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Assembled and edited by K.J. Tremain

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NEWS AND INFORMATION

JOURNAL ANNOUNCEMENT: THE RESUSCITATION OF LITHIC TECHNOLOGY

Manuscripts covering the full range of flaked stone studies (e.g., obsidian hydration/sourcing, residue, technology, theory, typology, use wear, etc.) are now being accepted. Requests for information or informal data exchange are also to be included along with announcements of upcoming conferences, knap-ins, and other lithic events. Manuscripts, announcements, etc. should be sent to: George H. Odell, Department of Anthropology, University of Tulsa, Tulsa OK 74104-3189. Telephone (918) 631-3082; FAX (918) 631-2540.

Lithic Technology is scheduled to appear biannually beginning with 1993. Subscriptions (\$17.00 per year) should be sent to the above address. A number of back issues are also still available.

THE NORTHWESTERN MEXICAN OBSIDIAN PROJECT

Steven Shackley (University of California, Berkeley) just received funding to pursue continued research on the archaeological obsidian sources in northern Chihuahua, Sonora, and Baja California. This preliminary project is funded by the Stahl Endowment Fund administered by the Archaeological Research Facility at UC Berkeley. Artifact quality obsidian sources in northern Mexico are essentially unknown, and some of these potential sources are probably present in archaeological contexts north of the border as indicated by consistent "unknown" assignments in southern Arizona and New Mexico sites.

This preliminary project will consist of two major phases. First, archaeological obsidian from sites in the three Mexican states, including Casas Grandes, Chihuahua will be analyzed to begin to generate probable source groups. Much of this material is in the collection at the Hearst Museum at UCB.

Next, known source standard material from the three states will be analyzed. Justin Hyland, a graduate student at UCB is currently in Baja California Sur, in part, working on a large source Tres Virgenes that will provide important data. Eric Ritter, Paul Bouey, and Tom Jackson have also provided source and archaeological data from the region. Hopefully, if the project shows some potential for identifying sources, additional funding will be sought. Anyone having any information on the region, please contact:

M. Steven Shackley, Phoebe Hearst Museum of Anthropology, 103 Kroeber Hall, University of California, Berkeley, CA 94720; (510) 642-3681; shackley@cmsa.berkeley.edu.

OBSIDIAN DOMES AND OREGON ROCK ART CHRONOLOGIES

by Craig Skinner, Infotec, Oregon

The pictograph to the right, (Figure 1), is one component of a rock art complex located near Devils Lake at the southeast foot of the South Sister Volcano in the Oregon High Cascades. This group of pictographs is found on boulders of obsidian that are located at the southernmost member of a 6 km-long alignment of Holocene rhyodacitic obsidian domes. These pictographs are unique in Oregon because they are found on geologically-recent volcanic rocks. The eruption of tephra that immediately preceded the extrusion of the obsidian domes has been well dated at about 2,000 ¹⁴C years (Scott, 1987). The unique association of radiocarbon dates and obsidian eruptions make these pictographs the most well-dated of any in Oregon. First described by Luther S. Cressman in 1937, and later by Loring and Loring (1983), the rock art at this site has been successfully restored after suffering serious spray paint damage by vandals. The now unmarked site is located only a few meters from a major Cascades highway. The line drawing of the pictograph was extracted from an obscure cultural resource overview conducted for the Deschutes National Forest (Dudley et al., 1979:452).

References

- Cressman, Luther S.
1937 *Petroglyphs of Oregon*. University of Oregon Monographs, Studies in Anthropology No. 1: Eugene, Oregon, 79 pp.
- Dudley, James; Rick Bryant, and David Eisler.
1979 *Cultural Resources Overview: Deschutes National Forest*. Pro-Lysts: Eugene, Oregon, 575 pp.
- Loring, J. Malcolm and Louise Loring.
1982 *Pictographs and Petroglyphs of the Oregon Country, Part I: Columbia River and Northern Oregon*. University of California Institute of Archaeology Monograph 21: Los Angeles, California, 252 pp.
- Scott, William E.
1987 Holocene Rhyodacite Eruptions on the Flanks of South Sister Volcano, Oregon, in *The Emplacement of Silicic Domes and Lava Flows*, ed. by J.H. Fink. Geological Society of America Special Paper 212, pp. 35-53.

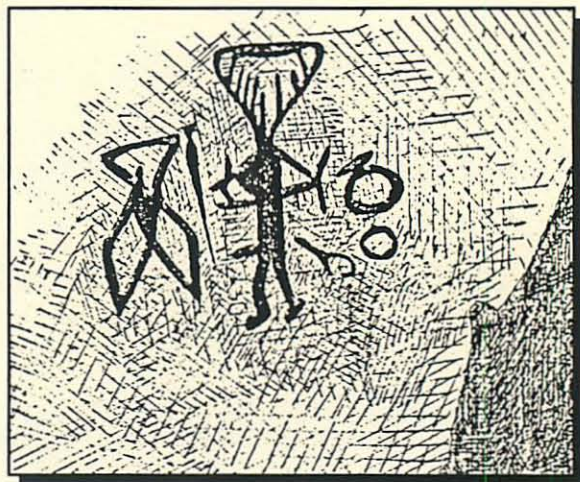


Figure 1. Zoomorphic figure and miscellaneous design elements from a pictograph found on an obsidian boulder.

HEBREW UNIVERSITY OF JERUSALEM: OBSIDIAN CHARACTERIZATION LABORATORY PROFILE

In our last bulletin, we invited obsidian characterization laboratories who didn't participate in our survey, or who were inadvertently left out, to send us a profile of services and capabilities (This goes for hydration laboratories as well).

Responding, the Archaeometry Unit at the Institute of Archaeology, Hebrew University of Jerusalem has been kind enough to send us information on their activities. Their lab conducts obsidian characterizations using INAA and the following major and/or trace elements: Na, Fe, K, As, Ba, Ca, Ce, Co, Cr, Cs, Eu, Hf, La, Lu, Nd, Ni, Rb, Sb, Sc, Sm, Ta, Tb, Th, U, and Yb. Sourcing areas which they reliably identify include Anatolia, and to some extent, east Turkey.

Besides obsidian, they characterize pottery, basalt, and flint. Analyses are generally carried out in conjunction with collaborative research, not as a commercial enterprise. For more information, contact: Joseph Yellin, tel 9972-2-882405; fax 972-2-825548; Bitnet TAUYJ @ HUJIVM1.

ARTICLE

**OBSIDIAN HYDRATION DATING OF
SITE 6-58:
A SOUTHERN COASTAL CAVE
EASTER ISLAND, CHILE**

*by Christopher M. Stevenson
Diffusion Laboratory, Columbus Ohio 43214*

In 1989, archaeological test excavations were conducted at Site 6-58, a small cave located along the southern coast of Easter Island in the vicinity of the region known as *Vaihu*. Approximately 6 m wide and 12 m deep, the cave was situated approximately 15 m above the water line. At the entrance a low rubble mound of basalt stones separated the cave interior from a small exterior apron which contained minor amounts of obsidian flakes and historic debris.

The excavation of other caves around the margin of Easter Island were conducted by William Ayres in the early 1970s (Ayres 1975). Assemblages from the caves indicated that they were primarily occupied by persons engaged in fishing and the collecting of shoreline resources (eg. urchin, sea slugs, shells). Radiocarbon assays on a variety of samples indicated that caves appeared not to have been occupied prior to the beginning of the 14th Century. Only after this date did these damp localities begin to dry as a result of increasing island aridity brought on by vegetation clearance.

Test units placed within the cultural deposits revealed two clear occupations. The lowest level consisted of a 10 cm soil strata containing very high densities of marine and terrestrial (eg. chicken, rat) remains. This deposit was sealed by a clear white clay floor upon which rested an occupation strata with lesser amounts of cultural material. Approximately 60 cm of historic alluvium had sealed the prehistoric deposits.

Our analysis of the material assemblages, stratigraphy, and architecture revealed that the first use of the cave had been for fishing, and the manufacture of fishing-related tools such as fishhooks. The second use of the cave began with the construction of a white clay

floor. A wall was also constructed to conceal the opening of the cave which was accessed by a small tunnel entrance. This cave form is referred to as an *kionga* or refuge cave which were reported to have been constructed during the period of endemic chiefdom warfare during the late 1600s (Metrax 1945).

Obsidian hydration dating was conducted at Site 6-58 to test the proposed age estimates based upon earlier research and the ethnohistoric literature. An obsidian hydration rate at 160°C and the activation energy (86500 J/mol) was developed for the major obsidian source (Mt. Orito) under conditions of 100% relative humidity. With these constants, the high temperature hydration rate was extrapolated to known ambient conditions at the archaeological sites.

In 1988, soil temperature and relative humidity cells were planted within Site 6-58. A single pair was buried at a depth of 10 cm approximately 6 meters from the cave opening. At this location no sunlight fell upon the cell location. At the end of one year the cells were removed and an effective hydration temperature of 19.8°C and a relative humidity of 100% were determined (Stevenson et al. 1993). This resulted in a hydration rate of 6.29 $\mu\text{m}^2/1000$ years which was used to convert the hydration rim widths into absolute ages.

A suite of 25 obsidian flakes was selected from the assemblage contained within Test Unit F since the stratigraphy above and below the white clay floor was well defined in this excavation. Samples from Level 8 located below the floor produced the earliest dates which ranged between 1352 AD and 1620 AD, a span of approximately 300 years (Table 1). From contexts located above the floor samples were taken from Levels 5, 6, and 7. These dates ranged between 1656 AD and 1830 AD. The dates from the upper levels are significantly later than the dates from Level 8 and exhibit a time span of 174 years. Unfortunately, the samples from the latest levels did not decrease in age as the surface of the deposits were approached. The apparent uniformity in age suggests that the upper levels of the cave have been mixed.

The obsidian hydration results confirmed the age expectations based upon earlier archaeological

Table 1. Obsidian Hydration Dates for Site 6-58

Lab No.	Provenience	Width (um)	S.D.	Date	S.D.
92-618	T.U.F.L.8	1.94	0.06	1352	63
92-619	T.U.F.L.8	1.57	0.05	1558	52
92-620	T.U.F.L.8	1.44	0.05	1620	47
92-621	T.U.F.L.8	1.69	0.04	1495	55
92-622	T.U.F.L.8	1.86	0.05	1400	61
92-623	T.U.F.L.8	----	----	----	--
92-624	T.U.F.L.7	1.26	0.05	1697	42
92-625	T.U.F.L.7	1.23	0.05	1709	41
92-626	T.U.F.L.7	1.04	0.06	1778	35
92-627	T.U.F.L.7	1.07	0.05	1768	37
92-628	T.U.F.L.7	0.87	0.05	1830	29
92-629	T.U.F.L.7	1.36	0.05	1656	45
92-630	T.U.F.L.6	0.96	0.05	1803	32
92-631	T.U.F.L.6	1.03	0.05	1781	34
92-632	T.U.F.L.6	1.16	0.06	1736	39
92-633	T.U.F.L.6	0.96	0.07	1803	32
92-634	T.U.F.L.6	0.96	0.05	1803	32
92-635	T.U.F.L.6	0.96	0.05	1803	32
92-636	T.U.F.L.5	----	----	----	--
92-637	T.U.F.L.5	1.13	0.05	1747	37
92-638	T.U.F.L.5	0.87	0.04	1803	29
92-639	T.U.F.L.5	0.97	0.05	1800	32
92-640	T.U.F.L.5	1.00	0.05	1791	33
92-641	T.U.F.L.5	1.01	0.06	1788	34

* Rim measurement standard deviations represent precision errors. Accuracy of the measurement system is estimated to be 0.1 um.

research and ethnohistoric information. The results also attest to the ability of laboratory hydration rates to produce accurate chronometric dates when the environmental conditions of the site have been monitored.

References

- Ayres, William
1975 Easter Island: Investigation in Prehistoric Cultural Dynamics. Unpublished manuscript.
- Metraux, Alfred
1945 Ethnology of Easter Island. Bernice P. Bishop Museum Bulletin 160. Honolulu, Hawaii.
- Stevenson, C., Friedman, I., and J. Miles
1993 The Importance of Soil Temperature and Relative Humidity in Obsidian Dating: with Case Examples from Easter Island, Chile. In, Rapa Nui Studies: Essays in Honor of William T. Mulloy, S.R. Fisher, editor. Oxbow Press (in press).

SHORT REPORTS

Compiled by Mike Rondeau, Caltrans, Environmental Division, 650 Howe Avenue, Suite 400, Sacramento, California 95825 USA; (916) 263-3375; FAX (916) 263-3384

Short Reports offers a brief, but broad based *archaeological context* in which to report obsidian research and related information. Reviews of recent studies, research in progress, older findings, regional, site, and artifact specific summaries, as well as other reports, announcements, etc. of pertinent interest are encouraged. To submit contributions to Short Reports or for an outline of recommended archaeological/obsidian information for the Short Reports format contact Mike Rondeau.

ECUADORIAN OBSIDIAN STUDIES: REGIONAL SUMMARY

A *Review of Ecuadorian Obsidian Studies* was delivered by William J. Mayer-Oaks, Texas Tech University, at the 21st (1993) Annual Midwest Conference on Andean and Amazonian Archaeology and Ethnohistory at Washington University in St. Louis. The paper traced the use and development of obsidian studies in Ecuadorian archaeology. The current status of obsidian research was reviewed and future directions were discussed.

Ecuadorian glass studies are closely tied with the development of North American studies and consequently exhibit a number of developmental parallels. Hydration band width analysis of Ecuadorian obsidians began in 1960. The paper charts attempts to apply hydration rates to derive obsidian dates. The kinds of temporal placements that were subsequently suggested by this early research were noted.

The recognition that chemically different glasses had potentially different rates of hydration led to the chemical characterization of obsidians by both neutron activation analysis and x-ray fluorescence. Some work has been aimed at developing comparable sourcing results between different laboratories. The geological search for source locations and limited work towards the development of source specific hydration rates has also been attempted.

Two major source areas were found in Ecuador: the Mullumica/Sigsipamba escarpments and the Tablon Grade surface deposits. The former is an eight kilometer long flow exhibiting increased chemical variation across its length with the lesser Sigsipamba flow presenting its own distinct chemical profile. The Tablon Grande source area was found to be a single, cohesive chemical unit.

Recommendations for future efforts includes more work on source specific rates, definition of the prehistoric distribution and use of various glasses, and the establishment of an organized system of obsidian research for investigators within and adjacent to Ecuador, a mapping of the geographic extent of geologically redeposited obsidian sources, and the

correlation of obsidian studies with technological lithic analysis.

SOUTHERN ARIZONA OBSIDIAN STUDIES: SURVEY RESULTS

An archaeological survey in southern Arizona was conducted for the U.S. Army Corps of Engineers in the spring of 1989 by Statistical Research of Tucson, Arizona. The survey covered approximately 10,500 acres. Ninety-three prehistoric and 13 historic sites were recorded. Most of the projectile points recovered were assignable to the Formative Period, being Hohokam or Patyan. One hundred and fifty-six obsidian specimens, 5.5% of all recovered lithics, were collected.

Thirty-nine pieces from 29 sites were submitted for sourcing studies. These specimens included 15 unmodified nodules, one biface, one uniface scraper, and one non-cortical flake. Twenty pieces were found to be from the Savceda Mountains source, 17 were Los Vidrios, and two remained unidentified. Savceda Mountains obsidian is locally available in the project area which is southeast of Gila Bend. Los Vidrios glass comes from northern Sonora, approximately 100 kilometers to the southwest. The chemical characterization was conducted by Paul Bouey.

Further information on the project and its results are detailed in: Intermontane Settlement Trends in the Eastern Papagueria: Cultural Resources Sample Survey in the Northern Barry M. Goldwater Range, Maricopa County, Arizona. *Statistical Research Technical Series No. 37.* by J.A. Homburg, J.H. Altschul, and R. Vanderpot.

EARLY OBSIDIAN USE ON THE SONOMA COAST, CALIFORNIA

Archaeological excavations at the Duncans Point Cave site (CA-Son-348/H) were conducted by the California State Department of Parks and Recreation during October and November of 1989 under the direction of Rea Schwaderer. Excavation of a single unit in the cave portion of the site revealed five major components and at least 8000 years of occupation.

The site is located on the Sonoma County coast about halfway between Bodega Bay and the mouth of the Russian River. It sits 25 meters above sea level. A complex stratigraphy including shell refuse heaps and ash lenses was exposed. Seven radiocarbon dates involving both shell and charcoal samples ranged from 3210±100 BP to 8210±110 BP. These dates largely indicated intact stratigraphy although subsequent obsidian studies suggested otherwise.

Obsidian was recovered throughout the deposit (n=101). Of these tools and debitage, 89 were submitted for hydration and source analysis. Forty-seven were found to be Annadel glass and 41 Napa Valley. There was also one each of Franz Valley and Borax Lake. The Napa Valley obsidian band widths ranged from 1.3 to 7.1µm. The Annadel specimens had a range of 1.3 to 5.2µm.

It has been concluded that the Duncans Point Cave site provides "the first conclusive evidence for early Holocene obsidian trade to the coastal region north of the San Francisco Bay" (Schwaderer 1992:69). Hydration band analysis and visual sourcing was conducted by Tom Origer and the XRF sourcing was done by Richard Hughes.

Further discussions of site findings by Rea Schwaderer are available: Archaeological Test Excavation at the Duncans Point Cave, CA-Son-348/H, in *Essays on the Prehistory of Maritime California*, pp. 55-71., edited by Terry L. Jones. Center for Archaeological Research at Davis, No. 10.

RIBBON FLAKED OBSIDIAN BIFACES, DOS PALOS BURIALS GROUND, MERCED COUNTY, CALIFORNIA: A STUDY IN PROGRESS

From March through May of 1992, Archaeological Services, Inc. conducted a burial recovery project at CA-Mer-323 in southern Merced County near the Fresno County line. The remains of approximately 70 individuals were recovered. This dispersed burial ground is located on the west side of San Luis Creek at an elevation of 100 feet in the San Joaquin Valley. Five radiocarbon dates were acquired, ranging from

1680±70 BP (AMS on human bone) to 2230±60 BP (elk antler artifact).

Seven projectile points and fragments exhibited parallel oblique pressure flaking characteristic of the Sierra Concave Base type. Six of these were made of Casa Diablo obsidian ranging from 3.4 to 5.8 microns. Nearly all showed evidence of rejuvenation. A seventh point, less clearly typed, was found to be from the Coso source, measuring 6.0 microns. Only one point had a clear burial association.

Obsidian debitage from the site was indicative of biface edge rejuvenation. Other recovered toolstone types included cherts, basalt, andesite, quartz, quartzites, and other metamorphics. The report is being prepared by John Dougherty. Field work was completed under the direction of Jim Carter. Hydration studies were undertaken by Tom Origer and the source analysis by Richard Hughes.

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 Bulletin will alert readers to some of this information by reproducing abstracts and summarizing literature that may be of particular interest to IAOS members.

Abbott, Lawrence

1993 The Production, Use, and Distribution of Metavolcanic Raw Material from the Slate Belt: An Example from Central North Carolina. Paper presented at the 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

The Slate Belt is a group of fine-grained metavolcanic and sedimentary rocks of Precambrian to Paleozoic age outcropping mainly from Virginia to Georgia. This area was utilized during prehistory as a source of lithic raw material. Due to its geological complexity, little research has been directed toward the identification of raw material types at individual lithic sources or the distribution of these materials from their respective sources. This paper presents results of research regarding the documentation and distribution of source-specific raw materials from a Slate Belt quarry in central North Carolina, using an expedient, easily replicated methodology involving macroscopic variables.

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Allison, Eric

1993 Anderson Flat Projectile Point Types and Chronology. Paper presented at 27th Annual Meeting, Society for California Archaeology, Asilomar, California.

Abstract

Over 200 temporally diagnostic projectile points were recovered at Anderson Flat, the majority (+95%) made of obsidian, and most sampled for obsidian hydration. An additional +350 points were available in collections from other sites within a fifteen mile radius, including the Borax Lake, Houx, Creager, and Mostin sites. This progress report describes an examination of spatio/temporal patterning in morphological types, materials (inter and intra-source variability), and archaeological assemblages.

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Barrett, Thomas and Robert Santley

1993 Formative Period Obsidian Utilization in the Tuxtla Mountains, Veracruz, Mexico. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

Recent surveys in the Tuxtla Mts. of Mexico have recovered a large sample of obsidian from 180 archaeological sites. This paper reports on changes in source utilization, assemblage composition, and technology from these samples during the Formative Period. Extant data indicate major changes in reduction technology, with simple blades and flakes comprising most of the assemblage from Early and Middle Formative times and prismatic blades constituting the bulk of all materials from all later time periods, which along with other shifts in utilitarian technology suggest changes in the types of food resource consumed.

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Basgall, Mark E., and Hall, M.C

1993 Observations on Temporal and Morphological Variation in Pinto Point Forms From the Southwestern Great Basin. Paper present at 27th Annual Meeting, Society for California Archaeology, Asilomar, California.

Abstract

The sample of Pinto series projectile points from Fort Irwin now totals at least 300 specimens from 29 individual sites. Examining variation in the morphological and temporal parameters of these artifacts, this paper looks first at trends in stem size and shape as these relate to data for similar types (Elko and Silver Lake series) in the region, and then reviews chronological data that bear on the absolute temporal position of indented-base points (and relationships with antecedent stemmed forms). The latter include recently acquired radiocarbon assays, obsidian hydration profiles, and general patterns of artifact dispersion.

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Bouey, Paul D.

1993 Chronometrics at CA-SAC-43. Paper presented at 27th Annual Meeting, Society for California Archaeology, Asilomar, California.

Abstract

Chronological determinations at CA-SAC-43 are based on radiocarbon dates, obsidian hydration, shell beads and ornaments, and several miscellaneous artifact forms. The emphasis of this work is on ^{14}C and hydration, the data from which temporal parameters are established for the chronometrically dependent artifact types. Results indicate that the site contains substantial Late- and Middle-period deposits. Although these data are generally consistent with previous interpretations of CA-SAC-43, information suggests that use of some artifacts as time-markers might be inappropriate and that the designation of this site as a type locus (i.e., Brazil Facies of the Cosumnes District) is endowing the assemblage with too great a significance. Patterning also indicates that temporal relationships in lower Sacramento Valley prehistory are not as secure as most scholars have assumed and that those parameters must be re-evaluated in more thorough and contemporary contexts.

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Carpenter, Maureen

1993 Maya Elite Use of Obsidian at Caracol. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

During the 1992 season, several tombs of differing economic status were excavated. The resulting data shows an extensive use of prismatic blades and an exceptional assortment of eccentrics and exotics. These burials provide an excellent illustration of the variable access to wealth and resources. The obsidian mortuary goods are making a clear statement of conspicuous consumption, revealing through such 'waste of wealth', the socioeconomic 'wealth of waste'.

Clark, Dona

- 1993 Archaeology of the Batza Tena Obsidian Source, Alaska. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

A major obsidian source is located adjacent to the Koyukuk River, NW Alaska, in an area known to local Athabaskans as Batza Tena (Obsidian Trail). At numerous flaking stations, found within a few km of the geologic source, obsidian was reduced to biface roughouts and made into other tools. Several sites have yielded assemblages representing a broader range of activity than lithic reduction and may be regarded as camp sites. The tentative sequence, based primarily on typological comparisons, includes an apparent fluted-point Paleoindian occupation.

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Cook, John and Michael Kunz

- 1993 Batza Tena Obsidian: Its Identification and Distribution. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

Previous studies have shown that obsidian from this source has the widest distribution and was the most frequently used of the many kinds of obsidian found at archaeological sites in Alaska. Using Instrumental Neutron Activation Analysis (INAA), X-ray fluorescence (XRF), and microprobe analysis (EDS), more than 900 samples of obsidian have been analyzed for elemental composition. More than 100 of these are from the main Batza Tena source in west central Alaska. The statistical results of these analyses will be compared and the distinguishing signatures of the obsidians, particularly that of the Batza Tena material, will be identified.

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Ford, Anabel

- 1993 Organization of Domestic Activities in the Maya Area: the Initial Results of Intensive Excavations in the Belize River Area. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

Intensive excavations of small and large residential units in the valley, foothills, and uplands of the Belize River area reveal the nature and variety in domestic occupations of the ancient Maya. Distinctions in construction, activities, and wealth were evident particularly by land form zones, but also by size. Only half of the excavated units exhibited indications of permanent occupation. Manufacturing specialization was focused at foothill units, producing household items of local cherts, and upland elite units, involved with obsidian blade production. This paper offers a picture of domestic activities of the ancient Maya and offers explanations of the patterns.

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Freter, AnnCorinne

- 1992 Chronological Research at Copan: Methods and Implications. *Ancient Mesoamerica* 3:117-133.

Abstract

As a consequence of long-term archaeological research at Copan, 1,425 archaeological sites containing 4,507 structures have been located and mapped over an area of 135 km². As part of the PAC II research, 200 archaeological sites representing a 15% stratified random sample of all valley sites were test excavated from 1983-1989. From these excavations, 2,150 obsidian hydration dates were processed, representing the largest number of chronometric dates there appears to be an excellent fit with various other available chronological techniques for all time phases except the ending date of the important Coner ceramic phase, which now appears to have extended to A.D. 1250. This more detailed Copan chronology suggests that the political collapse of the Main Group and immediate vicinity was quite sudden, taking place c. A.D. 800-830. Beyond that, however, the chronometric data provide evidence that some of the secondary elite, or lineage heads, and large numbers of rural commoners continued to reside within the valley in reduced courtyard groups or small rural hamlets for about 400 years following the decentralization of the Copan polity.

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Freund, Joanna and Thomas M. Origer

- 1993 A Research Design for Interpreting Obsidian Source and Hydration Data from Sites on the Santa Rosa Plain, Sonoma County, California. Paper presented at 27th Annual Meeting, Society for California Archaeology, Asilomar, California.

Abstract

The Santa Rosa plain is an area rich in known archaeological deposits that have been investigated to one degree or another. This paper explores the potential for applying temporal, geographic, ethnographic, and environmental considerations to existing assemblages and sub-assemblages of artifacts, area studies, and excavation reports with the ultimate goal of "synthesizing" these information sets in order to generate a more cohesive understanding of the area's prehistory. Obsidian source and hydration analysis will constitute the primary data base, while the potential contribution of other areas of study (i.e., paleoenvironmental reconstruction, faunal and midden constituent analysis, etc.) will be considered as well.

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Gates, Gerald R.

- 1993 CA-MOD-1976: A Second Look at a "Battle Site" on the Modoc National Forest. Paper presented at 27th Annual Meeting, Society for California Archaeology, Asilomar, California.

Abstract

A unique site on the Devil's Garden Lava Plateau, in Modoc County, contains a large rock circle (over 26 m in diameter) with four associated loci of broken and whole projectile points. Over 200 projectile points are represented in the collection, so far; primarily either Gunther Barbed/Guntheroid or Rose Spring series. Based on a preliminary analysis of the projectile points, their distribution and breakage patterns, it would appear that one possible explanation is that this phenomena represents a late prehistoric "battle" site, possibly the location mentioned in the literature of a battle between an alliance of Pit River and Modoc against the Northern Paiute. Obsidian sourcing and hydration data will be used to attempt to confirm or deny this interpretation. The site area lies within a "border" zone [between the two tribes].

Hester, Thomas

- 1993 Obsidian in Texas: Geologic Sources and Archaeological Interpretation. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

For two decades, trace element analysis has been conducted of obsidian artifacts from archaeological sites in Texas. No geological outcrops of artifact-quality obsidian occur within the state, XRF and NAA analyses of Texas specimens indicate that they are derived from sources in Mexico, New Mexico, Wyoming and Idaho. Artifacts range in age from Paleoindian to Late Prehistoric. While Paleoindian and Archaic obsidian comes from varied sources (as far away as central Mexico), distinct patterns of obsidian distribution are seen in Late Prehistoric times. Particularly significant is the presence of Malad (Idaho) obsidian linked to Great Plains trade networks.

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Jackson, Tom and Joachim Hampel

- 1993 Size Effects in the Energy-Dispersive X-Ray Fluorescence (EDXRF) Analysis of Archaeological Obsidian Artifacts. Paper presented at 27th Annual Meeting, Society for California Archaeology, Asilomar, California.

Abstract

Archaeologists often require the non-destructive analysis of obsidian artifacts to determine the original geological source of artifact raw material. Artifacts occur in a wide range of sizes and it is necessary to understand what minimum size requirements are appropriate to non-destructive XRF analysis. Experimental analysis of obsidian samples of varying thickness and diameter leads to the conclusion that reliable and accurate trace element concentration values (expressed as parts per-million) can be obtained for artifacts as small as 3 mm thick and 10 mm in diameter. Analysis for live-time counting periods from 100 to 500 seconds suggests that accurate results can be obtained at relatively low counting times (100 seconds) if an artifact is of sufficient dimensions. Analysis of smaller samples yields inaccurate concentration values regardless of counting time, however, relative proportions of

trace-element concentrations appear to be relatively accurately represented in the data. These proportional data may be useful in assigning some artifacts to source.

Analyses were conducted at the University of California at Berkeley using a United Scientific Spectrace 440 energy dispersive X-ray Fluorescence system. The system is equipped with a Si(Li) detector with a resolution of 142 eV FWHM @ 5.9 keV in an area 30 mm². A Rh transmission target X-ray tube was operated at 30 kV, .40mA (pulsed) with a .04mm Rh Filter. Samples analyzed are from the Glass Mountain source in northern California and are from near the locality of the USGS RGM-1 rhyolite (obsidian) standard. This facilitates comparison of trace element concentration values for the experiment with reported standard values (ppm): Rb = 149, Sr = 108, Y = 25, Zr = 219 (Tatlock, D. B., F. J. Flanagan, H. Barston, S. Berman, and A. L. Sutton (1976) - *Rhyolite, RGM-1, from Glass Mountain, California*. USGS Professional Paper 840)

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McDonald, Alison Meg

1992 Indian Hill Rockshelter and Aboriginal Cultural Adaptation in Anza-Borrego Desert State Park, Southeastern California. PhD Dissertation, Department of Anthropology, University of California, Riverside.

Partial Abstract/Annotation

Indian Hill Rockshelter (SDi-2537) is the only site in the Colorado Desert that is known to contain a deep, culturally stratified deposit. Much of the culture history for the area has been based on analyses of materials recovered during previous investigations. The material culture remains from this site are extensive, and the combined analysis of excavation collections permit a characterization of the last 5,000 years of regional prehistory. Studies include analyses of site function and seasonality, local chronology, basic formed artifact sequence characterizations, and lithic reduction systems. These analyses, in the context of regional ethnography and ethnohistory, help elucidate the relationship of the Anza-Borrego Desert to other resource procurement areas in the surrounding desert areas. Use of the site appears to have steadily increased over the last 4,000 years.

Obsidian source determinations by Paul Bouey on 239 pieces indicate that 91% of the sample came from Obsidian Butte, located at the south end of the present Salton Sea, Inyo County, east central California.. Interestingly, 7.5% was found to derive from the San Felipe source in Baja California. Three specimens were attributed to unknown sources, and one specimen was found to come from the Coso source.

As pointed out by McDonald, six rates of hydration have been proposed for Obsidian Butte obsidian. She took this opportunity to evaluate these rates, as Indian Hill offered an abundance of obsidian associated with organic material sufficient for obtaining C14 dates. Further, the study was viewed as potentially useful for evaluating the influence of differing effective temperatures on rates of hydration as the site provided obsidian specimens found in three microclimates (inside the shelter, outside below surface, and outside surface). Analyses were conducted independently by both Jill Onken and Thomas Origer on 64 specimens from the Obsidian Butte source. Measurements were found to range from <1 to 10 microns. No distinct bimodal or multimodal distribution of the data is evident, but higher values tend to occur below the 15-18-in. level and there is a lack of hydration rind values between about 4-7 microns.

Linear, exponential, and polynomial regressions of the hydration data explain only 10-36% of the variation in the data, indicating no apparent statistical trends. Of the hydration models previously proposed, Koerper et al. (1986) appears to provide the best fit to these data, as a hydration rind of 10 microns gives an estimated date of about 5,000 years B.P., a date that appears to correlate well with initial use of the rockshelter. However, McDonald cautions that this correspondence does not necessarily indicate that Koerper et al.'s proposed rate formula reflects the true hydration mechanism or correct rate of hydration.

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McGuire, Kelly

1993 CA-FRE-61: A Mid-Holocene Millingstone Manifestation in the Kings River Area of the San Joaquin Valley. Paper presented at 27th Annual Meeting, Society for California Archaeology, Asilomar, California.

McGuire cont.*Abstract*

Recent excavations at CA-FRE-61 revealed a lower stratigraphic component containing a substantial number of handstones, millstones, and other processing equipment, as well as a disturbed burial. Radiocarbon assays (including a 5,900 B.P. date obtained from the burial) and temperature-corrected, source specific obsidian hydration rim measurements, date the component to approximately 3,000 to 6,000 B.P. The component is evaluated with respect to other mid-Holocene manifestations reported from valley, foothill and Sierran contexts, as well as extra-regional assemblages falling under the general rubric of the Millingstone Horizon. A preliminary outline of regional mid-Holocene assemblage variability and settlement structure is developed.

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Moholy-Nagy, Hattula

1993 Debitage Disposal and Artifact Production at Tikal, Guatemala. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

In urban settings the world over, the disposal of durable waste is a universal problem with diverse solutions. The spatial constraints operating at large sites in the Lowland Maya area favored the landfilling of trash in architectural fill and other kinds of deposits. Even though virtually all refuse is found in secondary context, the manner in which Tikal's population disposed of different classes of durable waste provides important insights into the production of artifacts of chert, obsidian, shell, and bone.

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Mundy, W. Joseph

1993 Elevation-related Variables and Obsidian Hydration: A Diffusion Cell Study in Yosemite. Paper presented at 27th Annual Meeting, Society for California Archaeology, Asilomar, California.

Abstract

Utilizing 250 diffusion cells, annual mean effective hydration temperature, and soil relative humidity are

examined by depth throughout the elevation of Yosemite National Park. Data from 35 archaeological sites bracketed between 600 and 3,292 m (1,970 and 10,800 ft) elevation are contrasted to surface weather data and compared for micro-climatic variation. Obsidian hydration and radiocarbon data from park studies are examined by elevation provenience towards a goal of establishing an elevation correction for hydration values.

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Neff, Hector, Mark Glascock, and David Walters

1993 North American Obsidian Studies at the Missouri University Research Reactor. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

The Archaeometry Laboratory at the Missouri University Research Reactor (MURR) is amassing a database of North American obsidian source analyses to complement the existing Mesoamerican databank. As in Mesoamerica, many artifacts can be sourced with elements determined by an abbreviated, low-cost NAA procedure. Complete analysis, which yields 27 elements, differentiates the chemically similar sources. Source determination is routinely coupled with hydration rim measurement at MURR.

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Ridings, Rosanna

1993 Variation of Effective Temperature in Obsidian Hydration Dating. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

Implicit in the calculation of obsidian hydration dates is the premise that effective hydration temperature (EHT) is constant in space and time, since only one effective hydration temperature- and thus one rate of hydration- is used for each artifact dated. To evaluate the validity of the premise, a comparative study has been conducted at Pot Creek Pueblo in north-central New Mexico. Several potential sources of variation in effective hydration temperature have been included in this study: differing activation energies of the materials involved, changes in effective hydration

temperatures with depth, and changes in air temperature over long periods of time.

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Root, Matthew and Douglas Harro

1993 Anasazi Aggregation and Stone Tool Production on the Pajarito Plateau. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

We test a model of the aggregation of the Pajarito Plateau Anasazi from hamlets into villages using data on stone artifacts gathered during four years of excavation within Bandelier National Monument. The model proposes that increases in population led to wild resource depletion, agricultural intensification, and subsequent aggregation. An increase in regional exchange should also accompany aggregation. Evidence for an increase in the production of obsidian tools for exchange during the Classic period, and decreases in the proportions of hunting tools and increases in the proportions of agricultural implements through time lend some support to the model of Anasazi aggregation.

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Shackley, M. Steven

1993 Gamma Rays, X-Rays, Stone Tools and the Sourcing Myth: Are We Missing the Point. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis.

Abstract

For nearly 30 years the scientific analysis of archaeological lithic material, particularly obsidian, has contributed much to our understanding of procurement, exchange, group interaction, and technology. The instrumental capabilities of these studies including energy dispersive x-ray fluorescence (EDXRF), and neutron activation (NAA) have increased tremendously, but in most regions of the world archaeologists have been slow to integrate these advances in the designs for research. Much of this is a failure of archaeometry to communicate these advances to archaeology in a meaningful way. A few recent examples serve to illustrate the problem and a

number of probable solutions are offered for both the archaeometrist and the archaeologist.

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Victor, Katharine and Timothy Baugh

1993 Obsidian from New Mexico Pueblos: Implications for Protohistoric Plains-Pueblo Interaction. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

While interaction between the Pueblos and the Plains during the Protohistoric period is well documented, less is known regarding the relationships between specific sites of the two regions. Through ICP analysis of obsidian from several Pueblo sites and Jemez sources our study seeks to elucidate patterns of obsidian acquisition in two regions.

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Waechter, Sharon A.

1993 Early-period Adaptations on the San Francisco/San Pablo Bay Estuary. Paper presented at 27th Annual Meeting, Society for California Archaeology, Asilomar, California.

Abstract

Excavations at CA-CCO-474/H near the east shore of San Pablo Bay have provided evidence of a very early occupation, predating most of the large shellmounds on the Bay by 2,000 years or more. Obsidian hydration measurements of 2.6-7.6 microns (Napa Valley), and comparisons of faunal remains with other bay shore sites, suggest habitation beginning in the Paleo-Indian or Early Archaic and continuing into the Emergent period. It is hypothesized that the period of heaviest use at the site began at, or just after, the formation of the tidal marshes around the newly-formed estuary (circa 6.0-6.3 microns, Napa Valley), and that it may have served as a temporary bay shore encampment for groups from the interior.

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Weisler, Marshall

- 1993 Inter-Island Exchange and the Settlement of Tropical Polynesia. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

Long-distance exchange was an important strategy employed by Polynesian colonists for maintaining small founding groups at distant archipelagoes. While the frequency and duration of inter-island social interaction influenced island prehistories, documenting the presence of exotic lithic materials-items necessary to identify prehistoric communication between Polynesian archaeological societies- has been difficult without the widespread occurrence of pottery. Using a non-destructive x-ray fluorescence technique, this paper examines the distribution and frequency of fine grained basalt artifacts from three archaeological sites in central and eastern Polynesia. The settlement of tropical Polynesia is discussed in light of this new evidence.

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Widmer, Randolph

- 1993 Obsidian Use-Wear Patterns and Craft Activities at the Classic Maya Site of Copan. Paper presented at 58th Annual Meeting, Society for American Archaeology, St. Louis, Missouri.

Abstract

Low power microscopic examination of over 2600 obsidian blades from 103 final phase proveniences from the Late Classic site of 9N-8, Patio H, Copan, reveal multiple and varied use-wear patterns on the blade edges. This patio contains lapidary and costume workshops. Analysis reveals the obsidian blade industry was involved in craft activities. These findings concur with other lines of evidence that suggest that most of the craft workshops also functioned as domiciles.

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Yohe, Robert M.

- 1992 A Reevaluation of Western Great Basin Cultural Chronology and Evidence for the Timing of the Introduction of the Bow and Arrow to Eastern California Based on New Excavations at the Rose Spring Site (CA-INY-372). Ph.D. Dissertation, Department of Anthropology, University of California, Riverside.

Abstract

In light of a number of important anthropological questions that have recently arisen with respect to chronology, projectile point temporal sensitivity, and the timing of the introduction of the bow and arrow to eastern California, a re-excavation of the Rose Spring site (CA-INY-372) was organized and undertaken with a research design focusing on these problems. The Rose Spring site has played an important role in the past development of western Great Basin culture history since it is one of the few deeply stratified open sites with an artifact-rich archaeological deposit located within this region. The main objectives of this study were: (1) to test the verity of the original chronology for the region based on the original work at Rose Spring; (2) to reevaluate the use of projectile points as temporal indicators for the southwestern Great Basin; (3) to test the applicability of obsidian hydration as a dating method in the region; (4) to determine when the bow and arrow were introduced to eastern California; and (5) to evaluate the impact, if any, of the introduction of the bow and arrow on use of local obsidian.

The re-analysis of flaked stone artifacts collected during the 1951-1961 excavations at Rose Spring was included with the study of the latest excavated material. The findings of this project support the original chronology for the region proposed in the earlier site study, as well as the *general* temporal sensitivity of most accepted Great Basin projectile point types. However, some problems are indicated with the use of obsidian hydration as a consistently reliable time-placement dating method. Additionally, the introduction of the bow and arrow, which appears to have occurred at approximately 1,500 B.P. at this site, may have contributed to a reduction in the size of bifacial cores after 500 B.P.

MEETINGS AND EVENTS

July 3-4. Symposium on Archaeological Dating. International House, University of Melbourne, Australia. Archaeological and Anthropological Society of Victoria, contact: James Evans. Tel (03) 499-4343; Fax (03) 347-6684. P.O. Box 328C, Melbourne, Vic. 3001, Australia.

August 13-15. 66th Anniversary Pecos Conference at Casa Malpais National Historic Landmark Site, Springerville, East-Central Arizona. Contact: John Hohmann, Ph.D. (602) 234-1124; Fax 241-1561 or Brian W. Kenny (602) 506-4608; Fax 506-4882.

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 21-24. Anasazi Symposium. San Juan College, Farmington, New Mexico. Contact: Meredith Matthews or Linda Wheelbarger, Cultural Resources Management Program, San Juan College, 4601 College Boulevard, Farmington, NM 87401-4699 or Wolky Toll, Office of Archaeological Studies, Museum of New Mexico, P.O. Box 2087, Santa Fe, NM 87504-2087.

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.

November. International Symposium "The Pleistocene/Holocene Boundary and Human Occupations in South America, Mendoza, Argentina.. Organized by the Facultad de Filosofia y Letras, Universidad Nacional de Cuyo. Contact: Marcelo Zarate, Centro de Geologia de Costas y del Cuaternario - UNMP, Casilla de Correo 722 - Correo Central, 7600 Mar del Plata, Argentina.

1995

April 2-7. Archaeological Chemistry. Symposium to be held at the American Chemical Society National Meeting, Anaheim, California. Major Areas of Interest: Bone Dating, Artifact Dating, Archaeology of Genetic Material, and Peopling of the New World. Contact: Mary Virginia Orna, College of New Rochelle, New Rochelle, NY 10805 USA; tel 914-654-5302; fax 914-654-5387.

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; 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 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.

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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 for articles, short reports, abstracts, or announcements for inclusion in the next bulletin should be received by January 1, 1994. 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 95825; (916) 263-3375; FAX (916) 263-3384.

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