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CONTENTS

News and Information – 1
Short Reports and Reviews – 3
Abstracts and Annotations – 4
Excellence Award – 6
Article, Oregon Obsidian Wealth Blade – 10
About the IAOS – 12

NEWS AND INFORMATION

From the President's Desk

by David A. Fredrickson
Sonoma State University (Professor Emeritus)

As I take over as IAOS president, this newsletter also has a new editor, Suzanne Stewart, a long-time IAOS member, who replaces Blossom Hamusek. Blossom has served us well since 1995, but because of pressure of work asked to be replaced. Mike Rondeau, compiler of short reports and reviews for several years, also submitted his resignation due to other work pressures (see his statement in the Winter 1998 newsletter). Janine Loyd, a relatively new IAOS member, replaces Mike. I extend thanks from both myself and the IAOS to both Blossom and Mike for their fine work and many contributions on behalf of the membership.

As I was leafing through past newsletters to get myself oriented to my new IAOS role, I noticed that I am the 10th president of the IAOS since its founding in 1989. A great deal can happen over 10 years, including ordinary forgetfulness about organizational history. For those interested, I list below the nine individuals who served as IAOS president prior to my accepting the gavel this year from Jon Ericson.

1989-90 Robert J. Jackson
1990-91 Christopher M. Stevenson
1991-92 Thomas M. Origer
1992-93 Craig E. Skinner
1993-94 M. Steven Shackley
1994-95 Kim J. Tremaine
1995-96 Michael D. Glascock
1996-97 Thomas L. Jackson
1997-98 Jonathon E. Ericson

Each of the past presidents is involved directly in technical studies of obsidian, including either geochemical source characterization or obsidian hydration analyses, or both. My experience has been as an archaeological user of the data generated by sourcing and hydration studies, although I have certainly cooperated many times over the years with individuals who generate these data.

My review of past newsletters shows that users such as I have not been ignored. Many of the short reports, reviews, and abstracts address issues of direct interest to users, and our current membership list includes many whose primary involvement with obsidian is with the data generated by sourcing and hydration analyses. After discussion with user colleagues over the past several years, I conclude that there are still at least a few who are not fully aware of basic concepts, such as the meaning of "source" or the inherent hydration-reading error due to limitations of the measuring devices. Without intending to insult the intelligence of our membership, I plan to solicit a brief note or two for newsletter use that hopefully will enlighten the "lay" user of obsidian data.

If any reader of this note has a suggestion or comment for me as IAOS president for the next 10 months or so, please feel free to use what my youngest daughter calls snail mail (1940 Parker Street, Berkeley CA 94704) or my e-mail address (vmda@aol.com).

Editor's Note

In this issue of the newsletter, my first as editor, I have made some minor style changes but left the basic structure alone. Now I'd like your feedback on what you want to see in the *Bulletin.* If you also have contributions — send them on! (See Short Reports and Reviews and page 13 for mailing and e-mail addresses.)

IAOS Annual Meeting

The 10th annual meeting of the IAOS was held at the Sheraton Seattle on Thursday afternoon, 26 March 1998, in conjunction with the 63rd annual meeting of the Society for American Archaeology. Fourteen members and two guests attended.

The meeting was called to order by President Jon Ericson, who welcomed the members and guests present and briefly reviewed the two Obsidian Workshops held earlier in the day. Jon then introduced Dave Fredrickson as IAOS President for the 1998-99 fiscal year, awarding him the gavel.

Dave Fredrickson described himself as a user of obsidian research, not a researcher himself, but noted he has strongly supported people doing basic research. He noted that using the results of archaeological obsidian studies for other purposes, such as studying the long-term survival of glass, is a switch, because archaeology normally borrows from other disciplines. He has been working with obsidian for more than 35 years—he first gathered obsidian samples in 1960, when he was a student at Berkeley.

Dave then presented this year's Excellence in Obsidian Studies Award to Jon Ericson. He noted that Jon has been responsible for fundamental findings in the field: not only that different sources hydrate at different rates, but that even the same sources can hydrate at different rates. Jon has been involved in studies involving characterization, dating, and trade. He has always been willing to collaborate on a project and willing to investigate even Dave's "crazy ideas." In addition, as a citizen, Jon has been instrumental in using obsidian research to give input on how to contain nuclear waste. Dave doubted we would have advanced as far as we have in California obsidian studies without Jon's efforts. We will publish Jon's obsidian bibliography in the *Bulletin*.

Treasurer Pat Dunning reported that our bank balance, as of 23 March1998, was $6,248, an increase of $1,259 over last year. Our income totaled $2,485, virtually all from membership dues (including $1,000 from five new lifetime members), while our expenses totaled $1,227, including the $500 honorarium for Wal Ambrose. We have a total of 53 paid-up members, including 2 who joined at the conference; of these, 16 are lifetime and 2 are complimentary. In addition, there are 29 who have paid dues for 1997 but not 1998, and 19 who last paid dues in 1996. Pat noted that although our bank balance appears healthy, it has to cover 16 lifetime members, and that we should probably increase the price of the Lifetime Membership.

Dave Fredrickson reported that Suzanne Stewart has agreed to take over as *Bulletin* Editor, at least for a year, and Janine Loyd has agreed to take over as Short Reports and Reviews Editor.

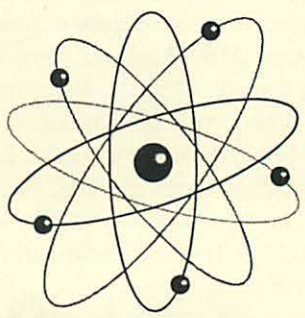
Dave announced that Geoffrey Braswell, Assistant Professor of Anthropology, SUNY-Buffalo, was elected President-Elect. Geoff said a few words, commenting that he is eager to contribute to the organization. He noted that SUNY-Buffalo sponsors an annual archaeometry conference, and it would not be difficult to add a second day to focus on obsidian studies.

Dave announced that the IAOS has been asked to co-sponsor a symposium at the 1999 Society for California Archaeology annual meeting on fire effects on obsidian, to be organized and chaired by Tom Origer, Sonoma State University. Jon Ericson moved that IAOS agree to co-sponsor the symposium; Chris Stevenson seconded, and the motion passed.

Nominations were requested from the floor for next year's officers. Craig Skinner, Wal Ambrose, and Andrew Darling were nominated. Craig Skinner declined due to press of work and Wal Ambrose declined because of the cost of getting to the US. Kathy Bapp, James Bard, and Linda Reynolds were nominated for secretary-treasurer.

Wal Ambrose thanked the Association for honoring him with last year's Excellence in Obsidian Studies Award. He described the afternoon tea in Australia, at which the award was presented to him.

At the end of the meeting, Dave Fredrickson asked all attendees to introduce themselves and describe their interest and research in obsidian studies. Attendees: Wal Ambrose, Geoffrey Braswell, Elizabeth Cook, John Cook, Pat Dunning, Jon Ericson, Dave Fredrickson, Michael Glascock, Mike Gottesman, Kathleen Hull, Janine Loyd, Alejandro Pastrana, Jay Patton, Craig Skinner, Anna Steffen, and Chris Stevenson.



– Effects of Fire on Obsidian – Symposium Contributions Sought

At our annual meeting in Seattle, the IAOS voted to co-sponsor a symposium at the 1999 Society for California Archaeology annual meeting, in Sacramento, on the effects of fire on obsidian. Those of you who have been doing research on this topic, please contact Tom Origer, Sonoma State University, at the following address for further information on contributing a paper:

Tom Origer
Anthropological Studies Center, Building 29
Sonoma State University
1801 East Cotati Avenue
Rohnert Park, CA 94928

Phone: (707) 664-0809
e-mail: origer@sonoma.edu

For reports on recent studies on the topic in California, see Technotes in IAOS *Bulletin* 19 ("Adding a Little Fuel to the Fire: Some Thoughts on Fire and Obsidian Hydration" by Anderson and Origer) and *Bulletin* 20 ("Cooked Obsidian" by Origer, Loyd, and Schroder).

SHORT REPORTS & REVIEWS

Compiled by Janine M. Loyd (707) 664-0809
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Cotati, CA 94931 loyd@sonoma.edu

Short Reports and Reviews provides an archaeological context in which to report obsidian research and related information. Your reviews of recent studies, research in progress, older findings, and regional-, site-, and artifact-specific summaries are welcome.

Introductions

My name is Janine Loyd, and I'll be your short reports editor/columnist for the next two years.

I work at the obsidian lab at Sonoma State University. Our laboratory is generally focused on obsidian hydration dating, with our main research interest currently being the development of comparison constants for the obsidian sources in California.

Let me start by saying that I hope to hear from each of you at least once in my tenure with this column. I'm confident you all have data to present, and I look forward to your contributions. I would also like to thank Mike Rondeau for his help and input during this transition period.

Picking up where Mike left off, I'd like to feature web sites and other media as well as paper documents. I came across several in an initial search, and I plan to do more research soon. You can expect to hear about them—along with an update from Craig Skinner about the IAOS web site—in the next issue.

For those of you wondering "why spend all this time on web pages?" one simple answer is color. A variety of color graphics can be used that contribute greatly to the presentation of information but would be prohibitively expensive to produce on paper. But most important, the web gets information out to a much broader audience than might otherwise be possible, and almost instantaneously.

As a lab worker, one of my goals is to provide a client not only with the information they have requested, but to help them understand how that information is valuable to their research. By providing access to useful applications of hydration and sourcing data, in glorious technicolor, the web gives us an opportunity to show the end users of obsidian data what a useful tool these data can be.

Next issue I plan to look at a combination of both electronic and paper documents. To contribute please contact me at the above address.

ABSTRACTS AND ANNOTATIONS OF REPORTS AND PUBLICATIONS

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 or to hear of and gain access to reports. In addition, the proliferation and number of journals, along with the interdisciplinary nature of obsidian and glass studies, make it difficult to keep abreast of all relevant current literature. The IAOS *Bulletin* will alert readers to some of this information by reproducing abstracts and summarizing literature that may be of particular interest to IAOS members.

SAA Meeting Abstracts

WORKSHOP ABSTRACT (abstracts for individual presentations follow):

Obsidian Hydration II: Environmental and Material Parameters – Obsidian as a Natural Analog to Nuclear Waste Form Glasses.

No repository has yet been selected in the United States. A 1996 National Research Council Report suggests that natural glass analog studies can be an important component of long-term performance assessment. Obsidian samples in their archaeological contexts provide samples and environments for such assessment.

The workshop will address environmental and material parameters affecting the stability of glass under natural conditions, which may ultimately lead to a refinement in obsidian hydration dating and improvement of knowledge on the stability of waste form glasses immobilizing radionucleides. In the context of applied archaeology this workshop will promote future collaborations between archaeologists and scientists.

BATES, J.

1998 Hydration of Glass in an Unsaturated Waste Repository Environment. Paper presented at the 63rd Annual Meeting of the Society for American Archaeology, Seattle Washington.

Abstract

Yucca Mountain is currently being evaluated as the U.S. site for disposal of high-level waste glass. The projected conditions under which the glass will be exposed to water are prolonged initial contact with saturated water vapor at temperatures below 96° C, followed by contact with small amounts of dripping water. Contact with water vapor will alter the glass such that eventual contact with dripping water will yield different elemental releases than observed with fresh glass. Test methods to study the corrosion of natural glasses have been applied to obsidians, tektites, and basalts, and the results compared to similar tests with nuclear waste glasses. While the reaction mechanisms are the same for all glasses, the rate controlling the mechanism is a factor of glass composition and environment, with the evolution of obsidian to mineral alteration phases being much slower than for nuclear waste glasses.

ABDELOUAS, A., W. LUTZE, AND R.C. EWING

1998 Rhyolitic Glasses - Natural Analogues for High-Silica Nuclear Waste Glasses. Paper presented at the 63rd Annual Meeting of the Society for American Archaeology, Seattle Washington.

Abstract

To date, high-level radioactive waste is converted into glass products for later disposal in geological repositories. Hydration/dissolution processes are a measure of the long-term durability of these glasses in an engineered geologic setting. The mechanism of glass/water interactions cannot be predicted with certainty for tens of thousands of years, using short-term laboratory test results. Rhyolitic and basaltic glasses have been studied to compare hydration/ dissolution processes and alteration products with those observed on nuclear waste glasses.

There is a wide range of compositions if liquid highly radioactive wastes. A large fraction of these wastes comes from reprocessing of defense reactor fuel and is high in non-fission product elements, e.g., refractory oxides such as ZrO_2. We are studying vitrification of these wastes by pressure sintering. The glass products contain 65-75 wt.% SiO_2. except for ZrO_2, Rhyolitic glasses have comparable compositions to these glasses and appear to be suitable natural analogs.

The paper will discuss analogies between obsidian and waste glasses in terms of composition, hydration energies and hydration/dissolution processes. Future research needs will be identified. A specific example will be presented: alteration phenomena observed on a nuclear glass corroded experimentally in a concentrated salt solution and on rhyolitic glass.

STEVENSON, C.

1998 Hydrothermal Experimentation in the Development of Obsidian Hydration Rates: Lessons from the Past. Paper presented at the 63rd Annual Meeting of the Society for American Archaeology, Seattle Washington.

Abstract

The development of obsidian hydration rates at elevated temperatures was introduced into archaeological research in the 1970's. A variety of experimental designs were implemented with the goal of establishing the hydration rate constants. These approaches included reaction in distilled water, silica saturated water and vapor environments at temperatures between 90°C and 200°C. Many of these experimental designs were inappropriate models for research goals, most noticeably in the cases where corrosion studies were used as a model of vapor hydration in the natural environment. These experimental designs are reviewed and recommendations are made for additional research.

NELSON, C.

1998 Scanning Electron Microscopy of Volcanic Glasses from Middle and Later Stone Age Sites in Kenya. Paper presented at the 63rd Annual Meeting of the Society for American Archaeology, Seattle Washington.

Abstract

SEM work on obsidian artifacts from later and Middle Stone Age sites at Lukenya Hill and Prospect Farm, in the highlands of Kenya, show that the outer layers begin to chemically erode in about 4,000 years. Within 20,000 years, large areas of the surface are sloughed away. Cycles of sloughing ensue. This paper presents visual evidence for four separate processes which contribute to this structural decay and discusses the time scale at which such effects occur.

AMBROSE, W.

1998 Hydration Measurement and Surface Weathering in Obsidian from Late Pleistocene Archaeological Sites. Paper presented at the 63rd Annual Meeting of the Society for American Archaeology, Seattle Washington.

Abstract

Obsidian, like all glasses, is thermodynamically unstable in normal terrestrial environments. The rate of its transition to a more stable hydrated or weathered form is controlled by temperature and chemical reactions with its surroundings. Laboratory weathering simulation cannot replicate the complex features of burial in archaeological deposits. Natural weathering in tropical conditions of Papua New Guinea late Pleistocene sites produces surface loss in all the examined specimens. In some cases, devitrification occurs as a network swarm of hydrating fissures penetrating throughout the obsidian, rendering it totally unsuited to hydration dating. The contribution will address the issue of obsidian weathering as it relates to hydration dating, with some relevance to nuclear waste glasses.

W.R. AMBROSE

1998 Hydration measurement and natural surface alteration in obsidian from late Pleistocene archaeological sites.

Abstract

Obsidian, like all glasses, is thermodynamically unstable but is relatively durable in normal terrestrial environments. The rate of its transition to a more stable hydrated or weathered form is controlled by temperature and chemical reactions with its surroundings. Laboratory weathering simulation cannot replicate the complex features of burial in archaeological deposits. Natural weathering in tropical conditions of Papua New Guinea late Pleistocene sites produces surface loss in all the examined specimens. By comparing weathered with unweathered surfaces from three archaeological sites, with ages ranging from modern to 12,000 BP, minimum loss rates of between -0.0003 and -0.0023 μm/y are indicated. The contribution addresses the issue of obsidian weathering as it relates to hydration dating, with some relevance to nuclear waste glasses.

DOREMUS, R.

1998 Parameters Influencing Hydration and Dissolution of Glass. Paper presented at the 63rd Annual Meeting of the Society for American Archaeology, Seattle Washington.

Abstract

The main factors involved in the reaction of aqueous solutions with silicate glasses are temperature, solution concentrations, especially pH, and glass composition. Reactions with water vapor involve formation of products on the glass surface instead of solution conditions. Some of the mechanisms influencing these processes are ion exchange between alkali in the glass and hydronium ions in the solution, breakdown of the silicon-oxygen network of the glass, and formation of surface layers of the glass. There is some understanding of these mechanisms, but much remains that is not understood.

JONATHON E. ERICSON, Ph.D.

Excellence Award

For lifetime achievement in obsidian research, Johnathon E. Ericson, Ph.D., is hereby awarded the IAOS Excellence Award. He has been nominated by his peers and selected by the International Association for Obsidian Studies to be internationally recognized for his contributions, collaborations with other scientists, and innovations in obsidian studies in three areas: Obsidian Hydration Dating, Obsidian Characterization, and Obsidian Trading Systems.

Obsidian Hydration Dating:

- Demonstrates differences in chemical composition and hydration rates in fused shale and two synchronous deposits from Oregon and Amapa, Mexico (C2, 1976).
- Hypothesizes importance of bridging/non-bridging oxygen structure in obsidian hydration (C1, 1976).
- Proposes use of major chemical variables affecting hydration process (C1, C2, 1976; M1, 1981).
- Suggests intrinsic water as an important variable of hydration by comparing stability tektites and obsidian (C5, 1974: J14, 1992).
- Measures hydration by nuclear reaction ^{19}F (J2, 1974), and later by ^{15}N nuclei (J14, 1992).
- Conducts high temperature hydration experiments (1970-present).
- Demonstrates different hydration rates among multiple sources (M1, 1981; J4, 1975; J6, 1975; J8, 1978; C4, 1974).
- Demonstrates different hydration rates within a single source (Coso) (J11, 1989).
- Tests effects of surface/area and pH and saturation (1980).
- Demonstrates hydration of tektites (J14, 1992) and quartz (J17, 1997).
- Demonstrates differences between laboratory and natural hydration rates (C8, 1981).
- Defines environmental variables of hydration (J9, 1982).
- Adopts and uses Lee's soil temperature equation in California (M1, 1981).

Obsidian Characterization:

- Discovers new obsidian sources in California, Oregon, and Nevada (C3, 1976).
- Discovers new obsidian sources in West Mexico (J7, 1977).
- Uses short and long half-life neutron activation to analyze obsidian (C2, 1976; M1, 1981).
- First to use stepwise discriminate analysis to statistically differentiate obsidian sources (C2, 1976).
- Chemical characterization of California, Oregon, and Nevada obsidian sources by INAA (M1, 1981; J16, 1998).
- Chemical characterization of West Mexico obsidians by INAA (J7, 1977).
- Chemical characterization of multiple flows within the Coso, California volcanic field (J15, 1998).

Obsidian Trade:

- Expands Jack's 1976 study of obsidian trade in California (C7, 1977; M1, 1981).
- Uses synagraphic/trend surface mapping of obsidian use (C7, 1997).
- First to link distance, trails, population, and alternative lithic materials with spatial changes in obsidian trade distribution (M1, 1981).
- Co-edited four books on trade, including 16 papers on obsidian trade (B1, 1977; B2, 1982; B4, 1993; B5, 1994).
- First to conduct semi-quantitative quarry analysis (C6, 1977).
- Co-edited a book which linked quarry analysis to obsidian trade (B3, 1984).

Complete Bibliography on Obsidian
by
Jonathon E. Ericson

BOOKS/MONOGRAPHS:

M1. Ericson, J. E. Exchange and Production Systems in Californian Prehistory. British Archaeological Reports, International Series, 110, 240 p. (1981).

EDITED VOLUMES:

B1. Exchange Systems in Prehistory, (T. K. Earle and J. E. Ericson, eds.) Academic Press, Inc., New York, 288 p. (1977).

B2. Contexts for Prehistoric Exchange. (J. E. Ericson and T. K. Earle, eds.) Academic Press, Inc., New York, 321 p. (1982).

B3. Prehistoric Quarries and Lithic Production (J. E. Ericson and B. A. Purdy, eds.) Cambridge University Press, 149 pp. (1984).

B4. American Southwest and Mesoamerica: Systems of Prehistoric Exchange (J. E. Ericson and T. G. Baugh, eds.) Plenum Press, Inc., New York (1993).

B5. Prehistoric Exchange Systems in North America (T. G. Baugh and J. E. Ericson eds.) Plenum Press, New York (1994).

JOURNAL ARTICLES:

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Late Pleistocene American obsidian tools, Nature, 249, 824-825, (1974).

J2. Lee, R., D. A. Leich, T. A. Tombrello, I. I. Friedman, and J. E. Ericson Obsidian hydration profile measurements using a nuclear reaction technique, Nature, 250, 44-47, (1974).

J3. Ericson, J. E. and J. Kimberlin
Instrumental neutron activation analysis: Techniques of analysis, data analysis, and a proposal for a national obsidian standard, Newsletter of Lithic Technology, 3, 3, 44, (1974).

J4. Ericson J. E., A. Makishima, J. D. MacKenzie, and R. Berger Chemical and physical properties of obsidian: A naturally occurring glass, Journal of Non-Crystalline Solids, 17, 129-142, (1975).

J5. Findlow, F. J., V. C. Bennett, S. P. DeAtley, and J. E. Ericson. A new obsidian hydration rate for certain obsidians in the American Southwest, American Antiquity, 40, 3, 345-348 (1975).

J6. Ericson, J. E.
New results in obsidian hydration dating, World Archaeology, 7, 2, 151-159 (1975).

J7. Ericson, J. E. and J. Kimberlin
Obsidian sources, chemical characterization and hydration rates for West Mexico, Archaeometry, 19, 2, 157-166 (1977).

J8. Ericson, J. E.
Obsidian Hydration Dating in California, Occasional Papers in Method and Theory in California Archaeology, Society for California Archaeology, 2, 44-52 (1978).

J9. Findlow, F. J., P. M. Martin, and J. E. Ericson
Effects of temperature on the Hydration Rates of Two California Obsidians, J. North American Archaeologist, 31, 37-49 (1982).

J10. Koerper, H. C., J. E. Ericson, C. E. Drover, and P. E. Langenwalter II Obsidian Exchange in Prehistoric Orange County, Pacific Coast Archaeological Society Quarterly, 22(1):33-69 (1986).

J11. Ericson, J. E.
Towards Flow-specific Obsidian Hydration Rates, Coso Valley Volcanic Field, Inyo County, California, Contributions of the Archaeological Research Facility, University of California, Berkeley, 48, 13-22, (1989).

J12. Ericson, J. E.
Obsidian Hydration Rate Development. Journal of Material Research Society. Vol. 123 pp. 215-224 (1988).

J13. Ericson, J. E., H. C. Koerper, C. E. Drover, and P. E. Langenwalter II.
Advances in Obsidian Hydration Dating and Obsidian Exchange in Prehistoric Orange County. Pacific Coast Archaeological Society, Quarterly, 25(2) 45-60 (1989).

J14. Rauch, F., J.E. Ericson, W. Wagner, Ch. Grimm-Leinsner, R.P. Livi, Chengru Shi and T.A. Tombrello.
Hydration of tektite glass, Journal of Non-Crystalline Solids 144, 224-230 (1992).

J15. Ericson, J. E., and M. D. Glascock
Flow-specific Characterization of Obsidian Utilization of Flows and Domes of the Coso Volcanic Field, China Lake, California (Submitted to American Antiquity 1998).

J16. Ericson, J. E., and J. Kimberlin
Neutron Activation Analysis of Obsidians from California, Oregon, and Nevada. (Submitted to *Geoarchaeology*, 1998).

J17. O. Dersch, A. Zouine, F. Rauch, and J. E. Ericson
Investigation of Water Diffusion into Quartz using Ion Beam Analysis Techniques. Fresenius J. Anal. Chem. 358:217-219 (1997).

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Physics and chemistry of the hydration process in obsidians, I: Theoretical Implications, in Advances in Obsidian Glass Studies: Archaeological and Geochemical Perspectives, R. E. Taylor, (ed.) Noyes Press Park Ridge, New Jersey, 24-45, (1976).

C2. Ericson, J. E., and R. Berger
Physics and chemistry of the hydration process in obsidians, II: Experiments and Measurements, in Advances in Obsidian Glass Studies: Archaeological and Geochemical Perspectives, R. E. Taylor, (ed.) Noyes Press Park Ridge, New Jersey, 46-62 (1976).

C3. Ericson, J. E., T. A. Hagan and C. W. Chesterman
Prehistoric obsidian sources in California, II: Geological and Geographic Aspects, in Advances in Obsidian Glass studies: Archaeological and Geochemical Perspectives, R. E. Taylor, (ed.), Noyes Press, Park Ridge, New Jersey, 218-239, (1976).

C4. Ericson, J. E.
A brief report on the current research on the obsidian hydration dating technique, obsidian sources used in California prehistory, and chemical characterization of California obsidian sources, in Obsidian Dates I: A Compendium of the Obsidian Hydration Determinations made at UCLA Obsidian Hydration Laboratory, C. W. Meighan, F. J. Findlow and S. DeAtley-Young, (eds.), University of California Press, Archaeological Survey, Institute of Archaeology, University of California, Los Angeles, Monograph. 3, 7-14, (1974).

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Natural solid solutions: Obsidians and tektites, in Recent Advances in Sciences and Technology of Materials, A. Bishay, (ed.), Plenum Press, New York, Vol. 3, 187-190 (1974).

C6. Singer, C. A. and J. E. Ericson
Quarry analysis at Bodie Hills, Mono County, California: A case study, in Exchange Systems in Prehistory, (T. K. Earle and J. E. Ericson Eds.), Academic Press, Inc., New York, 171-188 (1977).

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Egalitarian exchange systems in California: A preliminary view, in Exchange Systems in Prehistory, (T. K. Earle and J. E. Ericson, eds.) New York: Academic Press, Inc., 109-126 (1977).

C8. Ericson, J. E.
Durability of Rhyolithic Obsidian Glass Inferred from Hydration Dating Research, Scientific Basis for Nuclear Waste Management, Vol. 3, (J. G. Moore, Ed.), Plenum Press, Inc., New York, 283-290. (1981).

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Production for Obsidian Exchange in California in Contexts for Prehistoric Exchange (J. E. Ericson and T. K. Earle, eds.) Academic Press, Inc. New York pp. 129-148 (1982).

C10. Ericson, J. E.
Towards the Analysis of Lithic Production Systems. In Prehistoric Quarries and Lithic Production (J. E. Ericson and B. A. Purdy, Eds.) Cambridge University Press, Cambridge pp. 1-9 (1984).

C11. Jackson, T., and J. E. Ericson
Prehistoric Exchange Systems in California, in Prehistoric Exchange Systems in North America. (T. G. Baugh, and J. E. Ericson, eds.) Plenum Press, New York, pp. 385-415 (1994).

The Geologic Source of an Obsidian Wealth Blade from the Whale Cove Site (35-LNC-60), Central Oregon Coast: Results of X-Ray Fluorescence Trace Element Analysis

Craig E. Skinner, Northwest Research Obsidian Studies Laboratory (skinncr@peak.org)
Ann C. Bennett-Rogers, Oregon State University (rogersa@ucs.orst.edu)

This article first appeared in the 1997 *Current Archaeological Happenings in Oregon* 22(3):8–10.

Introduction

The Whale Cove Site (35-LNC-60) is located along the central Oregon coast near Depoe Bay. The site is situated on a small knoll overlooking Whale Cove, a small salt water cove cut into the coastal sandstone. Excavated by Oregon State University archaeologists in 1985, the Whale Cove Site is primarily composed of midden deposits – the vast majority of materials removed from the 63.5 m^3 excavation consisted of marine shell and the remains of marine mammals. Only one obsidian artifact consisting of several broken fragments of a large obsidian biface was found (Figure 1). The results of the archaeological investigations at Whale Cove are reported in detail by Bennett (1988) and Bennett and Lyman (1991).

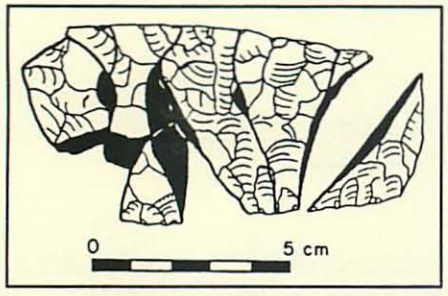

FIGURE 1. Obsidian wealth blade fragment (adapted from Bennett and Lyman 1991:249).

The obsidian biface, although incomplete, is almost certainly a portion of a large wealth or ceremonial blade, a unique category of artifact occasionally encountered at sites along the Northwest California coast and southwest Oregon (Kroeber 1905; Gould 1966; Hughes 1978, 1990). Once assembled, the biface fragments measured 9.0 cm in length, 5.2 cm in width, and 1.2 cm in thickness. The weight of the combined pieces totaled 47.8 gm.

A small fragment of the biface was initially geochemically characterized in 1987 using instrumental neutron activation analysis (Skinner 1987) as part of an investigation of local use of obsidian from the nearby Siuslaw River (i.e., Inman Creek chemical obsidian source groups). At that time, the source of the biface was not identified although it was noted that it shared the same geologic source as a similar smaller biface fragment recovered from another central Oregon coastal site, the Umpqua/Eden Site (35-DO-83; Lyman 1991). In 1996, we reanalyzed the Whale Cove and Umpqua/Eden artifacts using nondestructive X-ray fluorescence trace element methods.

Results of X-Ray Fluorescence Analysis

Nondestructive trace element analysis of the obsidian biface was completed using a Spectrace 5000 energy dispersive X-ray fluorescence spectrometer. The system is equipped with a Si(Li) detector with a resolution of 155 eV FHWM for 5.9 keV X-rays (at 1000 counts per second) in an area 30mm^2. The X-ray tube employed is a Bremsstrahlung type with a rhodium target and 5 mil Be window. The tube is driven by a 50 kV 1 mA high voltage power supply, providing a voltage range of 4 to 50 kV. Specific analytical conditions used for the analysis of all elements reported here are described in Skinner (1997). The results of the analysis are presented in Table 1.

TABLE 1. Results of trace element analysis of the obsidian blade.

Trace Element	PPM *	Uncertainty (±)
Rubidium (Rb)	119	4
Strontium (Sr)	14	5
Yttrium (Y)	49	3
Zirconium (Zr)	321	7
Niobium (Nb)	19	3

* Parts per million

The trace element values used to characterize the sample were compared directly to published values reported for obsidian sources located in Oregon and northern California (Skinner 1997) and with unpublished trace element data collected by Northwest Research Obsidian Studies Laboratory through analysis of geologic source samples.

The Source of the Biface

The geologic source of the characterized blade was identified as the Silver Lake/Sycan Marsh geochemical source (Figure 2). Obsidian from this source group is found at many scattered outcrops ranging in distribution from the town of Silver Lake in the Fort Rock Basin to south of Silver Lake in the northeast margin of the Klamath Basin. Obsidian nodules from the source are also spread over a large area south of Silver Lake in the Sycan River and Sycan Marsh regions (Hughes and Mikkelsen 1985:313–314; Hughes 1986:313–314).

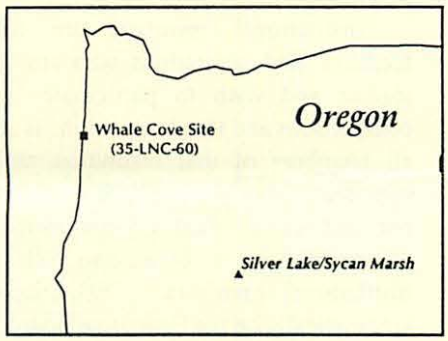

FIGURE 2. Location of the Whale Cove Site and the Silver Lake/Sycan Marsh obsidian source area

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Other wealth blades from northwest California (Hughes 1978; Hughes and Bettinger 1984), southwest Oregon (Hughes 1990; Hall 1995; Northwest Research Obsidian Studies Laboratory, unpublished research results), and the Willamette Valley (Hughes 1990) have been previously characterized. They were all found to originate either from sources in northeastern California or the Klamath Basin and northwestern Great Basin of central Oregon. The identification of the source of the Whale Cove biface as the Silver Lake/Sycan Marsh source is consistent with the source use and artifact production patterns presented by previous trace element investigations.

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TECHNOTES

This section of the newsletter is devoted to sharing new techniques, innovative ideas, and sources of equipment and supplies, and for discussing new technologies. Obsidian analysts are invited to submit information relating to these topics.

No submissions this time. Please contribute—queries about technical issues are as welcome as solutions.

CALENDAR OF EVENTS

10-14 January 1999 - The World Archaeological Congress will be held at the University of Capetown, South Africa. For information on the Congress, contact the Congress Secretariat at Global Conferences, P.O. Box 44503, Claremont 7735, South Africa. See conference web site at

http://129.78.16.135/~wac99/

[Call for papers and symposia still out]

Get your events added to the calendar listings by dropping an e-mail note to the editor.

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 characterization results;
3. provide technical support in the form of training and workshops for those wanting to develop their expertise in the field, and;
4. provide a central source of information regarding the advances in obsidian studies and the analytic capabilities of various laboratories and institutions.

Membership

The IAOS needs membership to ensure 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
- Student member $10.00/year or free with submission of paper to newsletter and copy of current student identification
- 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; bulletins; 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 and/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 payments 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 are spent in currency exchange. If you wish to join us, mail a check or money order to the IAOS:

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CALL FOR ARTICLES AND INFORMATION

Submissions of articles, short reports, abstracts, or announcements for inclusion in the newsletter are always welcome. We accept electronic media on IBM-compatible 3.5" or 5.25" diskettes in a variety of word-processing formats, but WordPerfect (up to 8.0) or Word for Windows 95 is preferred. A hard copy of the text and any figures should accompany diskettes. (Contributions may also be e-mailed, by prior arrangement; see below.)

Deadline for the Fall *Bulletin* is 1 September 1998.

Send submissions to –

Suzanne Stewart
IAOS Bulletin Editor
Anthropological Studies Center, Bldg. 29
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To send short contributions, discuss article ideas, or make suggestions, please get in touch by e-mail:
sstewart@sonic.net

NEW MEMBERS

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(Some "new members" are long-term ones who re-subscribe under a new affiliation.)

– Announcing –

Archaeological Obsidian Studies: Method and Theory

Edited by M. Steven Shackley, University of California, Berkeley
Volume 3 in Advances in Archaeological and Museum Science, Plenum Press

Description.
The use of obsidian archaeometry has expanded dramatically in the last 20 years, due partly to technological advances and partly to recognition by archaeologists that archaeometrists provide much more information than mere measurement. Since the mid-70s, however, no book has appeared to document the latest advances. Archaeological Obsidian Studies , the only volume of its kind in print, corrects this situation by presenting the current state of the science, from volcanic glass geochemistry to hydration analysis. Archaeologists, museum professionals, geologists, materials scientists, and students will find this volume to be an indispensable guide to modern archaeometric theory and methodology, both in the lab and in the field.

(Find out more at http.//www..plenum..com)

Contents: Current Issues and Future Directions in Archaeological Volcanic Glass Studies: An Introduction (M.S. Schackley). A Systematic Approach to Obsidian Source Characterization (M.D. Glascock et al.). Mediterranean Islands and Multiple Flows: The Sources and Exploitation of Sardinian Obsidian (R.H. Tykot). Intrasource Chemical Variability and Secondary Depositional Processes: Lessons from the American Southwest (M.S. Schackley). Characterization of Archaeological Volcanic Glass from Oceania: The Utility of Three Techniques (M.I. Weisler, D.A. Clague). Application of PIXE-PIGME to Archaeological Analysis of Changing Patterns of Obsidian Use in West New Britain, Papua New Guinea (G.R. Summerhayes et al.). Factors Affecting the Energy-Dispersive X-Ray Fluorescence (EDXRF) Analysis of Archaeological Obsidian (M.K. Davis et al.). Laboratory Obsidian Hydration Rates: Theory, Method, and Application (C.M. Stevenson et al.). Obsidian Hydration Dating at a Recent Age Obsidian Mining Site in Papua, New Guinea (W.R. Ambrose). Perspective in the 1990s on Method and Theory in Archaeological Volcanic Glass Studies (R.C. Green). Index.