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ARCHAEOBOTANICAL REMAINS FROM SOUTHERN IDAHO

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ABSTRACT
This paper summarizes archaeobotanical data from 22 southern Idaho archaeological sites. Remains include plants used in construction and for food and medicines. The present overview reports materials only from Middle and Late Archaic contexts (5000-250 B.P.). In general, the same species have been found commonly across southern Idaho during the past 5000 years.

Key Words: archaeobotanical, subsistence, hunter-gatherer, Holocene, paleo-ecological

INTRODUCTION
Though recent ethnographic studies demonstrate the greater importance of plants in the diet of hunter-gatherers (Lee 1969, Hawkes, Hill and O'Connell 1982, Kelly 1995), regional archaeologists have tended to focus discussions of subsistence on the use of animals. While this emphasis reflects a more consistent preservation of faunal remains and the common recovery of stone tool assemblages used to process animals, it is also associated historically with inconsistent use of flotation and fine screening techniques to recover both macro and micro-botanical remains. Hence, assemblages of recovered plant remains have tended to be rather small. In addition, as is often the case with non-carbonized seeds it is difficult to determine whether deposition is by natural or human agency. A further complication is the portability of seeds and other plant remains. Kelly’s (1995:66-69) recent summary of ethnographic subsistence demonstrates that most mid-latitude hunter-gatherer populations rely more heavily upon gathering than upon hunting.

THE PALEOENVIRONMENTAL CONTEXT
A number of writers have addressed the evolution of the sagebrush-steppe biome in southern Idaho. Delineation of that sequence is relevant to the prehistoric distribution of plants and thereby to people on the Snake River Plain. Butler (1978:43-46) describes nine “climatic-ecologic” periods for southern Idaho based upon paleo-climatic data from Wilson Butte Cave, Wasden (Owl Cave) site, and Swan Lake (Bright 1966). During the period 11,400-8400 B.P., continuing warm conditions effected a retreat of coniferous stands in eastern Idaho and a continuing expansion of the sagebrush-grass biome, and which reached an optimum at approximately 7200 B.P. This is thought to be associated with an abrupt shift in the number of dry-adapted animals (Butler 1978). Following a minor cooling event between 3800 and 2800 years ago, increasing temperatures and dryness approximate modern conditions (Gehr 1982). Butler’s (1978) reconstruction is challenged to some extent by Henry’s (1984) investigations of Murphey’s Rockshelter along the Snake River in southwestern Idaho. Henry describes five paleo-climatic periods. Following cool-moist conditions of the early Holocene, he
argues that climate reached a maximum warmth between 8000 and 7500 B.P. With a minor cooling episode at 6200 years ago, warmer conditions emerge by 6000 B.P. These conditions are followed by a cooling trend extending until 3500 B.P. Between 3500 and 2500 B.P., much cooler and moister conditions prevailed, after which conditions warmed. His (1984) model, in contrast to Butler’s (1978), suggests a less dramatic shift to warmer and dryer conditions at ca. 7000 B.P.

An issue raised by the differences in the Henry and Butler constructions is the probability of local or sub-regional climatic variability. Pearson’s dendro-chronological data from four areas in the south-central mountains and Davis’s (1982) discussion of Holocene vegetational mosaics of the Plain suggest that considerable environmental variability existed during the Holocene. Though the existing body of paleo-ecological data for the Plain is insufficient to determine the extent to which these broadly changing patterns would have influenced the habitats of specific localities, they suggest that macro and micro-botanical data should be given greater attention in our constructions of prehistoric resource distributions.

ETHNOGRAPHIC PLANT USE

Though a distinction may be made between plants used primarily for food and medicinal purposes and those for construction and manufacture (structures vs. functionally discrete items such as baskets manufactured from specific materials), in some instances elements of materials primarily used in construction were seasonally used in other ways. For example, the fruit of juniper that was used ethnographically for rheumatism by the Harney Valley Paiute was intended primarily for construction material and fuel, but also used as a medicine for a variety of disorders including kidney, heart, menstrual disorders, colds, venereal disease and (Train, Henrichs and Archer 1941, Couture 1978, Couture, Ricks and Housely 1986). This was also the case with dogwood used ethnographically by the Harney Valley and Warm Springs Paiute to make baskets, cradleboards, seedbeaters, trays and fish traps (see Couture 1978, Mahar 1953, Whiting 1950). In this instance the root of the dogwood was ethnographically used to treat the eye (Mahar 1953: 98-99). Plants like Scirpus sp. (bulrush) produce a small seed pod but edible tubers and stalks that were used as manufacturing material by the Gosuite (Chamberlain 1911). Cattail (Typha sp.) is another plant serving as a food and medicinal source as well as for use in construction (Vizgirdas 2003). Included in the common food plant category is Cheopodium sp. or goosefoot, which produces thousands of seeds per plant and is harvestable in early fall. Other shrubs including western hackberry were collected in late spring. Steward (1938: 166-167, 186-218) reports the use of a number of plants by the Snake River Shoshoni and Northern Shoshoni bands (Lemhi, Central Idaho, Fort Hall Bannock and Shoshoni). These include serviceberry, chokecherries, sunflower, lamb’s quarter, rye grass, cattail, camas, onion, tobacco root and thistle as well as unidentified plants. An extensive review of the use of Great Basin plants is provided by Fowler (1986), while Vizgirdas (2003) provides a broad overview of useful plants of Idaho, the latter detailing the varied uses of different plants.

Archaeobotanical remains reported here that were used primarily for construction and manufacture include sagebrush, rye grass, cane, cottonwood, birch and fir. Food and medicinal plants include dogwood, cattail, bull rush, goosefoot, hackberry and currant.
METHODS

Data presented here are compiled from original reports of 22 excavations in southern Idaho conducted between 1961 and 2006. These reports constitute 24% of the 93 Snake River Plain excavations recently summarized by Plew (2000). The reports summarized here are on file at the archaeological curatorial centers in Idaho and at Boise State University and report only macrobotanical remains. No attempt was made to include unpublished data. Macrobotanical data from these sites are presented in Table 1.

The range of sampling and reporting of macrobotanical remains varies substantially. Reflecting then current data recovery strategies, reports produced prior to 1975 rarely report botanical remains. Many reports list only the presence or absence of botanical remains without specific description (Tuohy and Swanson 1960). A number of sites including Columbet Creek Rockshelter (Lynch and Olsen 1964), Rattlesnake Canyon (Bonnichsen 1964), and Schellbach Cave (Schellbach 1967), report cordage, grasses and/or other vegetal materials without botanical identification. These are not included in the table. Few reports adequately separate plant remains known to have been food sources from materials used in construction. Wooden artifacts have been reported from a number of sites but not identified as to species. The majority of specimens reported in this summary are identified as to family and include both food plants and materials used in construction and manufacture. Materials are included in the table as reported. To assess any apparent shifts in the presence and or possible use of different plants over time, sites containing evidence of plant remains are tabulated by temporal period as Early (8000-5000 B.P.), Middle (5000-2000 B.P.) and Late Archaic (2000-250 B.P.) (Plew 2000).

RESULTS

A review of the archaeological literature for southern Idaho identified 22 sites reporting botanical remains. Though sampling and recovery methods undoubtedly account for the absence of botanical remains from many sites, the number of sites reported here constitutes only one-quarter of the excavated localities in southern Idaho. Of these, only five contain materials used primarily in construction (sagebrush, juniper) and manufacture (cane). The remaining sites contain evidence of food and medicinal plants. Eight sites contain evidence of plants used primarily for food. Nine sites are in riverine locations (along the Snake River), ten are caves and rockshelters, and the remaining four are open sites. These sites reflect differing environmental settings within which certain species are most often found, as is the case with Chenopodium sp., commonly found in desert valleys, and Scirpus sp. and Phragmites sp., found in marsh areas or wetlands.

These materials though highly portable may serve as environmental indicators. Though probably reflecting sampling, 18 of the sites date to the Late Archaic period (2000-250 B.P.) whereas only three date to the Middle Archaic period (5000-2000 B.P.). Bachman Cave near Oreana, Idaho dates to a general Middle-Late Archaic time frame. No evidence of food plants is found in Paleoindian or Early Archaic contexts, though very likely a sampling issue. A vegetation layer has been radiocarbon-dated to the early Holocene (9220 +/-100B.P.CSUB-RWC-5) at Diversion Dam Cave (Rodgers and Yohe 2006). Notably, however, groundstone artifacts used in processing plant remains occur in many Early Archaic sites (Plew 2000). The presence of a single corn-cob from Diversion Dam Cave appears to
Table 1. Archaeobotanical Remains from Southern Idaho

<table>
<thead>
<tr>
<th>Age</th>
<th>Site</th>
<th>Remains</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Archaic</td>
<td>Jacknife Cave</td>
<td><em>Apocynum</em></td>
<td>Swanson and Sneed 1971</td>
</tr>
<tr>
<td>Middle Archaic</td>
<td>Bobcat Cave</td>
<td>sagebrush</td>
<td>Henrikson 1996</td>
</tr>
<tr>
<td>Middle Archaic</td>
<td>Nahas Cave</td>
<td><em>Juniperous occidentalis</em></td>
<td>Joyal in Plew 1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Cornus</em> sp.</td>
<td></td>
</tr>
<tr>
<td>Late Archaic</td>
<td>Diversion Dam Cave</td>
<td>Maize, reported similar to Pueblo races and Hopi red</td>
<td>Yohe 2000</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>Swan Falls</td>
<td><em>Elvmus</em> sp.</td>
<td>Ames 1983</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>Wilson Butte</td>
<td><em>Apocynum</em></td>
<td>Gruhn 1961</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sagebrush, cane, willow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>hawthorne, rabbitbrush</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>cottonwood, birch, fir</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>greasewood</td>
<td></td>
</tr>
<tr>
<td>Late Archaic</td>
<td>Kwahadu</td>
<td><em>Phragramites</em></td>
<td>Titmus and Woods, n.d.</td>
</tr>
<tr>
<td>Late Archaic</td>
<td>Pence-Duerig</td>
<td><em>Phragramites communis</em></td>
<td>Gruhn 1961b</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Apocynum, Artimisia</em> sp.</td>
<td></td>
</tr>
<tr>
<td>Late Archaic</td>
<td>Aviator’s Cave</td>
<td>sagebrush bark</td>
<td>Lohse 1989</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bunch grass</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>rushes, cattail stems</td>
<td></td>
</tr>
<tr>
<td>Late Archaic</td>
<td>Baker Caves</td>
<td>sagebrush</td>
<td>Plew, Pavesic and Davis 1987</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Western juniper</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>bitterbrush</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Utah serviceberry, puccoon</td>
<td></td>
</tr>
</tbody>
</table>
brome grass, shadscale reed

**Late Archaic**
- Kitty’s Hot Hole: *Juniperous sp.*
- Weston Canyon: *Scirpus sp. (bullrush)*
- Rock Springs: *Chenopodium-Amaranthus*
- Manning: *Ribes antenum*

**Meatte, Woods and Titmus 1993**

**Heath in Arkush 1999**

**Sayer, Plager and Plew 1996**

**Huter, Kennedy, Plager, Plew and Webb, 2000**

**Plew, Plager, Jacobs and Willson 2006**

**Sayer, Plew and Plager 1997**

**Gould and Plew 2002**

**Huter, Benedict and Plew 2002**

**Gruhn 1961**

**Plew et al. 1996**
be an anomaly. The item was removed from the cave by pothunters and though radiocarbon-dated to 1200 RCYB.P. has no provenience.

CONCLUSION

The data reported here provide only modest insights as to the relative dietary importance of plants in Middle and Late Archaic times. In fact, only a limited range of resources is represented by these data. The majority of remains are from plants known to have been used primarily in construction and manufacture. There is no basis upon which to infer temporal variation in the presence of any species within the Archaic. In fact, the range of species represented is quite similar for the past 5000 years. The Middle Archaic sites reported here contain only items used in construction. Further, the reported remains provide only limited insights regarding seasonality.

Figure 1. General location of archaeological sites
Since parts of some food plants are edible or utilized at different times during the year, it is difficult to draw any significant conclusions regarding the seasonal use of plants represented in this study. One exception may be Chenopodium and Scirpus seeds that are exclusively harvested in fall (Chamberlain 1911, Heath 1999). The presence of these seeds in the Late Archaic deposits at Kitty’s Hot Hole (Meatte, Woods and Titmus 1993), Weston Canyon (Heath 1999) and Rock Springs (Arkush 2002) may suggest a fall use of these localities.

Given that many recent hunter-gatherer studies (cf. Kelly 1995) indicate an extensive reliance upon plants, the relative absence of botanical remains in southern Idaho is notable. Though undoubtedly reflecting sampling and reporting issues future excavations must utilize data recovery techniques that ensure the recovery of macro and microbotanical remains. These data should prove invaluable in assessing the relative importance of plants in the diet of prehistoric peoples of southern Idaho.

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MAJOR REVISION OF GEOLOGIC SOURCE ATTRIBUTIONS FOR OBSIDIAN ARTIFACTS FROM VERATIC ROCKSHELTER, IDAHO

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ABSTRACT

In 1969 data derived from instrumental neutron activation analysis (INAA) of 20 volcanic glass (obsidian) artifacts from the Veratic Rockshelter archaeological site in northeastern Idaho supported the conclusion that the majority of prehistoric artifacts tested were manufactured from geologic obsidian erupted in the Yellowstone National Park area of Wyoming, more than 180 km. (125 miles) east northeast from the archaeological site. Contrary to the INAA findings, recent reanalysis of these same 20 specimens by energy dispersive x-ray fluorescence analysis (EDXRF) indicates that, although Yellowstone obsidian was used, the majority of specimens were manufactured from geologic obsidian source materials located much closer (between ca. 60-90 km.) to the archaeological site. These new results suggest revisions to archaeological understanding of the importance of Yellowstone obsidians in eastern Idaho prehistory.

Key Words: Obsidian Source Analysis, Veratic Rockshelter, Idaho Archaeology, Energy Dispersive X-ray Fluorescence Analysis

INTRODUCTION

It has been more than 35 years since Wright et al. (1969) identified the geologic sources for obsidian (natural volcanic glass) artifacts recovered from an Idaho archaeological site using instrumental neutron activation analysis (INAA). This study, the first of its kind in Idaho, reported results for 20 specimens from the Veratic Rockshelter site (10-CL-3), located in the Birch Creek Valley of eastern Idaho (see Figure 1). Extensive archaeological excavations were conducted at the site during 1960-1961 by Earl Swanson who submitted the obsidian samples for analysis and subsequently published a full report on his work (see Swanson 1972). Based on INAA analysis of the Veratic Rockshelter samples, it was concluded that the vast majority of specimens tested were manufactured from geologic obsidian source materials located in Yellowstone National Park, Wyoming (Wright et al. 1969: 28).
BACKGROUND

The Veratic Rockshelter samples were analyzed by INAA at the University of Michigan at the same time as other collections from throughout North America and the Near East. The ambitious INAA program and its results (e.g. Gordus et al. 1968; Griffin et al. 1969; Wright 1969) were extremely influential, representing one of the first and most visible early successes among a number of physical science technique applications in archaeology during the late 1960’s. In keeping with protocol successfully applied to other archaeological assemblages (e.g. Frison et al. 1968; Griffin et al. 1969) the Veratic Rockshelter obsidian artifacts were analyzed for a number of trace and rare earth elements, and the resulting data for sodium (Na) and manganese (Mn) were reported in weight percent composition and as percentage ratios. Using this procedure, three major Na/Mn ratio groups were recognized at the site; a 150 group, a 110 group, and a 90 group. As Wright et al. (1969: 28) summarized the results, “the 150 and 90 groups certainly, and probably also the 110 group, at Veratic Rockshelter, derive from obsidian flows located in Yellowstone Park”.

At the time the Veratic Rockshelter study was undertaken, Wright et al. (1969) had compiled chemical data on a considerable number of geologic obsidian sources including a number from Yellowstone National Park, which no doubt bolstered confidence in the Veratic Rockshelter artifact-to-source attributions.

Figure 1: General Location of Obsidian Sources Used to Manufacture Artifacts Identified by EDXRF at Veratic Rockshelter, Idaho

Dots represent obsidian sources identified in the Veratic Rockshelter assemblage; open circles depict other regionally significant obsidian sources not identified in the present study.
It became apparent a number of years later, however, that Group 90 was not located within Yellowstone National Park, but in the southern Centennial Mountains area of eastern Idaho (Wright et al. 1990) at a locality Hughes and Nelson (1987) named Bear Gulch (see Figure 1).

Even though subsequent research revised the geographic location for Group 90 obsidian, a major problem would emerge to cloud the significance of the INAA study of Veratic Rockshelter artifacts. In the ensuing years, as analyses of more and more archaeologically-significant obsidian sources were conducted, it became clear that obsidians distinguishable using combinations of trace or rare earth elements could possess nearly identical Na/Mn ratios (Hughes 1992: 516, Table 1), challenging the assumption that Na/Mn data unequivocally specify distinct chemical varieties of obsidian. Wright et al. (1969) were aware of this problem, but they explored the implications mainly when Na/Mn ratio data did not match those for nearby obsidians. Given this potential problem with relying solely on Na/Mn ratio data, the archaeological implication was clear. If the obsidian groups defined by Wright at al. (1969; Griffin et al. 1969) were not coherent geochemical entities (unique chemical types \textit{sensu} Hughes 1998) it was possible that obsidian identified as, say, Group 90 at Veratic Rockshelter may have come from \emph{more than one} geologic/geographic source. The same possibility exists for all other groups defined solely on the basis of Na/Mn ratios at this site, and those in Griffin et al. (1969).

It thus seemed advisable to re-examine all of the Veratic Rockshelter artifact samples (Wright et al. 1969: Tables 1 and 2), so the specimens in question were subjected to re-analysis. Since Wright et al. (1969) conducted their pioneering research there has been a vast increase in the number of known artifact-quality sources of obsidian, and there have been corresponding improvements in precision and accuracy of alternative instrumental methods capable of generating non-destructive trace and rare earth element concentration estimates to distinguish among different chemical varieties of obsidian (e.g., Anderson et al. 1986; Baugh and Nelson 1988; Hughes 1994; Nelson 1984; Shackley 1995).

LABORATORY ANALYSIS

Non-destructive trace element analysis of the Veratic Rockshelter specimens was conducted by the author using a QuanX-EC™ (Thermo Electron Corporation) energy dispersive x-ray fluorescence (EDXRF) spectrometer equipped with a silver (Ag) x-ray tube, a 50 kV x-ray generator, digital pulse processor with automated energy calibration, and a Peltier cooled solid state detector with 145 eV resolution (FWHM) at 5.9 keV. The x-ray tube was operated at differing voltage and current settings to optimize excitation of the elements selected for analysis. In this case analyses were conducted on all artifacts for the elements rubidium (Rb K\textalpha{}), strontium (Sr K\textalpha{}), yttrium (Y K\textalpha{}), zirconium (Zr K\textalpha{}), and niobium (Nb K\textalpha{}). Certain specimens were analyzed to determine barium (Ba K\textalpha{}) concentration, and iron vs. manganese (Fe K\textalpha{}/Mn K\textalpha{}) ratios also were computed for some artifacts. Each analysis subroutine was run at a minimum of 120 deadtime-corrected seconds, with tube current scaled to the physical size of each specimen. Details involving laboratory analysis protocol and comparative literature references appear elsewhere (Hughes and Pavesic 2005); the interested reader should consult this paper, and Hughes (1994, 2005: 249-250), for additional information on calibration and element-specific measurement resolution.
Table 1 - Energy Dispersive X-ray Fluorescence (EDXRF) Data for Artifacts from Veratic Rockshelter, Idaho

<table>
<thead>
<tr>
<th>I.S.U. Cat. Number</th>
<th>Rb</th>
<th>Sr</th>
<th>Y</th>
<th>Zr</th>
<th>Nb</th>
<th>Ba</th>
<th>Ti</th>
<th>Mn</th>
<th>Fe$_2$O$_3$</th>
<th>Fe/Mn</th>
<th>Obsidian Source (Chemical Type)</th>
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<tr>
<td>18328</td>
<td>162</td>
<td>48</td>
<td>44</td>
<td>293</td>
<td>53</td>
<td>741</td>
<td>nm</td>
<td>nm</td>
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<td>±4</td>
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<tr>
<td>18427</td>
<td>286</td>
<td>7</td>
<td>236</td>
<td>329</td>
<td>309</td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td>nm</td>
<td>58</td>
<td>Big Southern Butte</td>
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<td></td>
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U.S. Geological Survey Comparative Reference Standard

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Values in parts per million (ppm) except total iron (in weight percent) and Fe/Mn ratios; ± = estimate of x-ray counting uncertainty and regression fitting error at 120-360 seconds livetime; nm= not measured; nr= not reported. All samples have Idaho State University (I.S.U.) catalogue numbers.
### Table 2 - Comparison of Obsidian Source Assignments for Artifacts from Veratic Rockshelter, Idaho

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Na/Mn group attributions from INAA data in Wright (et al. 1969: Table 1); chemical type (obsidian source) assignments from EDXRF data in Table 1 herein.

### RESULTS

These results are of considerable interest in that they provide both support, and refutation, for the obsidian source identifications made on the basis of INAA Na/Mn ratio data. Table 1 presents the trace element data generated for each Veratic Rockshelter artifact using EDXRF analysis, Table 2 presents a comparison of INAA and EDXRF results for artifacts from the site, and Figure 2 illustrates the concordance between trace element data generated for artifacts and parent geologic obsidian source types using EDXRF analysis.
As summarized in Table 2, two specimens (cat. nos. 24321 and 28853) were assigned to INAA Group 150 on the basis of Na/Mn ratios, and both of these were corroborated by EDXRF data as originating at Obsidian Cliff, Wyoming (i.e. Yellowstone National Park) as Wright et al. (1969: 27) concluded.

Eleven other samples (cat. nos. 18328, 18953, 20478, 24180, 24182, 24383, 26198, 26513, 47668, 47695 and 47771) were attributed to INAA Na/Mn Group 90; these were originally ascribed with certainty to Yellowstone (Wright et al. 1969: 28) but later associated with Bear Gulch, Idaho (Wright et al. 1990). Ten of these eleven samples were identified as Bear Gulch obsidian on the basis of EDXRF data, while one (cat. no. 24182) was ascribed to Big Southern Butte, Idaho, on the basis of trace element composition.

All six specimens (cat. nos. 18427, 24763, 24796, 25596, 26988 and 47754) attributed to INAA Na/Mn Group 110 were correlated with Big Southern Butte volcanic glass on the basis of EDXRF data. Wright et al. (1969: 27-28) eliminated several Yellowstone sources in their attempt to find a geologic counterpart for the 110 Group, concluding that “further testing is certainly warranted, but the pattern of the data suggest Yellowstone as the most likely source area for the 110 group”.

Filled triangles represent values for artifacts (from Table 1 herein), while dashed lined demarcate the range of variation measured in geological reference samples. The numbers of artifact plots do not correspond exactly to the numbers in Table 1 because of convergence in data points at this scale.

Figure 2: $Y$ vs. $Sr$ Composition of Obsidian Artifacts from Veratic Rockshelter, Idaho
The final specimen analyzed (cat. no. 20508) had a very low Na/Mn ratio (46) and was not attributed to any INAA Group, although Wright et al. (1969: 28) speculated that the specimen "may be from Silver Lake, Oregon, but additional data are needed before this may be definitely established". EDXRF data indicate that this sample was manufactured from Timber Butte, Idaho, volcanic glass.

**DISCUSSION**

Overall, this EDXRF study provides corroboration for the coherence of the chemical groups established by INAA, but there are other issues of archaeological significance that follow from differences between the results of the two studies. The Na/Mn 150 Group, attributed to Obsidian Cliff in Yellowstone National Park, was corroborated by EDXRF as Obsidian Cliff at Veratic Rockshelter (as it has been at Hopewellian sites [Hughes 2006]) thus providing independent support for the linkage proposed by Wright et al. (1969). While the INAA Group 90 was supported- for the most part - by EDXRF data, the revised geographic location of this source (*from* Yellowstone *to* Bear Gulch) alters conclusions about the geographic distance, but not the direction, from which obsidian was conveyed to Veratic Rockshelter. In addition to primary outcrops (see Willingham 1995) there are numerous localities where obsidian of the Bear Gulch chemical type could have been procured. Perhaps the best known and closest is the Camas-Dry Creek area near Kilgore, less than 80 km to the east-northeast from Veratic Rockshelter. Since the Yellowstone obsidian sources are more than 180 km from the site, the revised location for the Group 90 samples certainly suggests a more geographically restricted prehistoric obsidian procurement range (cf. Plew 2000: 170-171). The fact that one artifact (cat. no. 24182), identified as Big Southern Butte on the basis of trace element data, was ascribed Group 90 membership via INAA is perplexing and presently unexplained (see below).

Perhaps the most dramatic contribution of this EDXRF study affects the location of the Na/Mn 110 group. Although Wright et al. (1969) were appropriately cautious about the geographic source location for this group, they favored the Yellowstone area. EDXRF data show unequivocally that Yellowstone was *not* the source area for the Na/Mn 110 Group; the geologic source counterpart is, in fact, Big Southern Butte, located in the Snake River Plain about 90 km south of Veratic Rockshelter. At first blush, it might appear that the lack of concordance between INAA derived Groups and geographic source locations revealed by this EDXRF study could be attributable to sampling error. In other words, it might have been that- at the time INAA analyses of Veratic Rockshelter samples were undertaken- Bear Gulch and Big Southern Butte were unknown as obsidian sources, and would therefore not have been available for chemical comparison. I was unable to find any indication in the University of Michigan Museum of Anthropology analytical collection inventory that Bear Gulch, or a nearby locality containing obsidian of this chemical type in Idaho, was known at that time (1966-1968). However, Wright et al. (1969: 27) stated that they had "analyzed obsidian from 45 locations in the Western United States. Within a reasonable distance of the site we have compiled data on 16 obsidian localities in Yellowstone Park, a flow on the Powder River in Montana, two locations in Idaho (the Oneida Perlite and *Big Butte on the Snake River Plain*), a source in Millard County, Utah, four flows in Oregon...." (my italics).
Given the imposing presence of this obsidian-bearing dome on the Snake River Plain, Wright et al.’s (1969; Wright 1968: 65) Big Butte can have been none other than Big Southern Butte (cf. Swanson 1974: 3). If so, it is difficult to understand why Group 110 was not associated with Big (Southern) Butte, unless the focus of chemical comparison was for some reason restricted to the much better known volcanic glass deposits within Yellowstone which also yielded generally similar Na/Mn ratios (but dramatically different trace and rare earth element combinations). Since the single specimen analyzed from Big Butte yielded a Na/Mn ratio of 100 (Wright 1968: Table 12) one can only speculate why the linkage between this source and the 110 Group was not made given the wide range of Na/Mn ratio values subsumed, for example, in the 150 group (range = 132-172; Wright 1968: Table 6). Laboratory analysis must have been limited to Na and Mn data (see Wright 1968: Table 12), because Big Southern Butte obsidian is extremely distinctive along a number of different chemical dimensions (see Figure 2; cf. Macdonald et al. 1992: Appendix I, p. 142). Mn values for Big Southern Butte obsidian range between 300-400 ppm (Hughes, unpublished data) consonant with the value published for most Group 110 samples (Wright et al. 1969: Tables 1 and 2) and for the single specimen from Big Butte (Wright 1968: Table 12). Significantly, the Mn composition of artifacts assigned to INAA Group 90 also fall within this same concentration range, perhaps accounting for the misclassification of one actual Big Southern Butte specimen (cat. no. 24182) as belonging to Group 90. It thus appears that ratio level measurement data may have led to this misidentification because, as Wright et al. (1969: Table 2) illustrate, two samples (421 and 1068) with different Na and Mn concentrations yield nearly identical Na/Mn ratios—meaning that if Na/Mn ratios alone were used for comparison, obsidian differing along other elemental dimensions (i.e. different sources) would likely have been identified as the same “source”.

SUMMARY AND CONCLUSIONS

Results of this EDXRF re-analysis of Veratic Rockshelter specimens indicate, contra Wright et al. (1969: 28), that Yellowstone National Park was not the principal geographic source of origin for the obsidian artifacts. The present study shows that, although a small amount (n=2; 10% of the sample total) did come from Yellowstone (i.e. Obsidian Cliff), the majority of tested samples (17 of 20; 85% of the sample) were manufactured from geographically closer, non-Yellowstone obsidians (Bear Gulch and Big Southern Butte). These results carry both local and regional significance. On the local level, these new results indicate a much more restricted prehistoric obsidian acquisition range for peoples visiting and staying at Veratic Rockshelter than inferred from the results of the earlier INAA work (e.g. Swanson 1972: 145). At the regional level, these results should influence and revise extant characterizations of the distribution and prehistoric importance of Big Southern Butte (e.g., Plager 2001: 83, Figure 19) and Yellowstone obsidian in eastern Idaho (e.g., Holmer 1997: 186; Roll and Hackenberger 1998: 136;), particularly at archaeological sites located south and west of the Teton Range and Centennial Mountains.

It is important to emphasize that this reanalysis was conducted explicitly to re-evaluate the results of the earlier INAA study. Because only a small fraction
of the obsidian and “ignimbrite” artifacts from the site was analyzed here, I have avoided conjecture about potential temporal or spatial significance and caution that these results should not be extended to the site as a whole. Swanson (1972) documented that Veratic Rockshelter yielded considerable numbers of obsidian artifacts, in addition to material described as ignimbrite\(^1\), which could be subjected to non-destructive source analysis. The present study has modified and altered conclusions from the earlier INAA study, but more thoroughgoing geochemical analysis of ash-flow tuff and obsidian artifacts from Veratic Rockshelter will be required to further delineate time/space continuities and contrasts in prehistoric obsidian source utilization in this area of eastern Idaho.

**ACKNOWLEDGMENTS**

This study could not have been completed without the assistance and support of William R. Farrand, Curator Emeritus at the Museum of Anthropology, University of Michigan. Bill enthusiastically supported and facilitated the loan and Karen O’Brien (University of Michigan Museum of Anthropology Collections Manager) made the entire loan process seamless. I thank J. Andrew Darling for proving a copy of the University of Michigan Museum of Anthropology analytical collection inventory and for his insights into the collections’ history. I also acknowledge assistance received from Kenneth P. Cannon, and the constructive comments from anonymous JIAS reviewers. Tammara Norton skillfully rendered Figure 1.

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\(^1\) Based on his statement that “ignimbrite could have been obtained at Howe twenty-five miles to the west [sic]” Swanson (1972:145) probably was referring to artifact-quality glass (i.e. obsidian) formed in ash-flow tuffs (Hughes and Smith 1993). It is likely that the artifact-caliber ignimbrite mentioned by Swanson occurs within the Walcott Tuff eruptive unit of the Heise Volcanic Field (Morgan 1992; Morgan and McIntosh 2005: 296, Figure 2c), which occurs about 12 km east of Howe at the southern tip of the Lemhi Range (Kuntz et al. 1994).
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Wright, Gary A., James B. Griffin, and Adon E. Gordus
2007 Distinguished Science Communicator

DR. STEVEN L. SHROPSHIRE

For his outstanding efforts at effectively communicating the excitement of physics among science teachers and students in Idaho and throughout the United States, the Idaho Academy of Science awarded Dr. Steven L. Shropshire the Distinguished Science Communicator reward.

Steve was born in Boise in 1962 and grew up there and in Loman, Idaho. When he was seven years old, his family moved to Walla Walla, WA, where both of his parents worked as high school teachers. Steve loved the outdoors. His family vacationed every summer in Boise and Loman. At Walla Walla High School, Steve was deeply affected by his physics teacher, Johnny Dennis, who was recognized by President Jimmy Carter as an outstanding teacher.

After high school, Steve enrolled at Washington State University (WSU) in Pullman, planning to study physics, mathematics, and music. He graduated with a B.S. in Physics and Math (and nearly a B.A. in music). He played in the Cougar marching band at WSU, holding the position of first chair French horn for three years. WSU is also the place where he met “the love of my life,” Crystal.

In 1988, Steve completed an M.S. in Physics, followed by a Ph.D. in Physics in 1991 under Dr. Gary Collins at WSU. His thesis focused on a study of defects in solids using nuclear spectroscopy. After graduating from WSU, he accepted a one-year teaching position at Idaho State University (ISU). The following year he accepted a tenure-track position. He continued work on materials science using nuclear spectroscopy, but his focus gradually shifted to physics education and outreach.

Steven has won the outstanding public servant award at ISU numerous times. His public service includes providing more than 200 short workshops for teachers, more than 350 science demonstrations at Idaho schools, 17 public demonstrations on the ISU campus, and 30 presentations at workshops at meetings of the American Association of Physics Teachers (AAPT), National Science Teachers Association (NSTA), Idaho Science Teachers Association (ISTA), and other teaching societies. He has served in various positions for AAPT, including president of the Idaho/Utah section in 1998. He also has reviewed proposals for NSF in Material Science. To support these efforts, he has received 23 grants from agencies such as the Idaho Community Foundation, American Physical Society, NASA Idaho Space Grant Consortium, AAPT, and ISU College of Education.
One of his students at ISU space camp said, “From my experiences, I know that teachers like Dr. Shropshire are very rare. He truly enjoys teaching science—it is obvious he wants to share the excitement of learning science with everyone because he loves it so much. Teachers like this are priceless.”

The Interim Dean of Graduate Studies at ISU said, “Steve’s work with local schools is not simply to show up, do some neat physics stuff, and disappear in a cloud of dust. . . . When a school or teacher calls to ask him to visit their school, Steve finds out which text is being used and where in that text the teacher expects to be when he makes his visit. A week or two before the demonstrations for the students, Steve meets with the teachers involved to go over the demonstrations to be performed and to help the teachers incorporate them into their lesson plans for the week.”

With his family, Steven enjoys camping, hiking, fishing, and backpacking, especially in wilderness areas. They own several horses and love to ride the trails in the hills around Pocatello. He enjoys reading science fiction and history, as well as “building entertainingly destructive devices, blowing things up, setting things on fire,” and playing computer games.
2007 Distinguished Scientist/Engineer

DR. CAROLYN HOVEDE BOHACH

For her internationally recognized research on microbial pathogenesis and her leadership in biomedical research in the state of Idaho, the Idaho Academy of Science awarded Dr. Carolyn Hovede Bohach the Distinguished Scientist Award.

Carolyn was born in Chicago, Illinois – right on the southside. She attended a private prep school called the University of Chicago Laboratory School, which focused on experimentation with educational techniques (not science!). For example, one “experiment” was to “push” very bright kids to do whatever level of school work they could accomplish. This led to 9- and 10-year-olds graduating with B.S. degrees or going to graduate school at the University of Chicago. Unfortunately, without the necessary social maturity, the kids were miserable. The experiment was stopped when the need for social adjustment during childhood development was recognized as a necessity.

The lab school did include innovative teachers who focused on problem solving and communication skills. Carolyn said that they were free to study or not, but this method didn’t work for her. She didn’t study much for her chemistry class and “paid dearly in college for not being prepared!”

Carolyn received her B.S. from the University of Illinois, her M.T. (ASCP) from the Swedish Hospital Medical Center in Seattle, and her Ph.D. from the University of Minnesota, Minneapolis. She worked as a medical technologist from 1976-1980 and then returned to school to study microbiology/molecular biology. Her research investigates factors associated with the establishment of E. coli O157:H7 in its cattle and sheep reservoir. Over the years, her research has provided great insight into reservoir-host interactions. She conducts an active research lab with good collaborative interactions. Carolyn serves as an associate director of the Idea Network of Biomedical Research Excellence (INBRE) program, sponsored by NIH to enhance research throughout Idaho. She also has served on numerous graduate student committees.

Her numerous publications have been included in journals such as Applied Environmental Microbiology, Journal of Clinical Microbiology, Infectious Immunology, and Molecular Microbiology and Biochemistry. She also has written a laboratory manual for teaching the principles of microbiology, which has been published by Kendall/Hunt Publishing Company. She has received more than 50 grants and contracts for her research, including awards from NIH, USDA, EPA, BRIN, and the Idaho Beef Council.
Carolyn has also received numerous awards, including 2005 University of Idaho Faculty Member of the Year, 2005 Gamma Phi Beta Society Faculty Member of the year. She is accomplished both in and out of the classroom. She received the Carski award honoring her classroom teaching from the American Society of Microbiology. A fellow professor says “she engages the students in her discourse and encourages questions. It is clear she is at ease in her role and displays confidence and experience in communicating with students.”

Carolyn says she feels “lucky every day to get to live in Idaho!” She feels she has a very satisfying career at the University of Idaho. When she moved here she says she was taken out of her comfort zone in the big city when she relocated to the town of Moscow, but it “was the best thing that could have happened to me.” She loves to play pool, and enjoys art, interior design, and ballroom dancing.
IAS Award Program

The Idaho Academy of Science seeks nominations for two prestigious annual awards:

**DISTINGUISHED SCIENTIST/ENGINEER**
Individual with outstanding achievements in science or engineering.

**DISTINGUISHED SCIENCE COMMUNICATOR**
Individual with outstanding achievements in communicating the meaning and values of science to students and/or the general public.

The awards will be presented at the Academy’s next Annual Meeting and Symposium.

**REQUIREMENTS AND ELIGIBILITY**
Nominees’ work should be conducted in or related to the state of Idaho. That means the person may live and work in Idaho or the work that he/she has done is of specific value or interest to Idahoans. Nominees need not be members of the Idaho Academy of Science or even professional scientists so long as their accomplishments are clearly scientific or in the realm of science education. Generally, nominees must be living at the time of the nomination . . . only in truly exceptional cases would the Academy consider giving an award posthumously. Other than these conditions, any individual who has contributed substantially to science/engineering or to science communication is eligible for one of these awards.

Submit nominations (4 copies please) to the IAS Award Program Coordinator at:

Dr. Dwight Wray
IAS Award Program Coordinator
BYU-Idaho Dept. of Biology
Rexburg, ID 83460-1100
E-mail: wrayd@byui.edu
Phone: (208) 496-2004

**NOMINATION PROCEDURES**
Nominations must be typed and submitted in quadruplicate (four copies). All should include the following information:

- Nominee's name, institutional or company affiliation*, address, and phone number. [Optionally, the nominee’s title and e-mail address may be included.]
• A summary of the accomplishments for which the person is to be recognized (about 250 words).
• A brief biographical sketch of the nominee, including educational and professional career information.
• The nominator's name, address, phone number, and (optionally) e-mail address.
• At least one seconding letter in support of the nomination, more are preferable.

But the core of the nomination is:
• A detailed description of what makes the nominee worthy of an Award.

In no more than three or four typed pages, the nominee's accomplishments should be described in broad terms, with a statement of why the work is considered outstanding. Just enough key details should be included to support the case being made. This supporting description will vary depending upon the Award and, to some extent, the nature of the nominee's accomplishments.

Nominations for Distinguished Scientist/Engineer should focus on the breakthrough qualities of his or her accomplishments. Typically, this would include a discussion of pioneering discoveries, seminal investigations, major innovations, and so on . . . always with a brief statement of why these are considered to be landmark achievements. Evidence of leadership - numerous citations of his or her publications, widespread follow-on work by others, service on technical committees and advisory groups, etc. - would do much to support the nominations. It is acceptable to include a full list of publications and patents in the nomination package, but a better approach would be to show only the most important papers and simply state the total number the nominee has to his or her credit.

Nominations for Distinguished Communicator could well cite innovation and inventiveness, but they are also likely to focus on effectiveness, impact, and influence. Outstanding achievers in education devise innovative classroom or field exercises and programs, create new and better ways to present scientific materials, find fresh ways to reach out to more students . . . they do whatever it takes to effectively convey the facts and concepts of science, and an appreciation for the scientific enterprise. Of course, providing "hard evidence" for the value of some of these accomplishments may be difficult. Sometimes the work may result in the publication of a manual, a conference paper, news articles, or even a textbook; but such opportunities are generally relatively limited. Supporting the nomination with additional "testimonials" may be the best way to show effectiveness and impact . . . but supporters should be urged to be as specific as possible. Comparable factors would also apply to other communicators - article writers, TV or movie producers, radio commentators, and so on.

They too will be judged on their effectiveness, impact, and influence. In these cases, the nomination might describe how a local series of "hit" science programs was picked up by the national media and broadcast all over the country. Perhaps a book with a science/technical theme by an Idaho author suddenly becomes a national bestseller. Maybe a lecturer from Idaho starts turning up on national public television, or becomes a "hot item" on the national lecture circuit. Such accomplishments could well qualify an individual for this award.
SUBMISSION INFORMATION

Completed nomination packages (4 copies please) should be submitted by March 1, 2008 to the IAS Award Program Coordinator at:

Dr. Dwight Wray
IAS Award Program Coordinator
BYU-Idaho Dept. of Biology
Rexburg, ID 83460-1100
E-mail: wrayd@byui.edu
Phone: (208) 496-2004

Nominations will remain active for a period of two years; after that, the nomination package would need to be revised and re-submitted. Additional supporting information may be submitted for addition to a nomination that is already one year old.

SELECTION PROCESS

Nominations will be reviewed by an ad hoc panel of at least three individuals, selected by the Academy President and Executive Director. If at all possible, the group will include individuals whose fields of expertise correspond to those of the nominees. That is, if nominees represent chemistry, science education, and civil engineering, then the panel should have representatives from each of those fields.

The panel will review all the nominations versus the criteria outlines above and makes a formal recommendation to the Executive Committee. The final decision on whether there will be an award, and to whom, will be made by the Executive Committee. The President will then contact the person(s) selected to make sure he or she will actually attend the Annual Meeting or have to accept the award in absentia.
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Additional contributions to the IAS Scholarship Fund or for general operation of the Academy are sincerely appreciated. Contributions to the IAS are tax deductible; hence, receipts will be provided upon request.

Send the above form and dues payment to:

Idaho Academy of Science
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Pocatello, ID 83201-2542

Additional inquiries may be directed by US Mail to the address above, by phone to (208) 234-7001, or by e-mail to: IdAcadSci@aol.com

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NOTES
INFORMATION FOR CONTRIBUTORS

Contributions to the JOURNAL OF THE IDAHO ACADEMY OF SCIENCE may be in all fields of science or science education which relate in some manner to the state of Idaho and have not been published elsewhere.

Manuscripts submitted (one hard copy) to the Editor should be doubled spaced throughout with ample margins and typed on only one side of the paper. Submit an electronic copy of the manuscript on a CD along with the paper copy. An email attachment containing the manuscript would also be appreciated. Regular articles include, in order, the following: title, author(s) name(s), author(s) address(es), abstract, key words, text (with desired headings), acknowledgements, literature cited, tables and figure legends. First mention of scientific names should include authority.

The abstract should be complete and understandable without reference to the text. The scope of the article should be stated in the introduction or, in the case of brief articles, an introductory paragraph. Footnote material should be incorporated in the text whenever possible. Authors should follow the suggestions in the latest edition of the CBE Style Manual (AIBS) for abbreviations, punctuation, and similar matters. All numerical measurements should be given in the metric system with the English system following parenthetically where desirable. Tables and figures should be kept within economic limits. Tables should be typed on separate sheets. Lettering and line drawings must be of letter quality (i.e. laser printing). Figures should be planned for no reduction when printed; thus, they may be no larger than 11 X 17 cm (4-1/2 X 6-¾ inches). If photographs are submitted they must be electronic files (jpeg, gif or tif files). Legends must be brief; legends for figures should be placed on a single, separate sheet.

Page proof will be sent to the author. Reprints can be ordered when the author returns the proofs; 50 reprints of each article will be furnished free to IAS members. There will be a $1 per reprint charge for nonmembers with a minimum order of 50. Illustrations will be destroyed unless their return is requested on the reprint order.

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