

International Association for Obsidian Studies Newsletter

Number 9

Spring 1993

Business Address: Department of Anthropology, San Jose State University, San Jose, California 95192-0113

Assembled and edited by K.J. Tremaine

CONTENTS

- *News and Information* 1
- *Article: A Description of Paul's Fire Cache (35LIN542): A Biface Cache from the Western Slopes of the Cascades, Oregon, by Anne Bennett Rogers* 3
- *Abstracts and Annotations of Reports and Publications* 5
- *Obsidian Characterization Laboratory Survey Results* 12
- *Meetings and Events* 17
- *About the IAOS* 17

NEWS AND INFORMATION

IAOS ANNUAL MEETING

Our fifth annual meeting was held on Saturday, April 10th, at the beautiful Asilomar Conference Center, overlooking the Pacific Ocean outside Monterey, California, in conjunction with the 27th annual meeting of the Society for California Archaeology. Approximately 30 persons attended. To recap: membership is reported over the one-hundred mark (a 20% increase from last year); membership is composed 92% USA, with others representing Australia, New Zealand, Israel, Mexico, and Russia; it was decided to operate on a quarterly membership renewal schedule; Craig Skinner volunteered to head up the membership drive committee; and the Treasury holds \$2815.87. The executive committee has initiated the formation of an Advisory Board (composed of senior obsidian researchers) to lend credibility to our organization and provide information based on experience regarding future directions. IAOS member, Roger Green of New Zealand, has

agreed to be our first board member. Other personages held in high esteem are currently being invited to serve. Non-profit incorporation status will be investigated by Steve Shackley, in order to be a daughter organization of the SAA. Further, he will pursue updating the organization's by-laws. The topic of organizing a symposium on obsidian studies for the next SAA meetings in Anaheim, California (at which we plan to hold our next annual meeting) was raised. Paul Bouey tentatively accepted the responsibility of chairing this event. It was reported that Robin Torrence, now an archaeologist with the Australia Museum, has asked us to put together a symposium in Australia. He can arrange for lodging, but not airfare. Lastly, the first IAOS Occasional Paper will soon be made available at no cost to all current members (Obsidian: An Interdisciplinary Bibliography, by Craig Skinner and Kim Tremaine). Plans for additional Occasional Papers were discussed.

NEW OFFICERS

Officers were elected by mail ballot a few weeks after the Annual Meeting. Steve Shackley, previously President Elect, became President. Kim Tremaine was elected our new Vice President, and Viviana Ines Bellifemine will serve as Secretary/Treasurer. Craig Skinner, outgoing President, and Lisa Swillinger, outgoing Secretary/Treasurer will assist in the transition. Both plan to remain active members.

GREETINGS FROM THE EX-PRESIDENT

Craig Skinner

The IAOS Annual Meeting has come and gone, the peaceful transition of power has taken place, and I'd like to welcome Steve Shackley as the new President. I'd also like to offer my congratulations to the new President-elect, Kim Tremaine, and Secretary-Treasurer, Viviana Ines Bellifemine.

My thanks to everyone who contributed his/her time and writing to the 1992-1993 newsletters: Viviana Bellifemine, Jeff Hamilton, Clement Meighan, Charles Miksicek, Mike Rondeau, Steve Shackley and everyone who returned the obsidian hydration and characterization laboratory survey forms. We couldn't have done it without you. My special thanks to Newsletter editor/producer Kim Tremaine and Rob Jackson who spent many hours pulling together the Newsletter and to Lisa Swillinger for taking care of financial details and for getting everything printed up and safely out in the mail.

We didn't get everything done last year that we had originally mapped out - no IAOS t-shirts, postcards, and calendars - but things didn't go too badly. The *Obsidian Dates IV* publication special went well, suggesting that this is a concept that would be worth repeating in the future. The latest iteration of the on-disk IAOS Obsidian Bibliography (version 1.5) is finished and about to go in the mail for those of you who request a copy. This one is a major upgrade with over 1,000 new references, so don't miss it. I think that we have finally found just about all the references that anyone will ever need. The paper version of the bibliography is in the final production stages and will be going out in the mail to all current IAOS members within the next few months.

A personal testimonial for the bibliography: As I was making the last of many sweeps through the IAOS Bibliography for the endless typos, misspellings, and omissions that had crept in, I was called upon to produce a very rapid turnaround report on California obsidian sources and procurement patterns. Saved by the Bibliography! By loading the basic bibliography text file into one WordPerfect window and the report document into the other window, I could search the bibliography for key text strings (e.g., Casa Diablo, Medicine Lake, Trans-Sierran, etc.) and then cut and paste the references into the report. Very handy.

We're now geared up to add images to Newsletter articles and announcements. Thanks to the miracle of the HP ScanJet, we're now able to easily incorporate high-resolution scans of photographs, line drawings, and other images into the Newsletter. New authors -- send us your photographs along with your research articles and reports.

This naturally brings me to the topic of Newsletter materials. I know that many of you out there are sitting on information that the rest of us would like to know about. We would like to hear about your obsidian-related research projects (completed or not), thesis or dissertation research progress, obsidian source details and descriptions, and reviews of specific topics that are of interest to you. Other suggested topics might include: a) The role of obsidian research in the new Clinton Administration; b) Extraterrestrial sources of natural glass; c) What to do when the sample size (e.g., budget) is too small; d) Where to find easy research money so that the sample size can be large enough; e) Rapid inexpensive approaches to non-destructive hydration rim measurements; f) Hand care tips and obsidian hydration slide preparation; g) Where to find surplus XRF spectrometers for under \$1000; h) High-paying job opportunities in obsidian-related research; and i) How to find a doctoral committee that likes you just the way you are.

Thanks. It's been fun. See you next year at the Annual Meeting in Anaheim, California. *Craig*

INCOMING PRESIDENTS MESSAGE

Steve Shackley

While IAOS is only a half a decade old, the organization has made great steps forward mainly due to the able guidance of previous executive committees, interested members, and the dedicated few who have been pushing IAOS through its infancy. We all owe a debt of gratitude to the previous executive committee: Craig Skinner, president; Lisa Swillinger, Secretary/Treasurer; and Kim Tremaine the Newsletter Editor. Rob Jackson, who piloted the newsletter in the early transition years, deserves healthful thanks for the very hard work editing can be.

I will endeavor to carry out my job as president to the best of my abilities, and continue the upward ascent of the organization. To that end, we are working on a number of projects that will help insure the health of the organization. My work with the Society for Archaeological Sciences (SAS) suggests that a small society can benefit greatly from non-profit incorporation. Any funds received as gifts are tax sheltered, grants can be enabled through endowed

trusts, and we can become a daughter organization of the Society for American Archaeology (for free), and gain access to workshop space and representation at Annual Meetings. This is a relatively easy and inexpensive natural step in the evolution of the organization. I think we can attract even more members through SAA's annual meeting next year. In concert with this, will be a revision of the by-laws begun by Craig Skinner. This will include the non-profit status declaration.

The IAOS Advisory Committee, an idea begun by the last president, is underway. Roger Green (University of Auckland) has agreed to be our first member. Dr. Green has been involved with obsidian studies in Oceania since the 1960s, and continues to actively pursue obsidian research toward the solution of archaeological problems.

Finally, as mentioned earlier, we will be holding our annual meeting with the Society for American Archaeology in Anaheim, California next spring. This promises to greatly increase our visibility on an international scale, and continue to demonstrate the importance of archaeological science to the discipline of archaeology.

I would like to thank everyone in advance for their support and I would like to see a good turn out at the annual meeting. Please feel free to contact me or the other members of the Executive Committee if you have any ideas or concepts you think important to consider. *M. Steven Shackley*

POLYNESIAN BASALT ARTIFACT PROVENANCE WORKSHOP

The identification of imported artifacts has played a prominent role in facilitating discussions of social interaction throughout world prehistory. With the widespread occurrence of pottery and obsidian in the western Pacific, archaeologists have proposed various models of settlement, identified the origin of colonizing groups, and documented subsequent social interaction that affected island prehistories. Unfortunately for Polynesian archaeologists, pottery and obsidian are not present in sufficient quantities for distributional studies. Consequently, recent research has focussed on the geochemical analysis of basalt artifacts. An interdisciplinary workshop,

organized by Marshall Weisler (Department of Anthropology, University of California at Berkeley) and John Sinton (Department of Geology and Geophysics, University of Hawaii) was held on 16 January to explore and discuss the application of x-ray fluorescence techniques to Polynesian provenance studies. In addition to data sharing, suggestions were made for increasing inter-laboratory comparability, minimal standards for data reporting, and the need for acquiring additional source samples. Inquires can be directed to Marshall Weisler (Anthropology Department, University of California at Berkeley, CA 94720; fax 510 643-8557).

ARTICLE

Description of Paul's Fire Cache (35LIN542) A Biface Cache from the Western Slopes of the Cascades, Oregon

*by Ann Bennett Rogers
Willamette National Forest*

On June 7, 1992, the Sweet Home Ranger District of the Willamette National Forest had an escape controlled burn resulting in fire spreading to a recently harvested and planted unit. During fire suppression activities, the Fire Management Officer, standing in an area disturbed during logging as part of a skid trail, looked down and collected eight large obsidian bifaces. The next day he reported this to the Sweet Home Ranger District staff and cultural resource personnel. These bifaces were all percussion flaked and could have served as preforms or cores. The site was visited that day and numerous whole and fragmentary bifaces were recovered from the area. The fire, still actively burning, caused vegetation to burst into flames around the archaeologist and cultural resource technician. Bifaces were often too hot to pick up with bare hands. The area was marked so that fire fighters would avoid it and plans were made to return when fire suppression activities were completed. Upon return, the datum used for the surface collection was re-established and controlled excavations began.

Units were established as bifaces appeared. This trail of bifaces led directly into a cut bank formed when a skid trail adjacent the site was constructed.

Excavations into the cut bank revealed 14 bifaces *in situ* within an earthen filled pit approximately 70 cm below the surface. All identifiable pit fill was collected. This pit fill is viewed as secondary fill associated with the placement of the bifaces. Two liters of this fill was submitted for flotation analysis. The botanical array was 99% *Pinacea* branches, bark and melted resin, of which 47% is conifer bark, 26% *Abies* (true fir) or *Tsuga* (hemlock), 13% pitch or resin, 7% *Pinus* sp. charcoal, 7% conifer twig tissue with a trace of fern stem tissue (Stenholm, 1992).

A sample of charcoal (less than 2 grams) from the pit fill was submitted for radiocarbon dating by accelerator mass spectrometry. The resulting date $4,075 \pm 55$ years BP (reference number AA-9773). This charcoal is not believed to be cultural in origin, but represents a wildfire incidence and was deposited into the pit along with the bifaces. There is no evidence that the pit was once a fire hearth as there was no evidence of burned soil.

A total of 33 whole bifaces were recovered along with numerous fragments (Figure 1). All bifaces show arris grinding on the edges and some arris on the surface flake scar margins. A sample of ten bifaces were initially selected on the basis of provenience for hydration and characterization. Nine of the bifaces were from unburned subsurface contexts adjacent to or in the pit feature and the tenth was selected from the burned disturbed area. Hydration measurements were consistently reported as 2.3 or 2.4 microns $\pm$ 0.1 microns. The burned biface displayed a diffused hydration band of 2.3 microns. One of the bifaces was cut so that the remnant ventral surface was included and it yielded a measurement of 2.4 microns. All the bifaces were correlated with Obsidian Cliffs, approximately 30 air miles from the site (Jackson et al., 1992)

Technological analysis, further obsidian characterization and hydration, and the relationship of this site to the local prehistory are underway. Obsidian Cliffs is the dominant source for obsidian on the Sweet Home Ranger District. A review of artifacts collected on the Sweet Home Ranger District by Forest Service personnel indicate fragments of such bifaces have been collected off of previously recorded sites. Debitage analysis from the data recovery excavations at nearby 35LIN336 suggests that tools were manufactured off bifaces similar to

those recovered in this cache (Fagan et al., 1992). This biface cache contributes significantly to the understanding of procurement and use of obsidian on the Sweet Home Ranger District.

References

- Fagan, J.L., D. Ellis, F.P. Rushmore and D. Wilson
1992 Archaeological Data Recovery Investigations at the Canyon Owl Site (35LIN336), Linn County, Oregon. Report prepared for the Willamette National Forest, Eugene, Oregon. Archaeological Investigations Northwest, Report Number 20.
- Jackson, T.L., J. King, and M.K. Davis
1992 Report on X-Ray Fluorescence Analysis and Obsidian Hydration Rim Measurement of Artifact Obsidian from 35LIN542. Report prepared for the Sweet Home Ranger District, Sweet Home, Oregon, by BioSystems Analysis, Santa Cruz, California.
- Stenholm, Nancy A.
1992 Flotation Results from Paul's Fire Cache Site, 35LIN542. Report prepared for the Sweet Home Ranger District, Sweet Home Oregon, by Botana Labs, Seattle, Washington.



Figure 1. A typical obsidian biface from the Paul's Fire Cache

**ABSTRACTS AND ANNOTATIONS
ON REPORTS AND PUBLICATIONS**

Compiled by Kim Tremaine of BioSystems Analysis, Inc., 1017 Front Street, Sacramento, California 95814 USA; (916) 557-4500; FAX (916) 557-4511.

The volume of so-called "gray literature" in archaeology is staggering, making it difficult for researchers who are not "plugged-in" to contract or research archaeology of a certain region to hear of and gain access to reports. In addition, the proliferation and number of journals, and the interdisciplinary nature of obsidian and glass studies make it difficult to keep abreast of all relevant, current literature. The IAOS Newsletter will alert readers to some of this information by reproducing abstracts and summarizing literature that may be of particular interest to IAOS members.

Blackman, James M.

1992 Obsidian Exchange Patterns in the Middle East: A Reevaluation. Paper presented 28th International Symposium on Archaeometry, March 23-27, Los Angeles, California.

ABSTRACT

Instrumental neutron activation analysis of over 200 obsidian artifacts, from archaeological sites in the Middle East dating to the 8th through the 5th millennium B.C., requires a complete reevaluation of the obsidian exchange patterns proposed for these regions (Renfrew and Dixon, 1977). Obsidian data from late Chalcolithic levels at Aphrodisias in western Turkey show a procurement pattern that focuses on the Aegean source at Melos rather than on the Central Anatolian source at Acigol as previously proposed. In northeastern Syrian sites of Aceramic Neolithic through 'Ubaid age, a procurement pattern utilizing the as yet unlocated Ig obsidian source persists well beyond the 5200 B.C. date given for a shift in source utilization to the 3a source north of Lake Van. Distribution patterns for the Ig source, previously proposed to be southwest of lake Van, indicate a more likely location is on the northern tributaries of Euphrates River northwest of Van. Further, these same distribution patterns suggest that Ig obsidian and the Nemrut Dag obsidian were established in different exchange systems from as early as the Aceramic Neolithic. This paper will present the data

upon which these conclusions are based and discuss the cultural implications of this reevaluation.

William Dreyer

1992 Sourcing in the Presence of Uncertainty: The Use of First Order Predicate Logic and Certainty Factors in the Analysis of Geochemical Sources for Obsidian Artifacts. Paper presented 28th International Symposium on Archaeometry, March 23-27, Los Angeles, California.

ABSTRACT

This paper examines the use of first order predicate logic and certainty factors in the evaluation of trace element data derived from X-ray fluorescence analysis of obsidian artifacts. Problems in the use of bayesian probability and multivariate statistical techniques for classification problems are briefly discussed and an alternative approach is proposed in the form of a rule-based expert system computer program.

Elam, J. Michael, M.D. Glascock, and H. Neff

1992 Source Identification and Hydration Dating of Obsidian Artifacts from the Valley of Oaxaca, Mexico. Paper presented 28th International Symposium on Archaeometry, March 23-27, Los Angeles, California.

ABSTRACT

This paper will present the results of an investigation of the procurement and distribution of obsidian at sites in the Valley of Oaxaca, Mexico. Oaxaca is one of the primary centers of early Mesoamerican civilization, yet it is notable for its lack of locally available obsidian resources. Consequently, obsidian procurement in Oaxaca required the development and maintenance of long distance exchange networks.

A sample of 400 obsidian artifacts was obtained from archaeological sites in the Valley of Oaxaca and immediately adjacent regions, including the ancient Zapotec capital of Monte Alban. These were chemically analyzed by neutron activation analysis (NAA) to determine the source and were dated via the obsidian hydration technique. Data derived from these methods were used to identify and describe diachronic shifts in obsidian procurement during the Terminal Formative, Classic and Postclassic periods.

The significant features of this report include: 1) a comprehensive description of the diachronic pattern of obsidian procurement by the ancient Oaxacans; 2) an evaluation of the roles played by Teotihuacán and Monte Alban in Classic period obsidian exchange networks in Oaxaca; and 3) a brief critique of current explanatory models of obsidian exchange in ancient Oaxaca.

Ericson, Jonathon E., and Michael D. Glascock
1992 Chemical Characterization of Obsidian Flows and Domes of the Coso Volcanic Field, China Lake, California. Paper presented 28th International Symposium on Archaeometry, March 23-27, Los Angeles, California.

ABSTRACT

Instrumental neutron activation and multivariate analysis have been conducted on Coso obsidian from 15 sample locations in eastern California. We have found that there are five distinctive geochemical fingerprints that can be used to distinguish obsidians from this extensively used volcanic source area.

The procedures used for sample preparation, irradiation and counting, and statistical analysis will be presented. In addition, an interpretation of the results as applied to sourcing obsidian artifacts and the importance for obsidian hydration dating will be discussed.

Freeman, Stewart P.H.T.
1992 A Novel Method for Dating Archaeological Lithic Surfaces by Measuring the Diffused Atmospheric Nitrogen Depth Profile by Secondary Ion Mass Spectrometry. Paper presented at the 28th International Symposium on Archaeometry Conference, March 23-27, Los Angeles, California.

ABSTRACT

We introduce and present the first results of a novel dating technique for determining the age of archaeological lithic surfaces.

Following the formation of a fresh surface, for example, by chipping, nitrogen and the other atmospheric gases start to diffuse through the new face. The modern profile of the nitrogen concentration as a function of depth from the surface

should contain potentially useful information on the history of the surface.

Secondary ion mass spectrometry (SIMS) is a powerful technique for determining elemental distributions in a wide range of sample matrices. It has proven itself capable of making the appropriate measurements for our requirements; an important application has been analyzing dopant concentrations in silicon, and similar, in the semiconductor industry.

We have investigated the potential of dating surfaces by depth profiling nitrogen by SIMS. We present the first profiles in archaeological obsidian from the Olmec Great Mound, Mexico.

Giaque, Robert D., Frank Asaro, Fred Stross, and Thomas Hester

1992 High Precision Nondestructive X-ray Fluorescence Measurements of Obsidian Artifacts for Provenance Determination. Paper presented 28th International Symposium on Archaeometry, March 23-27, Los Angeles, California.

ABSTRACT

A new high precision non-destructive X-ray fluorescence (XRF) method has been developed for the measurement of trace and major element concentrations in obsidian archaeological artifacts. The method is applicable to both thick and very thin artifacts with a variety of shapes. Essentially no sample preparation is necessary and just one 1000-second X-ray measurement is needed for each sample.

In three chemical groups of New World obsidian, the concentrations of the six most precisely measured elements (Fe, Rb, Sr, Ba, Zr and Y) had standard deviations that averaged 2.3%. The first five elements had reliable published values measured by neutron activation analysis or XRF and these differed on the average by only 2.0% from the present work. The concentrations of ten other elements were measured (K, Ca, Ti, Mn, Ga, As, Nb, Pb, Th and Zn), and their standard deviations averaged 7%. There was no discernible difference in standard deviations between source samples with freshly-cleaved surfaces and artifacts with untreated surfaces (for elements above Fe in atomic number).

The relationship between certainty of provenance assignment, number of elements studied, and precision of measurement was investigated, and it was found that high precision measurements on a few elements were more important than poor precision measurements on many. As a test of the potential usefulness of the methodology after comparable source measurements have been made, the literature data on 14 Guatemalan sources were studied. The data suggested that measurements with the precision of the new XRF methodology should be usually able to ascertain provenance of obsidian from different sources with a very high level of confidence (99.99999%). The study indicated the methodology is not yet as useful as NAA in distinguishing provenance when sources exhibit random variability in composition.

M.D. Glascock

1992 Recent Advances in the Investigation of New World Obsidian. Paper presented 28th International Symposium on Archaeometry, March 23-27, Los Angeles, California.

ABSTRACT

In certain regions of the Western Hemisphere (the Andes region, California and Mesoamerica) the volcanic glass obsidian was an important resource of the pre-Columbian peoples, used in the production of sharp-edged tools and, less frequently, the fabrication of jewelry and works of art. Because the raw material had limited availability, obsidian was an important item of commerce that archaeologists have frequently investigated to study prehistoric exchange networks. Two characteristics of obsidian make it an ideal artifact for archaeological investigation: (1) Between-source compositional variations are usually greater than within-source variations, and (2) the surface of obsidian slowly absorbs water (hydrates) with time. Thus, the techniques of chemical compositional analysis and hydration rind measurement offer two complementary functions (sourcing and dating) that are valuable to archaeological study.

Recent investigations of obsidian sources in the Western Hemisphere have revealed that compositional variations in some sources are large enough that questions concerning micro-provenancing may be answerable. However, these same variations raise

questions about the ability to date artifacts from these sources. As a result, chemical uniformity of a source cannot be assumed *a priori* but must be investigated by the analysis of a number of samples collected at different locations around the source. It may be that chemical data on more elements and more sophisticated statistical analyses using Mahalanobis distances can answer these questions. This paper will examine these and other questions concerning New World obsidian in greater detail.

Hamusek McGann, Blossom

1993 What X Equals: The Archaeological and Geological Distribution of "Source X" Tuscan Obsidian in Northern California. M.A. Thesis, Department of Anthropology, California State University, Chico.

ABSTRACT

A fundamental problem in hunter-gatherer archaeology consists of establishing the relationship between material remains recovered in the present and the nexus of human behaviors and societal relationships to which these remnants of the past may be attributed. With this perspective in mind, the present study has as its principal objective the gathering of relevant data regarding the archaeological, geographical, petrological and geochemical variability of artifact-quality glass derived from the Tuscan obsidian source located in northern California.

Eight previously unidentified artifact-quality glass sources were found within the Tuscan Formation as a result of this investigation. These sources were found to be relatively well dispersed over the landscape, making them available to early hunter-gatherers in diverse environments. Moreover, significant geochemical differences were established between several of the main source groups, indicating that in addition to the original Tuscan obsidian sources identified by Richard Hughes (1983), there are at least two new chemical source groups identifiable by obsidian characterization analyses.

The data obtained as a result of the geochemical analyses were then used to add to the understanding of the changing lifeways in prehistoric northeastern California, relying upon the central concept of "mobility strategies".

The results of this analysis lend support to the view that as the northern Sacramento Valley and surrounding areas became more heavily populated during the late prehistoric period, the mobility of the aboriginal inhabitants became more restricted. These local population increases most likely resulted in competition and conflicts for available land and resources, thus possibly necessitating the use of more locally available toolstone such as the Tuscan obsidians.

Jackson, Thomas L., and Joachim Hampel

1992 Size Effects in the Energy-Dispersive X-ray Fluorescence (EDXRF) Analysis of Archaeological Obsidian Artifacts. Paper presented 28th International Symposium on Archaeometry, March 23-27, Los Angeles, California.

ABSTRACT

Analysis of archaeological obsidian samples often requires that such samples remain intact. Size of archaeological specimens often cannot be controlled and researchers must attempt accurate analysis of samples of less than "optimal size." Although certain dimensional constraints (e.g., thickness) are known for prepared samples (e.g., pressed powder and fused pellets), the potential effects of sample dimensions for unprepared artifact obsidian are less well understood. Minimal dimensions for accurate analysis of archaeological specimens was determined experimentally in the EDXRF laboratories at BioSystems Analysis and at UC Berkeley. Obsidian from the Glass Mountain source in northern California was cut into square pieces with dimensions ranging from 30 microns to 5 millimeters thick, and from 1 to 30 millimeters on a side. Analytical results are compared with the reported trace-element concentration values for the USGS RGM-1 rock standard from the same source. The results demonstrate that thickness and area of the sample affect analytical results differently and that extended duration of analysis (live time) does not necessarily improve results for smaller pieces. Minimal sample dimensions for accurate results appear to be on the order of 3 millimeters thick by 10 millimeters on a side, with inconsistent and largely unpredictable results obtained from pieces of smaller dimensions.

Mauz, Kathy E.

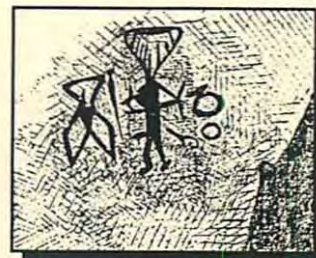
1993 Lifeway Reconstruction through Trace Element Analysis and Lithic Sourcing of Siliceous Artifacts, Snow Mesa, San Juan Mountains, Colorado. B.A Thesis, Geology Department, The Colorado College, Colorado Springs, 80903.

ABSTRACT

The archaeological survey of Snow Mesa in the San Juan Mountains of Colorado was conducted as an effort toward the reconstruction of lifeways enjoyed by peoples who once visited its high, rolling terrain. The evidence that remains occurs in the form of stone tools; interpretation of these in terms of morphological attributes and chemical composition has enabled postulation of temporal relationships at the site as well as tracing of the geographical origins of the people who left them there. Projectile point styles identified at the site indicate thousands of years of intermittent use and cultural influence from potentially every cardinal direction; other implements are suggestive of camping activity and thus of perhaps season-long occupation. Chert, quartzite, and obsidian pieces were sampled and subjected to trace element analysis; comparison of the results has revealed use of both native (to Snow Mesa) and foreign cherts, at least two to three quartzite sources, and at least four obsidian deposits, one of which is located in the Jemez Mountains of New Mexico.

Peoples following the annual migrations of game animals were guided to the mountain pastures by the Rio Grande River and its tributaries; during the summer months, they camped and hunted in the San Juans and other mountains where temperatures were cooler, resources diverse, and sources of water reliable. The nomadic, hunting and gathering lifestyle supported the human population in the region through often drastic climatic cycles and demographic shifts; the Snow Mesa artifacts may reflect these sorts of changes, too.

Zoomorphic figure and miscellaneous design elements from a pictograph found on an obsidian boulder in Oregon. More about Oregon obsidian rock art in the next issue!



Peterson, J., D. Mitchell, and M.S. Shackley
1992 Obsidian X-ray Fluorescence Data from
Pueblo Grande, Arizona: Modeling Social and
Economic Patterns of Lithic Procurement. Paper
presented 28th International Symposium on
Archaeometry, March 23-27, Los Angeles,
California.

ABSTRACT

A large set of X-ray fluorescence data from a Hohokam site in the Salt River Valley offers a unique opportunity to chart the organization of obsidian procurement. During its 500 year span of occupation, Pueblo Grande grew to be a large and complex site exhibiting considerable variability within both residential and burial contexts. A sampling program devised to maximize coverage of spatial, temporal, and reduction stage information resulted in the submission of 225 pieces of obsidian for testing. Laboratory investigations were performed at UC Berkeley's Department of Geology and Geophysics using an energy dispersive X-ray fluorescence spectrometer (Spectrace 440). X-ray intensity data was generated for seven trace elements that provide diagnostic indications of inter-source variability.

Once the XRF results were in hand, diversity measures were used as exploratory tools to examine changes in the obsidian assemblage over time and space. The results of the analysis suggest that, at an intrasite scale, many discrete residential and burial contexts are associated with a limited subset of obsidian source proveniences. These associations are used in conjunction with other site information to map the spatial analogs for some level of group affiliation. A regional perspective, incorporating past obsidian characterization projects, provides the opportunity to monitor variability in procurement strategies against a broader spatial backdrop. While regional settlement area and ceramic catchment zones were apparently shrinking during the Late Classic period (ca. A.D. 1400), the geographic extent and distribution of the obsidian sources being utilized at Pueblo Grande appears to remain constant. In light of the Pueblo Grande XRF results, the role of obsidian characterization data has been expanded to address both intrasite issues of social group definition and a reevaluation of current models for changing procurement and production networks through time.

Roper Wickstrom, C. Kristina

1993 A Study of High Altitude Obsidian
Distribution in the Southern Sierra Nevada,
California. M.A. Thesis, Department of
Anthropology, Sonoma State University, Rohnert
Park, California.

ABSTRACT

The purpose of this study is to examine the distribution of major obsidian source types within Sequoia and Kings Canyon National Parks. The boundaries of two obsidian source types-- Casa Diablo and Coso-- are examined relative to the presence of Fish Springs glass.

Twelve areas within the Parks, ranging in elevation from approximately 6000 to 12,000 feet above sea level, were inspected for prehistoric archaeological deposits. Four hundred and twenty-nine specimens of archaeological obsidian from prehistoric deposits within the 12 surveyed areas were collected and submitted for geochemical source analysis and obsidian hydration rim measurement.

Survey within the project area has yielded a surprisingly rich inventory of archaeological deposits. Casa Diablo obsidian is dominant in the northern study area, while Coso materials dominate the southern area assemblages. Fish Springs glass is the major source material identified in the central study area.

Analytical results indicate a long period of prehistoric use of the high altitude crest zone. A noticeably high percentage of Fish Springs obsidian materials occurs in a region previously thought to be outside of the proposed range of distribution of this glass. Greater consideration must be given to alpine environments in studies of aboriginal settlement patterns.

Gerwulf Schneider

1992 Analysis of Eastern Anatolian Obsidian Using
X-ray Fluorescence. Paper presented 28th
International Symposium on Archaeometry, March
23-27, Los Angeles, California.

ABSTRACT

Analyses of obsidian artefacts from Uruk/Warka in southern Iraq and from two sites in northeastern Syria

were compared with geological samples from Bingol and Nemrut Dag in eastern Anatolia. In samples of 100 mg, eighteen elements were determined. Because of their very homogeneous distribution, the major elements Si, Al, Fe, Na and K are useful and sufficient to define compositional groups. The series of minor elements include Ti, Mn, Mg, Ca, Zn and the geochemically most relevant elements Rb, Sr, Y, Zr, Y, Nb, Ba and Ce. These elements determinable by XRF, which to a large part are less easy to determine by neutron activation, can be used to correlate the resulting groups with those of the important work of Renfrew and coworkers. Results of interlaboratory comparisons are presented.

Shackley, M. Steven, and Joachim Hampel

1992 Surface Effects in the Energy-Dispersive X-ray Fluorescence (EDXRF) Analysis of Archaeological Obsidian. Paper presented 28th International Symposium on Archaeometry, March 23-27, Los Angeles, California.

ABSTRACT

For a number of years conjecture concerning the effects of the variability in surface configuration of obsidian artifacts on analytical results has become somewhat mythical in archaeometry. This problem is significant since the accurate analysis of whole flaked obsidian artifacts that must remain undamaged from sample preparation and analysis is frequently necessary. A series of experiments in the EDXRF lab at Berkeley was devised to test the potential effects of surface configuration on results. Standard flat core samples 33 mm in diameter were produced from nodules recovered from two northern California archaeological obsidian sources, Bodie Hills and Napa Glass Mountain. One side of each was polished to a high gloss and the other flaked with a copper wire pressure flaking tool to reproduce a flake-scarred surface typical of archaeological samples. Additionally, both the polished sides and the flaked sides were twice rotated 90° and reanalyzed. The results demonstrate that there are no significant differences between the polished and flaked sides on the same core sample, indicating that the range of surface effects commonly found on archaeological samples is not sufficient in and of itself to cause spurious source assignment.

Stevenson, C., J.J. Mazer, E.Knaus, and J.K. Bates
1992 Heterogeneity of Water Content in Obsidians from the Coso Volcanic Field: Implications for Obsidian Hydration Dating. Paper presented at 28th International Symposium on Archaeometry, March 23-27, Los Angeles, California.

ABSTRACT

Obsidian hydration dating is a chronometric technique that converts the thickness of a weathering layer to an absolute age by establishing the rate of rim formation. The hydration of obsidian is a process of inward diffusion of molecular water that proceeds with the square root of time. Establishing the rate of water penetration under conditions of elevated temperature is difficult. However, recent investigations have shown that the intrinsic water content (H_2O+) of the obsidian is strongly correlated with the penetration rate of molecular water. Therefore, the hydration rates for known obsidian sources may be determined if the assumption of glass chemical homogeneity is met.

During the last decade archaeologists have proposed over a dozen hydration rates for obsidians obtained from the Coso, CA, volcanic field, an important and widely used prehistoric obsidian source. One possible explanation for the conflicting solutions is that obsidian deposits are highly variable in H_2O+ , thereby resulting in many separate hydration rates. To evaluate this proposition, a total of 147 samples from seventeen primary obsidian flows (West Cactus Peak, Joshua Ridge) and secondary deposits were measured for H_2O+ using infrared spectroscopy.

Water content values ranged from 0.31 to 2.34 wt% H_2O+ . In general, the secondary deposits contained higher water values than the primary flows, thereby suggesting more rapid cooling and less devolatilization of the magma. Secondary deposits also produced the lowest water values. Primary flows possessed a narrower range of water values (0.48 to 0.88 wt% H_2O+), yet contained a within flow variation of approximately $\pm 20\%$. These results indicated that a wide range of hydration rates would be predicted for glasses from the Coso volcanic field. It is suggested that H_2O+ determinations be conducted on each archaeological sample prior to hydration dating.

Weaver, Richard

1993 Development and Assessment of Empirically Derived Hydration Rates for the Truman-Queen Obsidian Source, California and Nevada. M.A. thesis, Department of Anthropology, California State University, Sacramento.

ABSTRACT

The determination of empirically derived, source-specific, hydration rates has been an issue of geological and archaeological interest for over a quarter century. A variety of approaches have been pursued in various efforts to attain this goal. To date, however, only those which have relied on statistical correlations between cultural-temporal periods and hydration values from temporally sensitive artifacts have proven to be of much practical utility. The current "state-of-the-art" refinements in this approach were pioneered by Hall (1983, 1984) during his development of a now widely accepted rate for the Casa Diablo source.

Using projectile points from existing collections, Hall's (1983, 1984) approach was followed in an effort to determine a useful hydration rate for the Truman-Queen obsidian source. Assessment of the sixteen potential Truman-Queen rates developed in the course of this study resulted in a determination that none yields reasonably accurate absolute age conversions throughout the known range of cultural-chronological continuum.

The ancillary studies completed in support of the primary objective, however, yielded more fruitful results. First, the Truman-Queen projectile points assembled for this study exhibit inter-regional morphological variability beyond that which can be accommodated by Thomas' (1981) classificatory criteria. Consequently, as Thomas (1981:37) has cautioned (a caveat which has largely gone unheeded), it is quantitatively apparent that his point key can not necessarily be straightforwardly applied to portions of the western Great Basin beyond the Monitor Valley, Nevada, region. Suggestions as to the adjustments necessary for Thomas' criteria to applicable to the Truman Meadows are offered herein. Secondly, the Truman hydration data provide corroboration for Flenniken and Wilke's (1989) observation that Little Lake Split Stem and Elko

series projectile points can not be temporally segregated on the basis of hydration values. This does not, however, necessarily confirm their corollary assertion that this reality is due to the fact that the former are simply reworked versions of the latter. Lastly, obsidian sourcing indicated substantially more variability in the macroscopic characteristics of Truman-Queen obsidian than suggested by Bettinger, Delacorte, and Jackson (1984). This, in concert with the fact that several other area sources yield material which is visually indistinguishable from classic Truman-Queen glass, raises major ramifications for future visual sourcing efforts in the Inyo-Mono region.

Wilson, Glen B.

1993 The Archaeological Collection from CA-ALA-329, The Ryan Mound, Alameda County, California. Coyote Press Archives of California Prehistory No. 39.

ANNOTATION

Obsidian dates obtained from the Ryan Mound (CA-ALA-329), located on the southeast shore of San Francisco Bay, were recently compared with radiocarbon dates and temporally diagnostic bead types. Hydration measurements were taken by the author and Thomas Origer on 305 specimens visually ascribed to local obsidian sources. The author determined that the majority of specimens were from the Napa Glass Mountain source. Eleven percent were from an unfamiliar source, 6% were found to be from the Annadel source, while less than 1% were attributed to Borax Lake and Mt. Konocti sources. All measurements were converted to Napa values using Tremaine's (1989) comparison constants, and applied to Origer's Napa hydration rate. Radiocarbon dates and olivella bead types associated with burials containing obsidian were found to support the hydration dates.

Burial #	Radiocarbon date	Ave. hyd. date
48	250 ± 50	221
143	1220 ± 90	1773
227	650 ± 50	884
239	700 ± 55	497

OBSIDIAN CHARACTERIZATION LABORATORY SURVEY RESULTS

by Craig E. Skinner

INFOTEC Research, Inc., Eugene, Oregon

Introduction

In response to a lack of overall information about the scope and availability of obsidian characterization laboratories, a detailed obsidian laboratory questionnaire was distributed in 1992 to known and suspected obsidian characterization laboratories worldwide. This article presents a summary of the responses to that survey. The complete text of the questionnaire can be found in the appendix at the end of the article while the detailed responses to the survey are made available elsewhere. My objective in surveying the laboratories was to provide the archaeological (and geological) community with an initial baseline compilation of obsidian characterization facilities. It is my hope that this information will make it a little easier for archaeologists and analysts to get on with both the business and science of high-quality obsidian characterization studies.

The Characterization Laboratories

A total of twelve obsidian characterization laboratories located in four countries responded to the questionnaire. Five of the nine U.S. facilities were located in California; the other four were situated in Oregon, Missouri, Utah, and Wisconsin. The remaining three labs are located in Australia, Italy, and British Columbia, Canada.

All of the responding facilities used geochemical methods of characterization with x-ray fluorescence spectrometry as the most popular technique. All of the responding laboratories, with the exception of the Laboratory for Archaeological Chemistry, University of Wisconsin (see below), are available for commercial characterization work at the present time. Most labs used graphical methods (scatterplots and ternary diagrams) as an aid in correlating artifacts and obsidian sources. In addition, several also used statistical techniques such as discriminant analysis and cluster analysis to supplement the visual methods. Seven labs used nondestructive means of analysis; the

remaining ones required powdered samples for analysis. One of the laboratories that returned the survey, the University of Oregon Center for Volcanology Atomic Absorption Laboratory, does not routinely analyze obsidian and does not attempt to assign geologic sources to analyzed artifacts (see below for more details). The remaining characterization laboratories all attempt to indicate geologic sources of artifacts, although the geographic coverage of potentially identifiable sources varies considerably from facility to facility. A summary of the responses received by the different characterization labs is presented in Table 1.

The Laboratory for Archaeological Chemistry (Department of Anthropology, University of Wisconsin, Madison, Wisconsin 53706) is currently engaged in characterization research with ICP spectroscopy. The laboratory is **not** available for outside characterization at this time and, for that reason, laboratory capabilities are not summarized in Table 1. T.D. Price (Internet: tdprice@macc.wisc.edu) and J.H. Burton (Internet: jhburton@macc.wisc.edu) report that they plan to explore novel chemical methods of characterization.

Oregon State University Radiation Center (Oregon State University, Radiation Center A100, Corvallis, OR 97331). One additional facility, the Oregon State University Radiation Center, Corvallis, Oregon (INAA), did not respond due to the untimely death of Bob Walker, the INAA Project Manager at this facility. Geochemical data resulting from neutron activation analyses of western and central Oregon obsidian sources are available for comparison with characterized artifacts by contacting the author. Details about neutron activation analytical services and information about research grants may be requested from Art Johnson, Director, Oregon State University Radiation Center (503-737-2341).

Center for Volcanology, University of Oregon. The Atomic Absorption Lab associated with the Center does not normally analyze obsidian artifacts and will not attempt to identify the geologic source of analyzed artifacts. I've used AAS data from this laboratory, however, to characterize a limited sample of western Oregon obsidian artifacts and sources and will be glad to provide any interested party with my small database of comparative geochemical data.

Geographic Coverage

As I mentioned previously, the geographic regions to which laboratories are able to successfully or confidently assign geologic sources to characterized obsidian artifacts varies considerably. For this reason, the choice of laboratory will often be largely dictated by the available obsidian source universe characterized by that laboratory. Because of the importance of geographic coverage to most obsidian studies, I've reproduced verbatim the responses to the survey question: *For what geographic area(s) can you reliably identify the geologic sources of chemically-characterized artifacts?*

A&G Analyses: Mesoamerica (Mexico, Guatemala), Utah, New Mexico, Arizona, Nevada, Idaho, Wyoming.

ANSTO: Pacific islands and rim; others if geologic sources are provided.

Archaeometry Laboratory, University of Missouri: Central Mexico and Guatemala where about 99% of artifacts are being sourced successfully. We are collecting source information in other regions (South America, Southwestern U.S., California).

BioSystems Analysis: North Coast Ranges, northeastern California; East Side/Great Basin though our resources are limited for central and eastern Nevada; Western Oregon; Western and N. Central New Mexico; Mesoamerica; S.E. Oregon/Idaho is a definite black hole.

Center for Volcanology: No response; comparative AAS data are available from the author for several western Oregon sources.

CNR-ITABC: Italy, Greece, and, to some extent, Turkey.

EDXRF Lab, Berkeley: Greater Southwest (Arizona, New Mexico, Chihuahua, Sonora, and southeastern California; some Baja, California).

Geochemical Laboratory: Western North America.

Lawrence Berkeley Laboratory: We have studied sites in the United States, Mexico, Guatemala, Belize, Honduras, El Salvador, Nicaragua, Costa Rica, Ecuador, Peru. Our assignments are reliable. If we cannot match compositions, we do not make source assignments.

SFU-XRF Laboratory: Entire Pacific Northwest from northern California to Alaska and from B.C./Washington to Montana.

University of California, Davis: California.

Interlaboratory Comparison

In answer to one of the survey questions, ten of the twelve responding laboratories (A&G Analyses, ANSTO, the Berkeley EDXRF Lab, University of Missouri, BioSystems Analysis, Geochemical Research, Lawrence Berkeley Laboratory, SFU XRF Laboratory, CNR-ITABC, and the University of California at Davis) indicated that they would be interested in participating in an interlaboratory comparison of obsidian standard samples. The results of an interlaboratory comparison of geochemical data offer the possibility for improved comparability and calibration of data among different laboratories and may considerably extend the range of usable geochemical source data that is available to participants. The interlaboratory comparison is now in the planning stage and further developments will be announced in a future *IAOS Newsletter*.

Availability of Detailed Information

The characterization laboratory questionnaires that were returned contain considerably more information than is presented in this article (see Appendix 1 for a complete list of the questions). For reasons of space, it was not possible to include the entire text of the questionnaire responses in the *IAOS Newsletter*. For anyone who requires more details, the complete text of the responses is available as an archived, self-extracting IBM-PC text file (OBSLABS.EXE) and as a paper printout. To obtain a paper copy, send a SASE with your request. For a disk copy of the complete responses, please send me a stamped, self-addressed disk mailer and a blank formatted disk (1414 NW Polk, Corvallis, OR 97330, USA). For those of you with Internet access, the file has been posted in two Anonymous FTP sites - SAS-DEPOT (grv.dsiir.govt.nz), the Society for Archaeological Sciences' collection of file repository, and csn.org, the Computer-Assisted Geological Society file location.

An Invitation to Obsidian Characterization Laboratories

The IAOS extends an invitation to all obsidian characterization (and hydration) laboratories to send us a laboratory profile for publication in the *IAOS Newsletter*. A one to three-page description of lab facilities and services, personnel, geographic coverage, research interests, and accomplishments is

Table 1: Summary of the Results of the Obsidian Characterization Laboratory Questionnaire (page 1 of 2).

<i>Laboratory</i>	<i>Contact(s)</i>	<i>Method</i>	<i>Destructive?</i>	<i>Cost</i>	<i>Comments</i>
A&G Analyses 100 CRWH Brigham Young University Provo, UT 84602 USA	Fred W. Nelson (801)378-6879 (801)378-5977 [Fax]	XRF	Yes	\$30	Analytical uncertainties available on request.
ANSTO Lucas Heights Research Laboratories Private Mail Bag 1 Menai, N.S.W. 2234 Australia	Mike Hotchkiss G.M. Bailey 02 717 3148 02 717 9265 [Fax]	PIXE PIGME	No	A\$65	15% discount for more than 50 samples. Minimum of 25. Other archaeological projects include analyses of pottery and ochre. Internet: mah@atom.lhrl.oz.au
Archaeometry Laboratory Missouri University Research Reactor 223 Research Reactor University of Missouri Columbia, MI 65211 USA	Michael D. Glascock (314)882-5270 (314)882-6360 [Fax]	INAA	Yes	\$20- 150	Also provides obsidian hydration measurements and neutron and neutron activation analysis of pottery, chert, basalt, and other materials. BITNET: GLASCOCK@MURRVAX.
BioSystems Analysis, Inc. 303 Portrero, Suite 29-203 Suite 29-203 Santa Cruz, CA 95060 USA	K. Roper Wickstrom Tom Jackson (408)459-9100 (503)459-4191 [Fax]	XRF	No	\$18 + setup (\$50)	Also offers obsidian hydration analysis and XRF analysis of non-obsidian materials (andesite, basalt, pumice, etc.). Setup fee reduced to \$25 if sample data are sent on disk.
Center for Volcanology Atomic Absorption Laboratory University of Oregon Eugene, OR 97403 USA	Christine McBirney (503)485-4569	AAS	Yes	\$20- \$40	13 major elements - \$30; 9 trace elements - \$20; \$40 - both. Add \$4 for prep, if not powdered. Comparative obsidian data available at present only for western Oregon. Non-obsidian rocks also analyzed 20 sample minimum.
EDXRF Laboratory P.A Hearst Museum of Anthropology University of California Berkeley, CA 94720	Tim Teague M.S. Shackley (510)642-3681 (510)643-8557 [Fax]	XRF	No	\$20	\$50 minimum charge. Also offers XRF analysis of volcanic glasses, rhyolite, basalt, ceramics, secondary siliceous sediments. Nominal price reduction for student research projects. Internet: shackley@cmsa.berkeley.edu.
Geochemical Research 9991 River Mist Way Rancho Cordova, CA 95670 USA	Richard E. Hughes (916)364-1074 (916)364-1442 [Fax]	XRF	No	\$25- \$30	Very extensive source database for Western North America.
CNR - ITABC C.P. 10 Monterotondo Rome, Italy 00016	Vincenzo M. Francaviglia xx39-6-9005274	XRF	Yes	Low (inquire)	Also offers XRF analysis of pumices and basalts.
Lawrence Berkeley Laboratory Building 70-193A, 1 Cyclotron Road Berkeley, CA 94720 USA	Robert D. Giaque Fred Stross (510)486-5658/5433	XRF	No	\$90- \$100	See publications for a list of sources. Minimum 20 samples; discount negotiable on 100+ per year. Capable of analyzing very small samples.
SFU-XRF Laboratory Department of Chemistry Simon Fraser University Burnaby, British Columbia Canada V5A 1S6	John D'Auria (604)291-4607/4873 (604)291-3765 [Fax]	XRF	No	\$30- \$40	\$40/sample for <20 samples; \$35 for 21-40; \$30 for 40+. Compared with 109 glass sources. Internet: dauria@sfu.ca
University of California, Davis 418 University Avenue Davis, CA 95616 USA	Paul Bouey Peter Schiffman (916)758-6315	XRF	No	\$17.50	Also operates in association with UCLA Obsidian Hydration Laboratory. Samples smaller than 1.5 cm diameter and 2 mm thickness can often be characterized with trace element ratios.

Table 1 (continued): Obsidian Characterization Laboratory Summary (page 2 of 2).

<i>Laboratory</i>	<i>Elements Used</i>	<i>+/-?</i>	<i>Minimum Size</i>	<i>Source List?</i>	<i>Geographic Area</i>	<i>Payment Method</i>	<i>Final Report</i>	<i>Data Form</i>	<i>Turn-around</i>
A&G Analyses Brigham Young University	Rb,Sr,Y,Zr,Nb,Mn,Fe, Ti,Ba,Na	Yes	0.5 gm	Yes	Mesoamerica West U.S.	Check	Letter	P,D	1 mo.
ANSTO Lucas Heights Research Labs	F,Na,Al,Si,K,Ca,Mn, Fe,Rb,Sr,Y,Zr,Nb	Yes	5 mm	Yes	Pacific Islands New Zealand	Bank draft in A\$	Letter	P,D	2 wks.
Archaeometry Laboratory University of Missouri	Ba,Ce,Eu,Fe,Hf,La,Mn, Nd,Rb,Sc,Sm,Sr,Th,Zr +	Yes	50 mg	Yes	Mexico Guatemala	Check P.O.	Report	P,D	2-3 mo.
BioSystems Analysis, Inc. Santa Cruz, CA	Rb,Sr,Y,Zr,Nb,Fe,Mn, Zn,Pb	Yes	7 mm diameter 1-2 mm thick	Pos- sible	Parts of West U.S./Mesoamer.	Check Cash	Letter	P	1 mo.
Center for Volcanology Atomic Absorption Laboratory	Ba,Co,Cr,Cu,Li,Ni Rb,Sr,Zn + majors	No	2 gm	No	Not Applicable	Check Cash	Data table	P	2 wks.
EDXRF Laboratory P.A. Hearst Museum of Anth.	Rb,Sr,Y,Zr,Nb,Ba,Ti, Fe,Ni,Zn,	Yes	10 mm diameter 3 mm thick	Yes	Southwest U.S. Northern Mexico	Corporate check P.O.	Report	P,D	2 wks.
Geochemical Laboratory Rancho Cordova, CA	Rb,Sr,Y,Zr,Nb,Ti,Mn, Fe,Ba	Yes	10 mm diameter 2-3 mm thick	No	Western North America	Inquire	Letter Data tables	P	Varies; Inquire
CNR-ITABC Rome, Italy	Rb,Sr,Y,Zr,Ti,Mn,Fe, Ba + many others	Yes	> 1 gm	Yes	Italy, Greece, Parts of Turkey	Bank order	Data tables	P,D	Inquire
Lawrence Berkeley Laboratory Berkeley, CA	Rb,Sr,Y,Zr,Nb,Ti,Mn, Fe,Ba,Th	Yes	50 mg	Yes	Western U.S. Mexico, Central & S. America	Advance	Letter	P,D	About 2 wks.
SFU-XRF Laboratory Burnaby, B.C.	Rb,Sr,Y,Zr,Nb,Mn,Fe, Ba,Zn,Cu,Cr	Yes	.75 cm diameter .75 mm thick	Yes	Pacific NW B.C., N. Calif.	Check, M.O., P.O.	Letter	P,D	About 1 wk.
University of California Davis, CA	Rb,Sr,Zr,Fe,Mn,Ba	No	1.5 cm diameter 1-2 mm thick	No	California	Check Cash	Letter	P	2-4 wks.

Method: Analytical method used. AAS = atomic absorption spectrophotometry; INAA = instrumental neutron activation analysis; PIXE/PRIXE: proton-induced x-ray emission; XRF = x-ray fluorescence.

Destructive?: Is the analytical method destructive (powdered sample)?

Cost: Cost per sample for characterization.

Comments: Other services and pricing details; if available, Internet or BITNET e-mail addresses are listed.

Elements Used: Major and/or trace elements routinely used to characterize the samples.

+/-?: Are analytical uncertainties reported with the analytical results?

Minimum Size: Minimum sample size required for accurate results (sample weight or diameter).

Source List?: Is a list of obsidian sources used for comparison available?

Geographic Area: Geographic area for which confident source assignments can be made.

Payment Method: Method of payment - M.O. = Money Order; P.O. = Purchase Order

Final Report: Type of final report.

Data Form: Format in which data are distributed. P = Paper table; D = Disk (IBM PC compatible, usually .WKS); must be requested by most labs.

Turnaround: Average turnaround time.

suggested. Photographs are welcome. Please direct any submissions to Kim Tremaine, IAOS Newsletter Editor.

Concluding Remarks

Different laboratories serve different analytical needs and have different analytical requirements for samples. Any single lab can reliably identify geologic sources of artifacts only in specific geographic areas for which its characterized sample universe is relatively complete. In addition, some laboratories may be seasonally unavailable or may be currently engaged in demanding projects that preclude the immediate processing of new samples. For these reasons, I strongly recommend that you **always** contact the laboratory that you plan to use prior to submitting samples. This is particularly true when sample turnaround time is an important concern or if large quantities of artifacts are involved. The obsidian characterization facilities will appreciate the warning and the chance to educate users about specific sample requirements; the archaeologist (or geologist) end-user will be assured that his/her samples will yield optimal analytical results.

Acknowledgements

I would like to thank everyone who responded to the none-too-short laboratory survey questionnaire. To Bob, thanks for all those INAA data - may your numbers always be good and your uncertainties small.

APPENDIX

Obsidian Characterization Laboratory Survey Questions

A. General Information

1. Name of Laboratory
2. Laboratory Director/Principal Contact(s)
3. Address
4. Phone/Fax number(s)
5. Internet/BITNET/CompuServe:
6. Type of Laboratory (University, Commercial, Other
- if your facilities are not available for outside
characterization services, please indicate this here)
7. Geochemical Method of Obsidian Characterization?

Yes ___ No ___

(if no, please skip the geochemical information
section and describe the method on a separate
attached sheet)

B. Obsidian Geochemical Characterization Laboratory Information

1. Geochemical characterization method used: X-ray fluorescence (XRF), instrumental neutron activation analysis (INAA), atomic absorption spectrophotometry (AAS), electron probe microanalysis (EPMA), etc.
2. What major and/or trace elements are routinely used to characterize the obsidian?
3. What additional major and trace elements can you determine? H_2O^+ ?
4. What are your detection limits for commonly determined elements?
5. Are analytical uncertainties included with data?
6. Destructive or non-destructive analysis?
7. Any special sample preparation considerations before sample submission? Minimum sample size? Samples to avoid?
8. Are you interested in participating in a geochemical interlaboratory comparison of obsidian standard samples? Any suggestions about what you might like from this?

C. Obsidian Source Identification

1. Do you attempt to identify the geologic source of the characterized artifact?
Yes ___ No ___ If yes, would you please
complete the remainder of this section.
2. What type of source-artifact correlation methods do you use? Visual (scatterplots, ternary plots, etc.)? Statistical (cluster analysis, etc.)? Other?
3. For what geographic area(s) can you reliably identify the geologic sources of chemically-characterized artifacts?
4. Do you have a listing available of the obsidian sources that you use for source-artifact comparisons?

D. Other

1. What types of other obsidian-related analytical

services do you offer, if any (thin section preparation, analysis of non-obsidian materials, obsidian hydration measurements, etc.)?

2. What is your average turn-around time for obsidian characterization services?
3. How much do you charge per sample? Minimum number? Price breaks for large orders?
4. What methods of payment will you accept?
5. What is your final report? Letter report? Data tables? Other.
6. Are obsidian analytical results distributed on paper and/or disk? If on disk, IBM PC-compatible or otherwise?

MEETINGS AND EVENTS

June 14-16. Lithic Analysis Conference. Tulsa, Oklahoma. George Odell, Department of Anthropology, University of Tulsa, Tulsa, OK 74104, USA; tel 918-631-3082. Theme: The Articulation of Archaeological Theory and Lithic Analysis.

July 28-Aug. 5. 13th Congress, International Union of Anthropological and Ethnological Sciences. Mexico, D.F., Mexico. Linda Manzanilla, Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México, Ciudad Universitaria, Coyoacán D.F. 04510, Mexico; tel 52-5-548-78-28; fax 52-5-554-04-67, 548-36-67; BITNET LMANZA@UNAMVM1. Theme: Cultural and biological dimensions of global change.

August 8-20. Assembly of International Association of Geomagnetism and Aeronomy. Buenos Aires, Argentina. Comité Organizador, IAGA Assembly, Casilla de Correo 106, Sucursal 28, 1428 Buenos Aires, Argentina.

September 19-24. 6th Nordic Conference on the Application of Scientific Methods in Archaeology. Esbjerg, Denmark. Vagn Mejdahl, The Nordic Laboratory for Luminescence Dating, Riso National Laboratory, DK-4000 Roskilde, Denmark.

October 25-28. Geological Society of America, Annual Meeting. Boston, MA, USA. Vanessa George, Geological Society of America, Box 9140, Boulder, CO 80301, USA; tel 303-447-2020.

November 17-21. American Anthropological Association Annual Meeting. Washington, D.C. AAA, 1703 New Hampshire Avenue NW, Washington, DC 20009, USA; tel 202-232-8800.

1994

February 18-23. American Association for the Advancement of Science, Annual Meeting. San Francisco, California, USA. AAAS, 1333 H Street NW, Washington, DC 20005, USA; tel 202-326-6400.

April 11-15. Materials Research Society, Spring Meeting. Symposium: Materials Issues in Art and Archaeology IV. San Francisco, CA, USA. Materials Research Society, 9800 McKnight Road, Pittsburgh, PA, USA; tel 412-367-3012.

April 18-24. 59th Annual Meeting, Society for American Archaeology. Anaheim, California USA. SAA, 1511 K Street NW, Washington, DC, USA; tel 202-223-9774.

June 5-11. Geochronology, Cosmochronology and Isotope Geology (ICOG-8). Berkeley, CA, USA. Garniss Curtis, Institute of Human Origins-Geochronology Center, 2453 Ridge Road, Berkeley, CA 94709 USA; tel 510-845-4003; fax 510-845-9453.

ABOUT THE IAOS

The IAOS was established to:

- 1) develop standards for analytic procedures and ensure inter-laboratory comparability;
- 2) develop standards for recording and reporting obsidian hydration and sourcing results;
- 3) provide technical support in the form of training and workshops for those wanting to develop their expertise in the field.
- 4) provide a central source of information regarding advances in obsidian studies and the analytic capabilities of various laboratories and institutions.

MEMBERSHIP

The IAOS needs membership to ensure the success of the organization. To be included as a member and receive all of the benefits thereof, you may apply for membership in one of the following categories:

- Regular Member \$20.00/year
- Institutional Member \$50.00/year
- Life-Time Member \$200.00

Regular members are individuals or institutions who are interested in obsidian studies, and wish to support the goals of the IAOS. Regular members will receive any general mailings; announcements of meetings, conferences, and symposia; newsletters; and papers distributed by the IAOS during the year. Regular members are entitled to attend and vote in Annual Meetings.

Institutional members are those individuals, facilities, and institutions who are active in obsidian studies and wish to participate in inter-laboratory comparisons and standardization. If an institution joins, all members of that institution are listed as IAOS members, although they will receive only one mailing per institution. Institutional members will receive assistance from, or be able to collaborate with, other institutional members. Institutional members are automatically on the Executive Board, and as such have greater influence on the goals and activities of the IAOS.

*Membership fee may be reduced or waived in cases of financial hardship or difficulty in paying in foreign currency. Please complete the form and return to the Secretary with a short explanation regarding lack of payment.

**Because membership fees are very low, the IAOS asks that all payment be made in US dollars in international money orders or checks payable on a bank with a US branch. If you do not do so, much of your dues is spent in currency exchange.

If you wish to join us, mail a check or money order to the IAOS:

*Viviana Ines Bellifemine, Secretary-Treasurer
Department of Anthropology
San Jose State University
San Jose, California 95192-0113*

NEW MEMBERS LIST

Sophia Antipolis, Centre National de la Recherche Scientifique, France

Sandra Barnes, Infotec Research, Eugene, Oregon

Scott Byram, University of Oregon, Eugene

Jeffrey S. Couch, University of California, Riverside

Thomas Churchill, Coastal Magnetic Search & Survey, Oregon

Patricia Dunning, San Jose State University, California

John Fagan, Archaeological Investigations NW, Oregon

Debra Garwood, Eugene, Oregon

Lisa Hanson, United States Forest Service, Arizona

Gaman Harbottle, Brookhaven National Laboratory, New York

Elizabeth Lake, San Jose State University, California

Donald Laylander, California Department of Transportation

David Makar, Sonoma State University, California

Kathy Mauz, Golden, Colorado

Alan R. Schroedl, R-III Associates, Inc., Utah

Robert Stone, Infotec Research, Washington

Tod VanPool, Eastern New Mexico University

Damon White, San Jose, California

Carol Winkler, Willamette National Forest, Oregon

Donald Zettel, Deschutes National Forest, Oregon

CALL FOR ARTICLES AND INFORMATION

Submissions for articles, short reports, abstracts, or announcements for inclusion in the next newsletter should be received by August 15, 1993. We accept electronic media on IBM compatible 3.5" or 5.25" diskettes, in a variety of word processing formats

including Wordperfect (5.x), Wordstar, and Microsoft Word or ASCII text formats. A hard copy should accompany diskettes. Send to Kim Tremaine, c/o BioSystems Analysis, 1017 Front Street, Sacramento, California, 95814; (916) 557-4506.

Short Reports: If you are interested in briefly reporting on research findings (e.g., one column in length), contact Mike Rondeau at CALTRANS, Office of Environmental Analysis, 650 Howe Avenue, Suite 400, Sacramento, California 92825; (916) 920-7458; FAX (916) 920-7149.

IAOS OFFICERS, 1993-1994

President: Steven M. Shackley

President-Elect: Kim J. Tremaine

Secretary-Treasurer: Viviana Ines Bellifemine

Newsletter Editor: Kim J. Tremaine

Cut-Out

.....

___ Yes, I'd like to renew my membership. A check or money order for the annual membership fee is enclosed (see below).

___ Yes, I'd like to become a member of the IAOS ~~now~~. A check or money order for the annual membership fee is enclosed (see below). Please rush my first issue of the IAOS Newsletter and a copy of the on-disk IBM PC-compatible IAOS Obsidian Bibliography. Please check disk format needed: ___ 5 ¼ 360K ___ 3 ½ 740K

Still not convinced, but want to know more?

___ Please send me a complimentary issue of the latest IAOS Newsletter.

___ Please send me a copy of the on-disk IAOS Obsidian Bibliography and a complimentary copy of the IAOS Newsletter. My check or money order for \$10.00 (refundable if I join the IAOS this calendar year) is enclosed.

Name _____
Title _____
Street Address _____
City _____
Country _____
Affiliation _____
Work Phone _____
Home Phone (optional) _____
Internet/BITNET _____
Other E-Mail Addresses _____

My check is enclosed for the following amount (please check one):

___ \$20.00 Regular Membership
___ \$50.00 Institutional Membership
___ \$200.00 Lifetime Membership

Please return this cut-out to: International Association for Obsidian Studies › Ms. Viviana Ines Bellifemine, Secretary-Treasurer › Department of Anthropology › San Jose State University › San Jose, California 95192-0113

Have a friend or colleague who might be interested in the IAOS? Write their name and address on the opposite side of this cut-out and we'll forward a descriptive brochure to them.