in T12S, R35E, NW 1/4 sec. 4. Oneida obsidian occurs in relatively large nodules and is usually a transparent black, although occasionally it may also be mixed with red. This source is well characterized.

OWYHEE
Owyhee County

Owyhee obsidian occurs as small nodules over a broad portion of northern Owyhee County. Nodules are present in gravel deposits on both slopes of the northwest-southeast trending Owyhee mountain range across an area some 1600 km^2 (600 mi^2). The Owyhee source has been associated with K-Ar dates of 13.8–9.5 million years (Bennett 1976: Fig. 4) and the obsidian in the area is Pliocene or older in age (Earl H. Bennett 1980: personal communication). Owyhee obsidian is usually translucent or nearly transparent and is black in color. Samples were collected along the road between the Oreana and Triangle localities and additional ones have been provided by other archaeologists so that this source has been extremely well characterized.

TIMBER BUTTE
Gem and Boise Counties

Timber Butte obsidian occurs on Timber Butte as well as in gravel deposits along the Squaw Creek Valley and its tributary streams for some 16 km (10 mi) covering portions of 16 km^2 (10 mi^2). This material is related to the flows in the Owyhee Mountains and is approximately equal in age (Earl H. Bennett 1980: personal communication). Nodules collected on Timber Butte in T8N, R2E, SE 1/4 sec. 6 are chemically identical with those collected from a number of locations along Squaw Creek Valley where they have been redeposited. Timber Butte obsidian is often nearly transparent or sometimes a translucent black and commonly contains black bands. The Timber Butte source is very well characterized.

WALCOTT
Power and Bonneville Counties

The Walcott source has been identified at a number of locations between Neely, southwest of American Falls, and Ammon, southeast of Idaho Falls. This material is part of the Walcott Tuff Formation and it has been associated with radiometric dates of 6.7 ± 0.4 million years BP and 61. ± 0.3 million years BP (Trimble and Carr 1976:50). An excellent exposure of the Walcott Tuff is visible upstream from the Hunt Party Historical marker south of Neely in Power County in T8S, R30E, SW 1/4 sec. 29. Large nodules up to 25 cm in diameter are available in numerous locations in the vicinity of American Falls including the city dump in Ferry Hollow, T8S, R31E, NW 1/4 sec. 6. Near Ammon smaller nodules occur in the Pumice Pits in T2N, R38E, sec. 23. Walcott vitrophyre is an opaque black and often contains white spherulites as large as a cm in diameter. This source has been well characterized.

WYOMING

Note: Samples collected in 1968 by George Frison, the Wyoming State Archeologist, were loaned by Tom Larson of that office for analysis as part of this project. Detailed information as to the location of some samples does not exist. X-ray fluorescence similarities between several sets of samples indicates that they are different exposures of the same material.

CONANT PASS
Teton County

Several samples from T47N, R117W, sec. 16 loaned from the Wyoming Archaeological Survey are black and opaque and apparently are vitrophyre. Additional samples should be obtained before this source can be considered adequately characterized.

OBSIDIAN CLIFF
Yellowstone National Park

This is probably the best known source in North America. Samples collected by the author at the Cliff itself and in the vicinity of Crystal Springs Patrol Cabin several km to the north are chemically identical with one another. This material is a translucent to nearly opaque black and often contains visible phenocrysts up to several mm in diameter. This source is well characterized, but samples reported from other areas in Yellowstone Park should also be analyzed to determine whether or not they represent different exposures of the same material or discrete sources as reported by the initial analyses (Griffin and others 1969; Wright and others 1969).

TETON PASS/FISH CREEK/MOSQUITO CREEK
Teton County

Samples of obsidian collected from the Teton Pass quarry T41N, R119W (no section provided) correlate with samples from the Fish Creek Quarry (no location provided) and with a group of nodules from Mosquito Creek, T41N, R117W, sec. 10, provided by George Ziemens, Wyoming Associate State Archaeologist. The Teton Pass Quarry and Fish Creek Quarry material consists of a number of large worked bifaces which suggest that this is an important source area where more definitive work should be conducted. This material is generally a black translucent to nearly transparent obsidian.

UTAH

Note: Samples from all known sources in Utah were provided by Fred W. Nelson of Brigham Young University. With the exception of the Mineral Mountains source where additional samples have been provided by Michael P. Benson of the Division of State History, these sources are all underrepresented and additional samples are required in order to adequately characterize them. The sources and their chemistry are reported by Nelson and Holmes (1979).

BLACK ROCK
Millard County

Samples from several areas, possibly different sources, were provided by Dr. Nelson with three samples from source 8, one from source 9, two from source 12, and one from source 13. These sources are located across a broad area but additional samples are required to assess their significance as determined by our system.

MARYSVALE
Piute County

A single sample was provided from T27S, R4W, sec. 24. Additional samples are necessary to characterize this source.

MINERAL MOUNTAINS
Beaver County

Samples have been provided from the vicinities of the Schoo Mine, Wild Horse Canyon, and the Pumice Hole Mine across an area of two townships and a number of sections in T27S and T28S and R9W.

MODENA
Iron County

One sample each from sources 7a and 7b (apparently the same source) were provided from T35S, R19W, sec. 12.

TOPAZ MOUNTAIN
Juab County

Obsidian nodules occur in several locations in the vicinity of Topaz Mountain. Dr. Nelson provided five samples from T12S, R11W, sec. 28, 30 and 31. Additional samples are required to characterize this source.

NEVADA

Note: A number of sources are present in Nevada. Samples from many previously unreported sources have been provided by John Roney of the Winnemucca District, Bureau of Land Management. Several additional sources from which no samples have yet been obtained have been reported by David H. Thomas, American Museum of Natural History.

BOX SPRING
Nye County

Float obsidian is reported from the central Monitor Valley in T13N, R47E, sec. 19 Mount Diablo Meridian (MDM) (David H. Thomas: personal communication).

CROW SPRING
Esmeralda County

Several samples were provided by David H. Thomas from T5N, R43E, NE 1/4 of sec. 32 MDM. Additional samples are required to adequately characterize this source.

DOUBLE H MOUNTAINS
Humboldt County

This source appears in a number of areas and represents a major aboriginal quarry area (John Roney 1980: personal communication). This source was also characterized by Nelson and Holmes who referred to it as the "Sentinel Peak area" (1979). Samples have been provided from several locations including T44N, R36E, sec. 19, and T43N, R35E, sec. 24, MDM. This source is well characterized.

KANE SPRING WASH
Lincoln County

Dr. Nelson provided a single sample (referred to as #15 by Nelson and Holmes) from T11S, R63E, sec. 20 MDM. Additional samples are required to properly characterize this source.

MOUNT MAJUBA
Pershing County

Obsidian nodules occur in a number of locations in the vicinity of Mount Majuba including the Seven Troughs Mountains where a quarry area was reported for a thesis project (Toney 1972). Samples have been provided from a number of locations including the Seven Troughs quarry area in T31N, R29E, sec. 4, MDM. This source is well characterized.

PARADISE VALLEY
Humboldt County

Obsidian nodules are present in a number of locations in the vicinity of the Santa Rosa Mountains and in the Little Humboldt River Valley. This source has been well characterized by samples provided by several archaeologists, but specific locational information has not always been provided. One location is in T41N, R43E, NW 1/4 of sec. 31, MDM. This source is well characterized.

SILVERPEAK
Esmeralda County

Obsidian is reported in T2S, R39E, no section provided, MDM (David H. Thomas; personal communication).

VYA
Washoe County

The Vya source has been reported as occurring across most of Washoe County (Jack 1976). Samples provided from the Dolly Varden area in T35N, R22E, sec. 7, MDM probably represent this source. Further samples from additional areas are required to adequately delineate and characterize this material.

WHITE ROCK CANYON
Nye County

Obsidian is reported in T8S, R47E, sec. 19, MDM (David H. Thomas; personal communication).

OREGON

Note: There are more sources located in Oregon than in any other state in North America. Through the efforts of a number of archaeologists, we have located samples from all reported areas and many others for which there are no published reports. The frequency of the sources and their proximity to one another has made the ternary graph method less than satisfactory in a number of cases. The successful application of discriminant analysis to several of the easternmost sources relative to Givens Hot Springs should be continued for other sources. They are included here for reference purposes, but only locational information is provided because their macroscopic attributes are extremely diverse and their geology has not yet been fully outlined. All locations are relative to the Willamette Meridian (WM).

BEATY'S BUTTE
Harney and Lake Counties

Obsidian occurs on the north and west sides of Beaty's Butte in T36N, R29E, sec. 11 and 19 WM plus other locations. Samples were provided by Bill Cannon, Lakeview District, BLM, and John Loring, University of Oregon, Eugene. This source is well characterized.

BUCK SPRING
Crook County

Vitrophyre (and/or obsidian) samples were provided from T20S, R25E, SE 1/4 Sec. 22, WM by Cindy Swanson and Gary Reinoehl of the Ochoco National Forest.

BURNS
Harney County

A series of well known obsidian flows occur northwest of Burns with material available in a number of locations including T23S, R30E, sec. 27, WM. This source is well characterized.

COUGAR MOUNTAIN
Lake County

Obsidian occurs on Cougar Mountain and in the adjacent gravel deposits. Samples were provided from T25S, R15E, sec. 24 WM by Bill Cannon, BLM and by Kathy Toepel and Rick Minor of the University of Oregon. This source is well characterized.

FROG MOUNTAIN
Lake County

Obsidian occurs in several areas and samples have been provided from T30S, R14E, SW 1/4, sec. 11 WM by Hugh Burten of the Fremont National Forest. This is a well characterized source.

GLASS BUTTES
Lake County

This source is well known for its frequently occurring red and black "mahogany" obsidian. Samples occur on the buttes as well as in the surrounding outwash across T23S, R22E; sec. 15, 16, 21, 22 WM and beyond. This source is well characterized.

GREGORY CREEK
Malheur County

Obsidian samples were provided from T18S, R40E, SE 1/4, sec. 29 and SE 1/4 sec. 31 WM, by Duane Marti, Vale District, BLM.

McDERMITT AREA
Malheur County

Several samples were provided from T40S, R41E, NE 1/4 of sec. 36 WM, by Duane Marti, Vale District, BLM.

NEWBERRY CALDERA
Deschutes County

This well studied obsidian flow has been associated with radiocarbon dates some 1900 years BP. Samples were obtained from T22S, R12E, sec. 1 WM. This source is considered to be well characterized.

PETROGLYPHS
Malheur County

Samples were provided from T28S, R37E, NW 1/4, sec. 24 WM by Duane Marti, Vale District, BLM.

POVERTY BASIN/HORSE MOUNTAIN
Lake County

Obsidian samples were provided by Bill Cannon, Lakeview District, BLM from along a 16 km road transect in Poverty Basin west of Horse Mountain in T28S, R21E, and R22E WM. This material is macroscopically variable but chemically unique in central Oregon.

RILEY
Harney County

This obsidian source is located along U.S. Highway 395 and samples from T24S, R26E, NW 1/4 of sec. 29 WM, collected by James M. McKie, University of Idaho, Moscow, were used to characterize it.

SKULL SPRINGS AREA
Malheur County

This source occurs across a broad area at a number of locations. The original samples were from T24S, R40E, WM. The discriminant analysis indicates that the same material is also present at Coyote Wells—T23S, R41E, sec. 8; Mesa Reservoir—T22S, R41E, sec. 22; Buckboard Reservoir—T22S, R41E, sec. 34, and other localities in the area. Duane Marti, Vale District, BLM, provided most of the samples. This source is well characterized.

INCISED STONES FROM THE PEND O'REILLE RIVER AREA, NORTHERN IDAHO

by

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ABSTRACT

This paper describes twelve incised stones from the Pend O'Reille River area.

A number of recent papers (Huntley and Nance 1979; Plew 1977, 1981) have focused attention on the presence of incised stones in southern Idaho. At the present time the distribution of such stones is relatively unknown, though they have been reported from the Owyhee Uplands (Plew 1977); the Boise Valley (Huntley and Nance 1979); at the Rock Creek site (Green 1972) and at site 10GG1 near Bliss, in southcentral Idaho; Meadowcreek Rockshelter in the Upper Snake and Salmon River country (Powers 1969:Fig. 17) and in southeastern Idaho at the Hemmert site (10BL14) (Plew n.d.a.).

The senior author has examined incised stones from amateur excavations at Franklin Cave near Franklin, Idaho. These stones are similar to incised stones which occur in northern Fremont sites (see, for summary, Marwitt 1970).

The specimens illustrated in this paper (see Figures 2 and 3) were collected by the junior author from locations along the Pend O'Reille River in northern Idaho (see Figure 1). Metric measurements are provided in Table 1. The majority of the specimens are oval and have lenticular cross-sections. All but specimen R22 (see Figure 2a) are waterworn pebbles. Ten of the twelve stones illustrated in Figures 2 and 3 are native slate. One is a schist-like material and specimen R22, which appears to be a pendant, is made from granite. This specimen is circular and has 14 small holes drilled in a circular fashion around its center. A second large perforation is on the edge of the object and has broken. Six sets of parallel lines connect the center hole with the exterior edge. Four specimens (see Figure 2b, c, d, e) have complete or partially complete geometric designs. These include zigzag, rectangular, triangular and chevron elements. The remaining stones exhibit straight and cross-hatched lines.

Presently, little is known of the purpose or function of incised stones. It is, however, clear that considerable variation is present in design elements and raw material use. Further descriptions will provide comparative data needed to clarify the range of design variation and the geographical distribution of incised stones.

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ACKNOWLEDGEMENT

A note of thanks is due Margaret Pfoertner for the incised stone illustrations.

TABLE 1

Descriptions of Incised Stones from Pend o'Reille River

Specimen Number	Length*	Width	Thickness	Find Location
A1	4.3	1.7	0.6	Campbell's Point
B2	3.0	2.5	0.4	Campbell's Point
C3	4.7	2.7	0.6	Laclede
D4	4.0	3.8	0.7	Campbell's Point
F6	8.6	3.8	0.8	Campbell's Point
I9	7.7	3.5	0.5	Ramsey's Island
J10	6.6	3.5	0.5	Laclede
K11	8.4	3.7	0.7	Campbell's Point
L12	6.7	4.0	0.3	Campbell's Point
P9	5.7	4.9	0.7	Priest River
P11	6.0	2.6	0.5	Priest River
R22	3.5	3.5	0.5	Laclede

*All measurements in centimeters

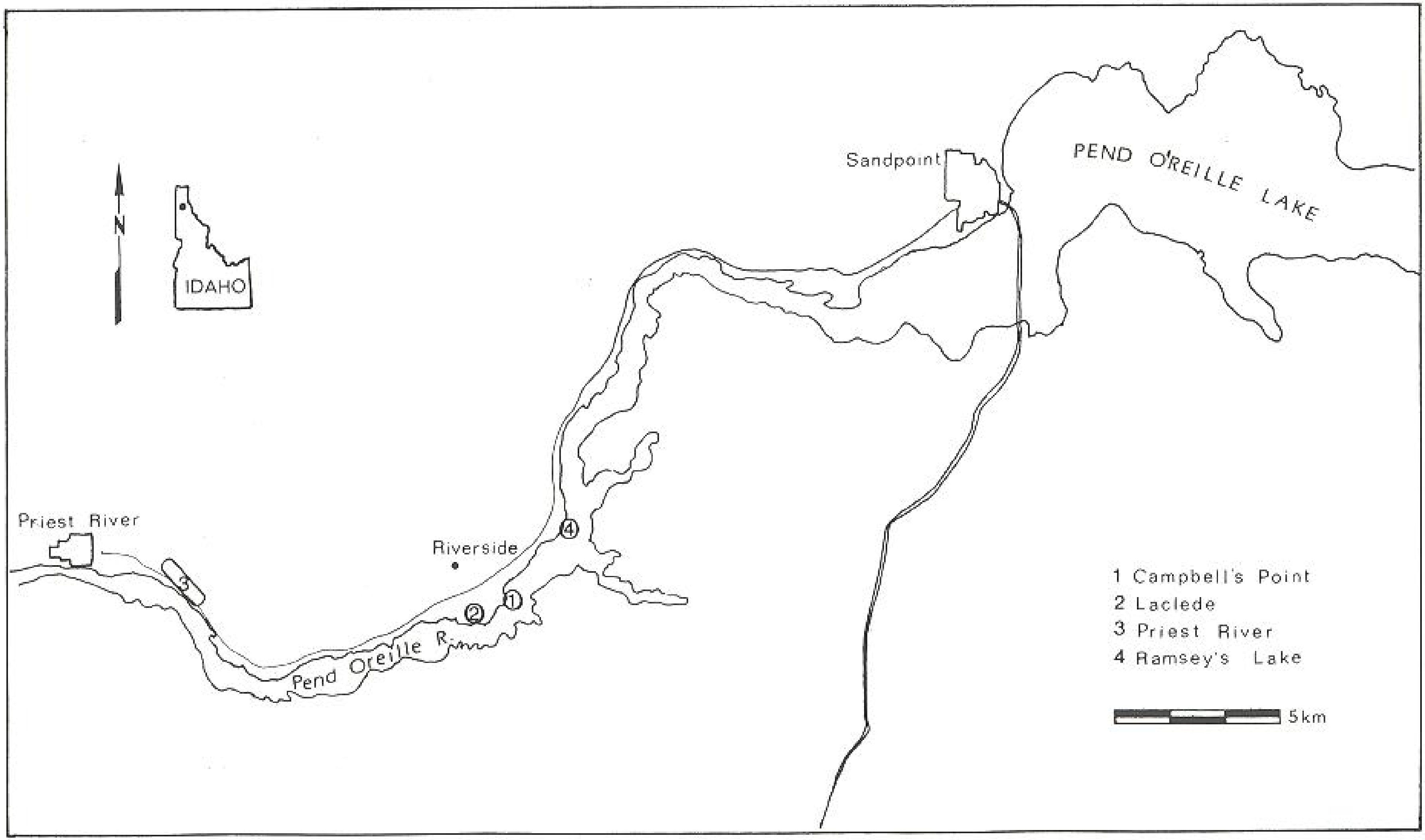

Figure 1. Map Showing Locations of Incised Stone Finds

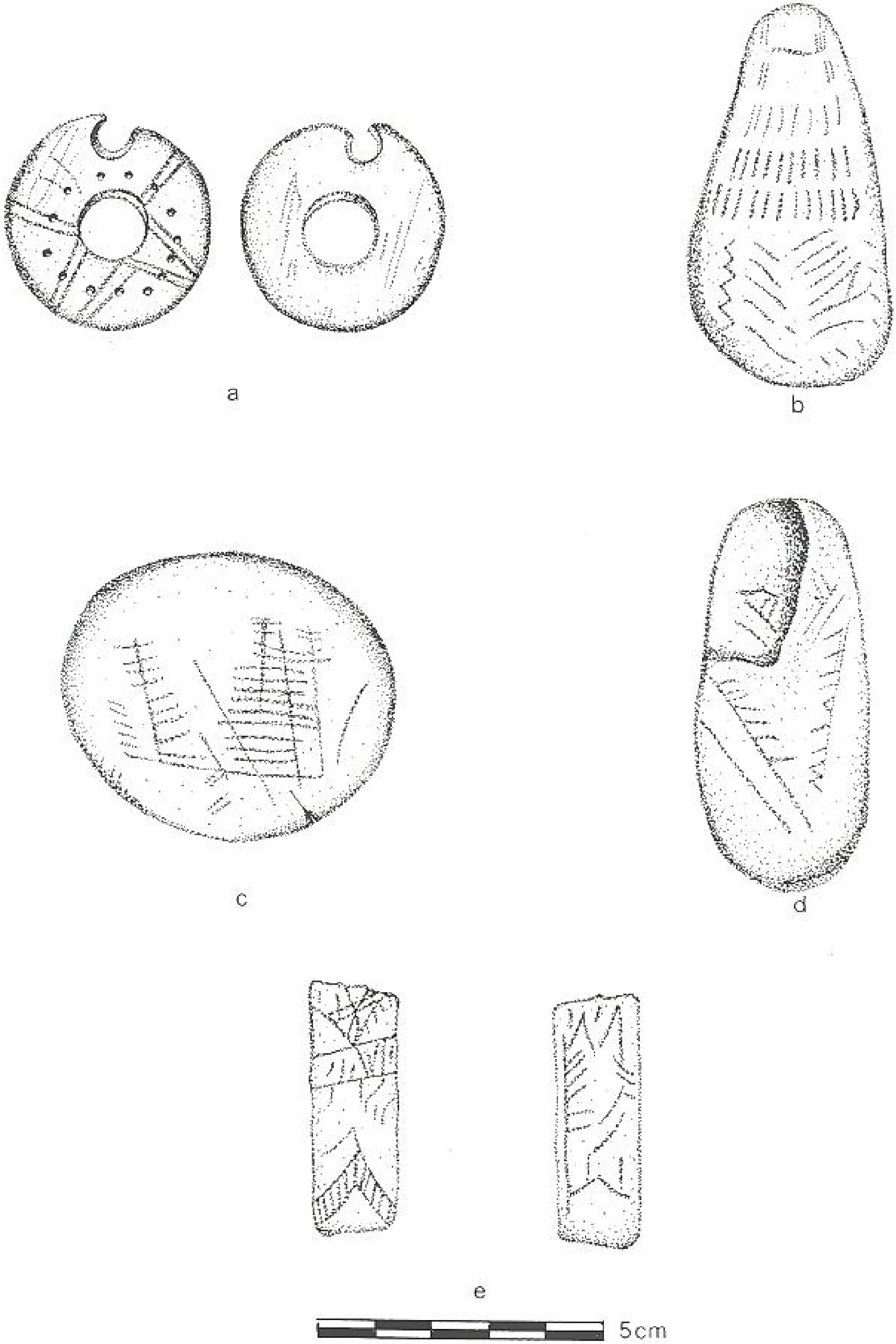

Figure 2. a, Specimen R22; b, Specimen J10; c, Specimen G7; d, Specimen E5; e, Specimen A1, Dorsal and Ventral Surfaces.

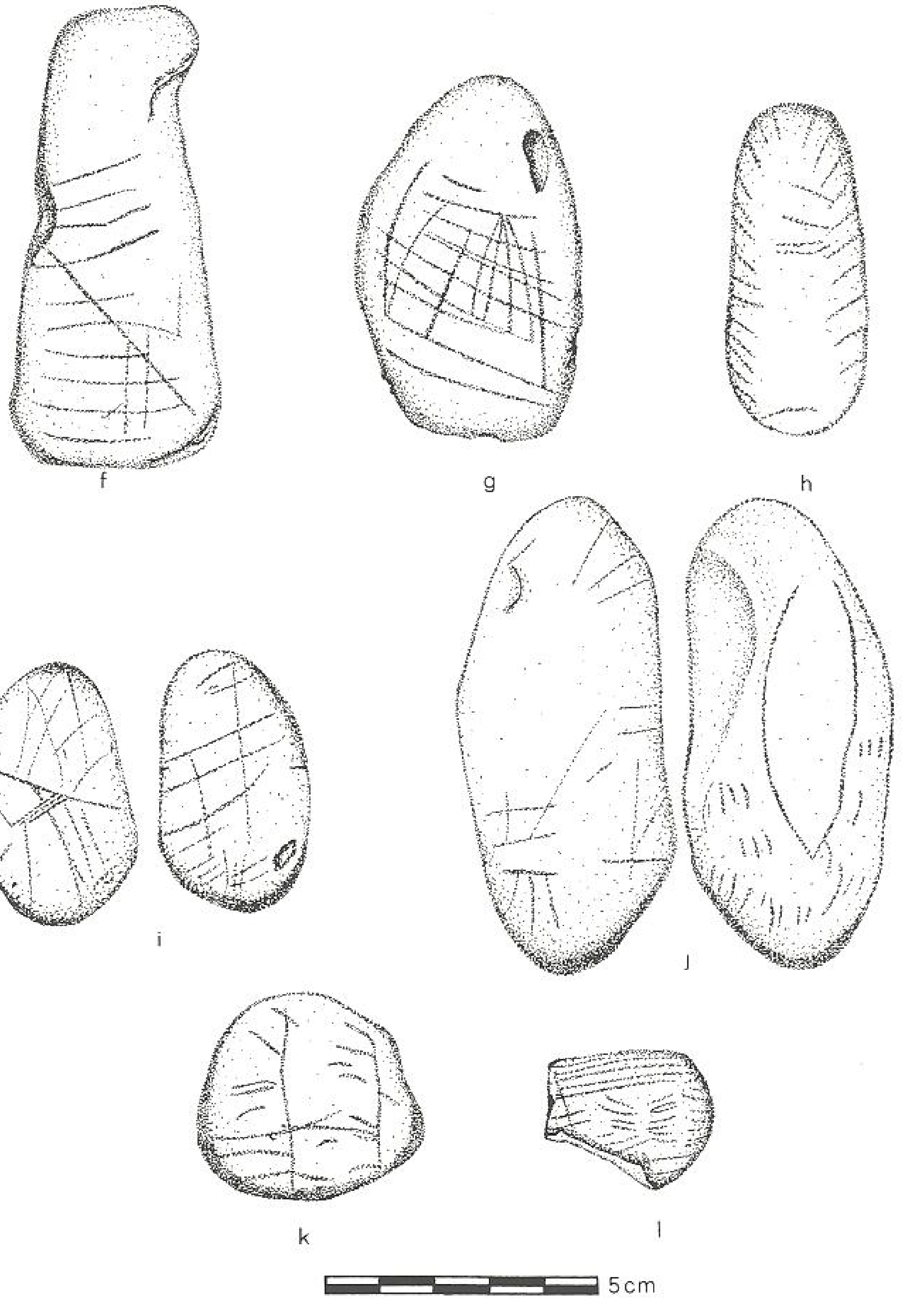

Figure 3. f, Specimen K11; g, Specimen L60; h, Specimen H8; i, Specimen C3, Dorsal and Ventral Surfaces; j, Specimen F6; k, Specimen D4; l, Specimen B2.

*** CALL FOR PAPERS ***

IDAHO ARCHAEOLOGICAL SOCIETY 1981 MEETING

The Idaho Archaeological Society's 9th Annual Conference is scheduled for Saturday, October 3, 1981, at the Borah Theatre on the University of Idaho campus. This year the meeting is being co-hosted by Boise State University and the University of Idaho.

Volunteered papers should include current research, research findings, methods, experimentation, etc. Ethnohistoric and Native American topics will be considered. All presentations will be limited to 15 to 20 minutes and may include research conducted beyond state or national boundaries. You are also invited to submit ideas for Symposia or Special Sessions.

Please submit titles and suggestions by August 15 to:

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