IAOS

International Association for Obsidian Studies

Bulletin

Number 34 **Winter 2006**

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NEWS AND INFORMATION

CALL FOR PAPERS

Please consider joining an IAOS sponsored session on long distance exchange at the 2007 Society for American Archaeology meetings in Austin, TX. If interested, please contact Carolyn Dillian at cdillian@princeton.edu

THE *BULLETIN* NEEDS YOUR HELP

The *Bulletin* is a twice-yearly publication that is typically a struggle to complete. The biggest hurdle is trying to acquire quality articles for publication. Please review your research notes and consider submitting an article, research update, or lab report for publication in the IAOS B*ulletin*! Articles and inquiries can be sent to cdillian@princeton.edu Thank you for your help and support!

PAYPAL ON THE IAOS WEBSITE

The IAOS website will now offer PayPal to those joining the organization or for renewing your IAOS membership with a credit card. It is a great way to facilitate the payment of non-U.S. membership dues with minimal cost to the IAOS. Thanks to Phil LeTourneau and Craig Skinner for making these arrangements!

2006 IAOS ANNUAL MEETING

The IAOS Annual Meeting will be held during the Society for American Archaeology meetings in San Juan, Puerto Rico. The IAOS meeting is scheduled for Friday, April 28, 2006 at 4pm. Location to be announced.

NOTES FROM THE PRESIDENT

I'm really looking forward to the upcoming SAAs in San Juan. They promise to be interesting as well as fun. I'm packing my beach blanket and snorkel gear. But first, several news items.

- Please welcome our new Secretary/Treasurer S. Colby Phillips. Colby will take over from Janine Loyd at our meeting at the SAAs.

- You can now pay your IAOS annual dues with PayPal. Craig Skinner has added a section to the IAOS web site and Janine will be including a PayPal link in the next membership dues renewal e-mail. As I wrote in the last *Bulletin*, PayPal provides a convenient option for IAOS members to pay their membership dues. Members in many foreign countries will be able to use this feature to pay in their own currency. Unfortunately, PayPal does not currently work in a number of countries, including Russia, and the nations of eastern Europe, Africa, and the Middle East. To use PayPal, click on the PayPal link on the web page or in Janine's e-mail and it will take you directly to IAOS' PayPal account where you can pay by credit card.

- Steve Shackley received a number of applicants for the Archaeological XRF Laboratory annual student research award of free XRF analysis. He will be announcing the winner in the near future.

- Lots of IAOS members are presenting papers and it looks like there will be several interesting sessions on archaeometry and lithic procurement. At least one session will be highlighting obsidian – the poster symposium on recent research at the Valles Caldera National Preserve.

I hope to see many of you in April.

Sincerely,
Philippe LeTourneau

AWARDS

The IAOS has instituted a new award for obsidian-related papers presented during conferences or meetings. The award consists of a two-year membership in the IAOS and publication of the paper in the IAOS *Bulletin.* If you have a paper you wish to nominate, please send the following information to Carolyn Dillian at cdillian@princeton.edu

- Name and affiliation of nominee
- Title of paper
- Conference where presented

Obsidian Studies in Sand Canyon and the Tehachapi Mountains of eastern California: Implications for the Timing of Numic Population Movements

Alan P. Garfinkel
California Department of Transportation, Fresno, California

The Sand Canyon Locality

Sand Canyon lies at an elevation of roughly 4000 feet and is located in the Tehachapi Mountains of southern California. The Tehachapis are a small group of hills and valleys marking the terminus of the far southern Sierra Nevada Mountain chain of eastern California. They range in elevation from 2700 to 5000 feet. The mountains are part of the transverse ranges and straddle the intersection between the southern San Joaquin Valley and the southwest edge of the Great Basin and Mojave Desert. The Tehachapis are not a particularly well-watered range and are marked floristically by a dense cover of valley and blue oaks grading into pinyon and juniper forests.

CA-KER-2787 (The Walker Site)

A total of three test excavation units (two contained cultural materials and the third was devoid of any artifacts) were completed at CA-KER-2787 (The Walker Site). All three were shovel test units or STUs and were excavated to a depth of 40 centimeters where they encountered the rocky substrate. Very few items were found in any of these units (Tables 1 and 2). There were no formal artifacts, nor concentrations of materials at any depth. Based on this exploration, it was concluded that only a rather shallow midden deposit was present at this site.

Flaked Stone

Obsidian

Obsidian debitage had the smallest size in the flaked stone inventory and all specimens represented small pressure or resharpening flakes of only a few centimeters in size (less than 20 mm square). Percussion reduction normally results in larger debitage. Only 16 items of obsidian were retrieved, representing a small fraction of less than 10% of the entire flaked stone assemblage. It is rather obvious that obsidian core and biface preparation were not being carried out on the site or in the Tehachapi region in general. All obsidian was being imported in finished or semi-finished forms.

Cryptocrystalline Silicates

Examination of the inventory of materials indicates typical constituents characteristic of Western Mojave prehistoric sites. Many flakes (n=36) were quarried from nearby sources of Kramer Hills cryptocrystalline. These materials are lustrous, mottled, and also transparent and have hues of red, gold, and white. Such materials can be found in exposures north of Highway 58 in eastern Kern County and the northwestern corner of San Bernardino County in the western Mojave Desert and also may be found in scattered locations throughout the Tehachapi Mountains and in areas near Sand Canyon.

The cryptocrystalline flaked stone collection does not reveal many diagnostic flakes. Much of the material is composed of broken flakes, due to the inherent fractures and cracks within this toolstone material. Yet biface production is indicated by the presence of several (n=3) early stage biface-thinning flakes and by the large size (many greater than 5 cm in length) of much of the material. It is apparent that local sources of cryptocrystalline stone, variously identified as chalcedony, chert, jasper, agate, and opalite, were being mined nearby and reduced on site. The resulting bifaces appear to have been at least 10 cm. in width. This estimate is based on feather-terminated biface reduction flakes that are generally interpreted as slightly long than half the width of the biface.

Rose Spring Projectile Point

The single projectile point retrieved from the site was found on the surface of the ground in the midden area of site CA-Ker-2787 (The Walker Site). It is classified as a Rose Spring Corner-notched point base and is manufactured of obsidian. Macroscopic source determination identified it as being quarried from the Coso glass fields. Hydration measurement provided a series of rim readings indicating multiple uses with several distinct episodes of reduction. Hydration rim readings were 3.1, 5.0 and 5.8 microns. Rose Spring points were originally recognized from the type-site of that same name, located in southern Owens Valley, at the edge of the Coso Range (Lanning 1963).

The Rose Spring type is a narrow, triangular arrow point with a variety of stem forms. Rose Spring points are conventionally identified as time markers for the interval from ca. 650-1350 B.P. and as such are attributed to the Sawtooth Period (Basgall and McGuire 1988; Bettinger and Taylor 1974; Gilreath and Hildebrandt 1997; Thomas 1981; Yohe 1992). Yet growing evidence (Garfinkel 2005; Yohe 1992) suggests that the introduction of Rose Spring points into eastern California occurred at least several hundred years earlier than that generally accepted initiation date, perhaps being introduced at ca. AD 300 (1650 BP) rather than the conventionally attributed age of AD 600 (1350 BP).

Metric attributes for the Rose Spring point are as follows:

ML	AL	MW	BW	TH	DSA	PSA	WT
18	17	17	13	2	40	40	10

KEY: AL- axial length; BW- basal width; DSA- distal shoulder angle; ML- maximum length; MW- maximum width; PSA- proximal shoulder angle; TH- thickness; WT- weight; measurements in millimeters.

A compendium of over 100 obsidian hydration rim measurements on Rose Spring Series points manufactured of Coso obsidian from lowland eastern California (Owens Valley, the Coso Range and Indian Wells Valley at 5,000 feet or less above mean sea level) has been developed (Garfinkel 2004). This summary indicates that the vast majority of hydration measurements fall between 3.9 to 5.8 microns. The latter measurement range incorporates over 87 per cent of all readings including outliers. The present example includes two readings within this range and a third outside that span - perhaps indicative of more recent reuse of an older, scavenged artifact or perhaps other unknown factors. The largest rims and presumably earliest dates associated with the introduction of the bow and arrow via Rose Spring points would equate with an age of 1600 to 2000 years ago based on either the Pearson (1995) or Basgall and Hall (2000) obsidian hydration rate conversion formulas.

Table 1. Cultural Materials from KER- 2787

Shovel Test Unit 1	No data
Shovel Test Unit 2	2 obsidian flakes, 10 cryptocrystalline flakes, 5 burned bone fragments (1 medium mammal, 2 large mammal, 2 small mammal)
Shovel Test Unit 3	2 obsidian flakes, 1 cryptocrystalline flake, 2 burned bone fragments (1 small mammal, 1 no ID)
General Surface Collection	11 obsidian flakes, 1 obsidian Rose Spring point, 176 cryptocrystalline flakes, 14 burned bone fragments (8 large mammal, 3 small mammal, 3 no ID)

Obsidian Studies

Source Determinations

Investigations at the Sand Canyon sites identified only 16 artifacts of obsidian (Table 1). This was the entire collection of volcanic glass recovered from both surface and subsurface investigations. Table 2 displays the hydration rim readings provided for these artifacts. All flakes of obsidian were visually evaluated by Tim Carpenter of Archaeometrics and were identified as coming from the Coso source in eastern California. Carpenter is skilled at macroscopic examination of California and Great Basin obsidian and the Coso obsidian thin sections contain characteristic microinclusions making these determinations rather unmistakable. As well, many years of trace element analysis have shown that all but a very few examples of obsidian artifacts identified in the far southern Sierra Nevada and Tehachapi Mountains emanate from the Coso Volcanic Fields. The Sugarloaf Mountain subfield of the Coso source cluster has the largest supply and highest quality glass and is situated within the China Lake Naval Weapons Center, but no subfield source attribution was attempted for this study and other subsources are known. The Coso glass sources are located 120 kilometers northeast of Sand Canyon.

Table 2. Summary Coso Obsidian Hydration Measurements from Tehachapi Mountain Sites*

Site	Readings	N	Mean	Range	Sd	Cv
Ma'a'puts CA-Ker-339	2.1, 2.1, 2.3, 2.5/6.6, 4.0, 4.0, 4.7, 5.4, 5.5, 5.5/5.8, (6.5)	10	3.8	2.1-5.5	1.4	.36
Walker CA-Ker-2787	(3.1/5.0/5.8), 3.6, 4.0, 4.1, 4.1, 4.4, 4.6, 5.0, 5.4, 5.5, 5.5, 5.6, 5.7, 6.1, (7.0), (7.1)	13	4.7	3.6-6.1	.7	.14
Twin Oaks CA-Ker-983	3.3, 3.9, 4.0, 4.1, 4.1, 4.2, 4.2, 4.7, 4.8, 4.8, 5.3	12	4.2	3.1-5.3	.6	.14
Nettle Springs CA-Ker-2334	3.0, 3.7, 4.0, 4.0, 4.1, 4.6	6	3.9	3.0-4.6	.5	.13

***cv=Coefficient of Variation, sd= Standard Deviation, ( )=Outlier values excluded from statistical calculations, N=Number of hydration samples with outliers excluded. Data compiled Garfinkel and Schiffman (1981), Hinshaw and Rubin (1996), Pruett (1987: Table 7), and present study.**

Table 3. Projectile Point Distributions for Tehachapi Mountain Sites*

Site	DSN	CT	RS	Dart Forms
Sand Canyon CA-Ker-1794	1	0	5	0
Ma-a-puts CA-Ker-1792	0	1	7	0
Ma-a-puts CA-Ker-339	4	23	26	9
J-22	1	7	6	0
Walker Site C A-Ker-2787	0	0	1	0
CA-Ker-2357	0	9	7	0
Twin Oaks CA-Ker-983	0	0	1	0
Oak Creek CA-Ker-1998	1	1	1	0
Nettle Springs	5	100	15	40
Total	12	141	69	49

By Period	#	%
Chimney (DSN & CT)	162	58
Sawtooth (RS)	69	25
Early (Darts)	49	17
Total	280	

***Data compiled from Garfinkel (2004, 2005), Garfinkel and Schiffman (1981), Gilreath and Hildebrandt (1997), Hinshaw and Rubin (1996), Pruett (1987: Table 7), Ptomey (1991), Sutton and Everson (1992) and present study. DSN= Desert Side-notched, CT= Cottonwood Triangular, RS= Rose Spring. Chimney (AD 1300 – contact), Sawtooth (AD 600-1300), Early (older than AD 600).**

Obsidian Hydration Dating

No previous study has synthesized the available corpus of hydration readings for the Tehachapi region. I attempted that project here in order to gather up those data to examine it for relevant trends germane to a number of research issues. Unfortunately few hydration rims are available for chronologically diagnostic points (Table 5).

Table 4. Coso Hydration Readings for Point Types from the Tehachapi Region*

Type	Hydration Readings	N	Mean	SD	Age BP
DSN	2.1, 2.3	2	2.2	.07	226
CT	2.1, 2.5/6.6, (5.0)	2	2.3	.2	237
RS	(3.1)/<u>5.0</u>/(5.8), 4.0, 4.0, 5.5	4	4.6	.7	1060
Darts	4.7, 5.4, 5.5/5.8, 5.8	4	5.3	.5	1600

***Data compiled from Garfinkel and Schiffman (1980), Pruett (1987: Table 7) and present study. Dates based on Basgall and Hall (2000). DSN= Desert Side-notched, CT= Cottonwood Triangular, RS= Rose Spring, SD= Standard Deviation, Underlined reading used for statistical computation, ( ) Outlier values excluded from statistical calculations, Artifacts with multiple rim readings use the smaller of the two rims and presume the larger caused by scavenging older artifacts.**

The most widely accepted hydration rates for Coso obsidian, that allow us to derive calendric dates, are those equations developed by Basgall (1990) and Pearson (1995). The Basgall rate has recently been revised (Basgall and Hall 2000) and the Pearson rate has also been modified for use in the higher elevations within the Kern Plateau (Garfinkel 2005). Both rates are based on the correlation of radiocarbon assays with mean measurements and ranges of associated obsidian hydration readings. The limited data currently available does not provide a definitive means of assessing which rate equation should apply in the Tehachapi area or what precise modifications to the existing rates would be most appropriate. Based on the mean rim reading for the Rosegate Series points in the area and the general distributions of the readings for Desert Series projectiles and early dart points, it would appear plausible that the most applicable rate may be more akin to lowland Coso rates than the higher elevation formula (see Tables 3, 4 and 5). For the current assessment we will use the lowland rate developed and refined by Marc Basgall (1990) and recently modified by Basgall and Hall (2000). That rate equation is:

$$Y=659.21 – 516.02X^2 – 4.56X^3$$

where Y equal years before present and X is the hydration reading in microns. That rate works rather well for most of the middle and late Holocene ages (cf. Basgall and Hall 2000).

A caveat with respect to using this formula is that it will eventually require some minor modification for use in the Tehachapi region. We anticipate that the resulting dates derived using this equation may be in error on the order of no more than 10 to 15%, appearing perhaps a bit too young (see discussion below).

We should mention here that that all chronological interpretations presented here are confounded by the fact that obsidian use in general is extremely limited in the Tehachapi Mountain region. Tehachapi hydration rim readings hence may only measure obsidian utilization during its brief and restricted fluorescence rather than having utility as a yardstick for general occupational intensity. Nevertheless, and possibly supporting the utility of rims as a chronometric devise, is the fact that obsidian hydration rims are available that fall within the Chimney, Sawtooth and Canebrake periods in the local chronological sequence. These hydration rims are not quite as infrequent as one might expect based on previous discussions (cf. Garfinkel 2005).

Furthermore, the reliability of Coso obsidian hydration dating as a chronological index has been repeatedly reaffirmed by correlation of temporally sensitive projectile point forms and hydration readings, and by radiocarbon determinations and hydration cluster values. Nevertheless, it is widely recognized that hydration rims are not amenable to great precision and are regarded as a more general measure of age and not to be interpreted as equating to a single age date. Therefore and in the interest of accuracy, hydration rims are not normally reported with associated calendar-specific age dates and hence we are interpreting the rim suites based on their mean values, ranges, and standard deviations (Table 6).

Table 5. Coso Hydration Readings for Point Types from Eastern California Archaeological Sites*

	N	Mean	SD
Desert Series			
Coso Volcanic Field	12	3.0	1.2
Stahl Site (CA-INY-182)	2	3.2	2.1
Kern Plateau	38	1.8	.5
Tehachapi	4	2.2	.7
Rosegate Series			
Coso Volcanic Field	20	5.2	.8
Kern Plateau	21	3.0	.5
Tehachapi	3	4.6	.7
Ash Creek (CA-INY-3812)	16	4.6	.4
Rose Spring Site (CA-INY-372)	32	4.6	.6
Fossil Falls Shelter (CA-INY-1634)	5	4.6	.8

Generally accepted age ranges for point forms in the Tehachapi area:

DSN/CT	100-650 B.P.
RS	650-1350 B.P.
Darts	older than 1350 B.P.

***Data compiled from Garfinkel (2004, 2005), Garfinkel and Schiffman (1981), Gilreath and Hildebrandt (1997), Pruett (1987: Table 7) and present study. DSN/CT = Desert Series, RS= Rosegate Series.**

Dating the Walker Site (CA-Ker-2787)

The Walker Site produced most all the cultural material and was evaluated most intensively for the present study. It appears to have been occupied mainly during the Sawooth Period (AD 600-1300). Converting the obsidian hydration rim readings provides a mean age of ca. AD 800 (Tables 4 and 7). Using this average plus one standard deviation in either direction provides an age range for the most intensive occupational episodes of ca. AD 300 to 1200 (cf. Basgall and Hall 2000). This age range is supported by the presence of a single Rose Spring Corner-notched point dating to an identical time span.

Dating Other Tehachapi Sites Using Obsidian

Obsidian hydration readings for the village site of Ma'a'puts, also located in Sand Canyon (Pruett 1987), are indicative of an occupation spanning a relatively long time range and has a coefficient of variation suggesting multiple period occupations (Table 6). If one uses the mean and one standard deviation as a basis to suggest the general age, then the site must have seen most activity from 2.4 to 4.2 microns or ca. AD 400 to 1700.

The Twin Oaks site (Garfinkel and Schiffman 1981) also appears to have an occupation largely restricted to the Sawtooth era. Mean age equates to 900 BP or ca AD 1050. An age range of AD 700 to 1400 appears reasonable based on the range of hydration measurements. This temporal frame is consistent with the discovery of a single temporally diagnostic Rose Spring point at the site dating to the same general time span.

Changing Patterns of Obsidian Use

As summarized by Macko (1993:20), the Tehachapi region flaked stone tool data indicates a relatively restricted use of obsidian, limited to complex, formalized tools - such as projectile points. These tools appear to have been imported in semi-finished or finished forms beginning in the Sawtooth Period (AD 600-1300). Obsidian import decreases somewhat in the following Chimney Period (AD 1300–1850). In the Chimney Period even high value artifacts, such as projectile points, were somewhat less frequently imported. This change in obsidian use is evidenced in part by the suite of Coso obsidian hydration readings from the region (Tables 8 and 9). As well there appears to be some limited evidence that an earlier occupation (pre AD 600) existed yet saw little to no use of obsidian and exhibited a distinct preference for non-obsidian toolstone (Tables 3 and 8).

Table 6. Dating Tehachapi Sites Based on Coso Obsidian Hydration Measurements*

	Microns			Age
Walker Site	4.7	4.0-5.4	784-1675	AD 275-1176
Twin Oaks	4.2	3.6-4.8	598-1250	AD 700-1352
Ma'a'puts	3.8	2.4-5.2	251-1526	AD 400-1699
Nettle Springs Locus	3.9	3.4-4.3	517-944	AD 1006-1433

***Mean rim readings provide average age and mean rims plus one standard deviation equals bulk of occupation (age range). Most substantial occupational episode based on obsidian dates derived using Basgall and Hall (2000) Coso rate equation. See discussion above for explanation and rationale for this formula and associated approximate age derivations.**

The only distinctively early material recognized from the Sand Canyon area is a small sample (n=40) of dart points uncovered during the early excavations by the Archaeological Survey Association at Nettle Springs (Pruett 1987). All other sites apparently post date AD 600. Pruett indicates that from the entire collection of large dart points recovered, only two were made of obsidian. The remaining projectile point assemblage is manufactured from cryptocrystalline materials. The reverse is true in the following periods. Points classified as dating to the Sawtooth Period include 15 points determined to be Rose Spring Series and 105 artifacts identified as Desert Series forms (Cottonwood, n=100; Desert Side-notched, n=5).

Table 7. Coso Hydration Rate Chronology*
Lowland Coso Rates

Sequence	Micron Range	Years B.P.	Basgall & Hall Rate	Pearson Rate
Chimney	<3.7	< 650	641	805
Sawtooth	3.7-4.9	650-1,350	641-1,316	805-1,212
Canebrake	4.9-7.6	1,350-3,500	1,316-3,684	1,212-2,394
Lamont	7.6-16.0	3,500-8,500	3,684-13,410	2,394-8,400
Kennedy	16.0-21.1	8,500-13,500	13,410-15,951	8,400-13,768

***Approximate age derivations based on Basgall and Hall (2000) and Pearson (1995). Time spans for chronological periods and hydration rim suites as suggested in Garfinkel (2005)**

Table 8. Tehachapi Obsidian Hydration Rims by Chronological Period*

		N	%
Chimney	<3.7	9	20
Sawtooth	3.7-4.9	21	47
Canebrake	4.9-7.6	15	33
Total		45	

***Data compiled Garfinkel and Schiffman (1981), Hinshaw and Rubin (1996), Pruett (1987: Table 7), and present study.**

Conclusions and Interpretations

A substantial increase in the late prehistoric use of the Tehachapi region has been interpreted as a possible manifestation of Numic in-migration and proliferation. Pruett (1987) suggests that the Sand Canyon sites in general do not show any significant occupation until ca. AD 1000. She speculates further that this represents the initial in-migration of the Kawaiisu (Southern Numic Branch) out of the Mojave Desert and into the Tehachapi Mountains.

Sutton (1991) apparently concurs in stating "Assuming that the climate during the late period was hotter and dryer than during Rose Spring times (***here he intends to equate the Rose Spring Period with the Saratoga Springs Period at ca. AD 500-AD 1100***), segments of the population may have moved out of the (desert) area as a response to the more xeric conditions. There is some reason to suspect that the major Kawaiisu occupation of the southern Sierra Nevada (and the Tehachapi Mountains) that was documented during the ethnographic period is limited to late times. It is possible that the Kawaiisu shifted their core occupation area from the western Mojave Desert to the southern Sierra Nevada beginning about AD 1000, but still retained claim to the western Mojave, the situation recorded by Kroeber (1925) and Zigmond (1986)."

Yet attribution of the Rose Spring Period as rather mesic is curious. Review of late Holocene paleoenvironmental data from the western United States suggests that during the time from A.D. 900-1350 there was a period of excessively warm climate (cf. Stine 1990 and other related discussions concerning the "Medieval Climatic Anomaly"). Yet the 450-year span was not consistently warm and dry but was punctuated with two intervals of extreme drought with a shorter intervening time of high rainfall. Two significantly dry intervals stand out as distinctive times of prolonged and severe drought. Stine (1994:549) has provided persuasive data for what he terms "epic" droughts dating to ca. A.D. 892-1112 and 1209-1350. Dates for these periods are based on submerged tree stumps at Mono Lake north of the Cosos (Stine 1990).

Contrary to the interpretations by Sutton and Pruett, growing evidence seems to indicate an initial and sustained occupation of the Tehachapi area dating from ca. AD 600 (see Table 6) and continuing through historic times. Examination of the projectile point frequencies and obsidian hydration rim measurements in the Tehachapi Mountains region both support such a premise. These data indicate a considerable Sawtooth Period occupation and use of the area (Tables 6 and 8). Fully 25% of all projectile points recovered in the region date to the Sawtooth Period and are Rose Spring types (Table 3). Point distributions further show that Rosegate points are the most frequent forms, numerically superior to the Desert Series forms, at a number of individual sites (e.g., Ker-339, -983, -1792, and -1794). Rose Spring points also have an equivalent distribution to Desert Series forms at Oak Creek and are nearly so at J-22. It is only at Nettle Springs where Desert Series points are represented in the vast majority of the assemblage compared with other earlier types.

If sustained occupation of the Tehachapi area did begin ca. AD 600 then in-migration into the area would have preceded the period of desiccation associated with the late Sawtooth age (e.g., Medieval Climatic Anomaly). Perhaps population movements may have had more to do with changes in technology and social organization, coming with the introduction of the bow and arrow, rather than the limiting factors associated with climatic conditions.

Summary

A synthesis of chronometric data from the Tehachapi region, focusing on obsidian hydration measurements and the frequency of diagnostic projectile points, supports an influx of people into the region dating to ca. AD 600 or slightly earlier. If this suggestion is accurate, then it is at odds with previous reconstructions positing a slightly later date (ca. AD 1000) for the Kawaiisu/Numic in-migration and interpreting those movements as a response to dramatic drought conditions. An alternative hypothesis posits movement of Numic outsiders into the better-watered areas from the desert to the east as a function of the introduction of the bow and arrow and changes in sociopolitical organization synchronous with this technological change.

References

Basgall, M. E.
1990 Hydration Dating of Coso Obsidian: Problems and Prospects. Paper presented at the 24th Annual Meeting of the Society for California Archaeology, Foster City.

Basgall, M.E and M.C. Hall
2000 Morphological and Temporal Variation in Bifurcate-Stemmed Dart Points of the Western Great Basin. *Journal of California and Great Basin Anthropology* 22(2):237-276.

Basgall, M. E. and K. R. McGuire
1988 *The Archaeology of CA-Iny-30: Prehistoric Culture Change in the Southern Owens Valley, California*. Report on file at the California Department of Transportation, Bishop.

Bettinger, R. L., and R. E. Taylor
1974 Suggested Revisions in Archaeological Sequences of the Great Basin in Interior Southern California. *Nevada Archaeological Survey Research Paper* No. 5:1-26.

Garfinkel, A. P
2004 Rose Spring Projectile Points and Lowland Coso Hydration Dating. Manuscript in author's possession.

2005 Linguistic Archaeology: Prehistoric Population Movements and Cultural Identity in the Southwestern Great Basin and far southern Sierra Nevada. Ph.D. Dissertation, University of California, Davis. To be published by Maturango Press, Ridgecrest, California.

Garfinkel, A. P. and R. A. Schiffman
1981 Obsidian Studies at the Ming Ranch Site (CA-Ker-983). In Obsidian Dates III, A Compendium of the Obsidian Hydration Determinations Made at the UCLA Obsidian Hydration Laboratory edited by C.W. Meighan and Glenn S. Russell, eds., pp. 125-129. *Institute of Archaeology, University of California, Los Angeles, Monograph* XVI.

Gilreath, A. J. and W.R. Hildebrandt
1997 Prehistoric Use of the Coso Volcanic Field. *Contributions of the University of California Archaeological Research Facility* No. 56. University of California, Berkeley.

Hinshaw, J. M. and S. Rubin
1996 An Artifact Collection from the Nettle Springs Site Complex, Sand Canyon, Kern County, California: A Lesson in Data Loss. *Kern County Archaeological Society Journal* 7:3-14.

Kroeber, A. L.
1925 Handbook of the Indians of California. *Bureau of American Ethnology Bulletin* 78. Washington, D.C.

Lanning, E. P.
1963 Archaeology of the Rose Spring Site (INY-372). *University of California Publications in American Archaeology and Ethnology* 49(3):237-336. Berkeley.

Macko, M. E., J. D. Binning, D., D. Earle and P. E. Langenwalter
1993 *National Register Eligibility Determinations for Historic Resources Along the Proposed AT&T Lightguide System, Victorville to Bakersfield, California*. Report on file at the Southern San Joaquin Valley Archaeological Information Center. Report KE-633.

Pearson, J. L.
1993 *Prehistoric Occupation at Little Lake, Inyo County, California: A Definitive Chronology*. M.A. Thesis, Department of Anthropology, Loyola University of Los Angeles.

Pruett, C.
1987 *Aboriginal Occupation in Sand Canyon*. M.A. Thesis, Department of Anthropology, California State University, Bakersfield.

Ptomey, K.
1991 Archaeological Investigations at CA-Ker-2357, Sand Canyon, California. *Pacific Coast Archaeological Society Quarterly* 27(1):39-74.

Stine, S.
1990 Late Holocene Fluctuations of Mono Lake, Eastern California. *Palaeogeography, Palaeoclimatology, Palaeoecology* 78:333-381.

1994 Extreme and Persistent Drought in California and Patagonia during Mediaeval Times. *Nature* (369):546-549.

Sutton, M. Q.
1988 An Introduction to the Archaeology of the Western Mojave Desert, California. *Coyote Press Archives of California Prehistory*, No. 14. Salinas: Coyote Press.

1991 Archaeological Investigation at Cantil, Fremont Valley, Western Mojave Desert, California. Museum of Anthropology, California State University, Bakersfield. *Occasional Papers in Anthropology*, Number 1. Bakersfield, CA.

Sutton, M. Q. and G. D. Everson
1992 Archaeological Investigations at the Oak Creek Canyon Site (CA-Ker-1998), Tehachapi Mountains. *Pacific Coast Archaeological Society Quarterly* 28(1):43-66.

Thomas, D. H.
1981 How to Classify the Projectile Points from Monitor Valley, Nevada. *Journal of California and Great Basin Anthropology* 3(1):7-43.

Yohe, Robert M., II
1992 *A Reevaluation of Western Great Basin Cultural Chronology and Evidence for he 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, Anthropology Department, University of California, Riverside.

Zigmond, M.
1986 Kawaiisu. In Handbook of North American Indians, Volume 11, *Great Basin*, edited by W. L. d'Azevedo, pp. 398-411. Washington, D. C.: Smithsonian Institution.

RESEARCH NEWS AND NOTES

This new section of the IAOS *Bulletin* is devoted to research news and notes from our membership. Please consider submitting an abstract or brief description of your current research, and include your contact information if you would like to receive comments, questions, or suggestions from our readers. Contributions for the research news and notes can be emailed to the *Bulletin* editor at cdillian@princeton.edu

Ana Steffen
Valles Caldera National Preserve
asteffen@vallescaldera.gov

As of 2000, New Mexico has a new national preserve that includes some of the most abundant obsidian sources in the southwestern United States. The Valles Caldera National Preserve (VCNP) encompasses the Valles caldera at the center of the Jemez volcanic field in north-central New Mexico. The 89,000 acre Preserve was created in 2000 with federal acquisition of the "Baca Location No. 1", also known locally as the Baca Ranch.

Primary obsidian-bearing geological deposits in the Valles caldera include Valles Rhyolite (at Cerro del Medio) and Cerro Toledo Rhyolite (at Rabbit Mountain and in the Sierra de Toledo Mountains). Secondary deposits of gravel and cobble obsidian occur in the Valle San Antonio, the Valle Toledo, and in the Valle Grande. When the area was under private ownership, the inaccessible obsidian quarries at Cerro del Medio near the center of the caldera had become nearly legendary. With the creation of the Preserve, these geological deposits are now accessible for research projects by geologists and archaeologists.

Archaeological survey has been on-going since 2001 as part of the "startup" for this unique federal landholding. Current research projects of interest to IAOS members include:

- geological mapping of the caldera to 1:24,000 scale by J. Gardner, F. Goff, and S. Reneau (geologists at Los Alamos National Laboratory);
- geological sampling of obsidian at Cerro del Medio, Rabbit Mountain, and in the Sierra de Toledo Mountains for dissertation research (including analyses of elemental and volatile composition) conducted by A. Steffen (University of New Mexico and the VCNP), and R. E. Hughes (Geochemical Research Laboratory);
- test excavations at archaeological sites on the Valle Grande and in Valle Jaramillo conducted for the VCNP by K. Cannon (Midwest Archeological Center);
- geological sampling of obsidian at Cerro del Medio and in the Valle Toledo and Valle San Antonio, including geochemical analyses, conducted by S. Shackley (University of California, Berkeley) and B. Vierra (Los Alamos National Laboratory);
- archaeological survey on Cerro del Medio, conducted by A. Steffen and other VCNP archaeologists.

To learn more about the Preserve, visit the website at *www.vallescaldera.gov*. For further information on the cultural and geological resources on the VCNP and planning for future projects, contact Ana Steffen, acting Cultural Resources Coordinator, at *asteffen@vallescaldera.gov*.

INDO-PACIFIC PREHISTORY ASSOCIATION

18TH CONGRESS, UNIVERSITY OF THE PHILIPPINES, MANILA 20-26 MARCH 2006

The 18th Congress of IPPA will be held from March 20-26, 2006, on the campus of the University of the Philippines, Diliman, Quezon City in MetroManila. The meeting will be hosted by the Archaeological Studies Program at the University of the Philippines, and by the Archaeology Division, National Museum of the Philippines.

A session on all aspects of obsidian studies in East Asia, Southeast Asia and the Pacific region has been accepted, but there is room for additional papers. Please contact Robin Torrence (robint@austmus.gov.au) with an abstract if you are interested in participating.

Technology, Exchange, and Ideology: New Approaches to the Study of Volcanic Glass

The purpose of the session is to review new developments in the study of volcanic glass (obsidian and basaltic glass) across the whole region comprising East Asia, SE Asia and the Pacific region.

Proposed papers:

Robin Torrence (Australian Museum): *Why was volcanic glass so special?*

Nina Kononenko (Australian National University): *Spatial patterning in obsidian use on Garua Island, Papua New Guinea*

Pip Rath (University of Sydney): *New ways to use old methods: obsidian characterization in Papua New Guinea*

Glenn Summerhayes (Otago University): *Modeling interaction and mobility using obsidian – a view from Melanesia.*

Marshall Weisler (University of Queensland*): Basaltic glass: an important component for prehistoric interaction studies in Hawai'i.*

Hubert Forestier (IRD, Jakarta): *Stone tool production on Sumatra, Nias and Mentawai Islands*

Trudy Doelman (University of Sydney): *Studying trade at the source: basaltic glass workshops in Primoye, Far East Russia*

Nikolai Klujev and Igor Sleptsov (Russian Academy of Sciences, Vladivostok): *New sites near the obsidian sources in Primorye, Far East Russia*

Irina Pantyukhina (Russian Academy of Sciences, Vladivostok): *Paleolithic obsidian microblade technology in Primorye, Far East Russia*

Mi-Young Hongmi (Seoul): Obsidian tool production at the Paleolithic site of Hopyeong-dong, Korea

Jong Chan Kim (Seoul National University): *A provenance study of obsidian artifacts from Paleolithic sites in Korea using PIXE.*

Keita Watanabe (Rikkyo University) et al. *SIMS(+) profiling of Japanese obsidians*

Masao Suzuki (Rikkyo University) et al. *Comparison of EDXRF, INAA, and LA/ICP-MS for sourcing archaeological obsidians*

Toru Tateishi et al. (Tokyo University of Fine Arts and Music) *Reconstruction of obsidian exchange systems in Jomon Japan: A combination of GIS and resource analysis*

Tetsuo Warashina (Kyoto University): *Sourcing of archaeological obsidian implements by X-ray Fluorescence Analysis*

Hiroyuki Sato (Tokyo University) and Masami Izuho: *Archaeological obsidian study in Hokkaido, Japan*

Hiroyuki Suzuki (Hokkaido Archaeological and Cultural Remains Investigation Center): *Obsidian manufacture and behavioral implication: a case of the Upper Paleolithic Shirataki site group in Hokkaido, North Japan*

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/year*
Institutional Member: $50/year
Student Member: $10/year or FREE with submission of a paper to the *Bulletin* for publication. Please provide copy of current student identification.
Lifetime Member: $200

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

Institutional Members are those individuals, facilities, and institutions who are active in obsidian studies and wish to participate in interlaboratory 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 fees may be reduced and/or waived in cases of financial hardship or difficulty in paying in foreign currency. Please complete the form and return it to the Secretary-Treasurer with a short explanation regarding lack of payment.

NOTE: Because membership fees are very low, the IAOS asks that all payments be made in U.S. Dollars, in international money orders, or checks payable on a bank with a U.S. branch. Otherwise, please use PayPal on our website to pay with a credit card. http://www.peak.org/obsidian/

For more information about the IAOS, contact our Secretary-Treasurer:

Janine Loyd
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Cotati, CA 94931-7602
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iaos@origer.com

Membership inquiries, address changes, or payment questions can also be emailed to iaos@origer.com

ABOUT THE IAOS

The International Association for Obsidian Studies (IAOS) was formed in 1989 to provide a forum for obsidian researchers throughout the world. Major interest areas include: obsidian hydration dating, obsidian and materials characterization ("sourcing"), geoarchaeological obsidian studies, obsidian and lithic technology, and the prehistoric procurement and utilization of obsidian. In addition to disseminating information about advances in obsidian research to archaeologists and other interested parties, the IAOS was also 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
4. Provide a central source of information regarding the advances in obsidian studies and the analytic capabilities of various laboratories and institutions.

ABOUT OUR WEB SITE

The IAOS maintains a website at http://www.peak.org/obsidian/
The site has some great resources available to the public, and our webmaster, Craig Skinner, has recently included a members' only section.

NEW: You can now become a member online or renew your current IAOS membership using PayPal. Please take advantage of this opportunity to continue your support of the IAOS.

Other items on our website include:

- World obsidian source catalog
- Back issues of the *Bulletin.*
- An obsidian bibliography
- An obsidian laboratory directory
- Photos and maps of some source locations
- Links

Thanks to Craig Skinner for maintaining the website. Please check it out!

CALL FOR ARTICLES

Submissions of articles, short reports, abstracts, or announcements for inclusion in the *Bulletin* are always welcome. We accept electronic media on IBM compatible disks and CD in a variety of word processing formats, but MS Word or WordPerfect are preferred. Files can also be emailed to the *Bulletin* at cdillian@princeton.edu Please include the phrase "IAOS Bulletin" in the subject line. An acknowledgement email will be sent in reply, so if you do not hear from us, please email again and inquire.

Deadline for Issue #35 is April 30, 2006.

Send submissions to:

Carolyn Dillian
IAOS *Bulletin* Editor
c/o Princeton University
Princeton Writing Program
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U.S.A.

Inquiries, suggestions, and comments about the *Bulletin* can be sent to cdillian@princeton.edu
Please send updated address information to Janine Loyd at iaos@origer.com

MEMBERSHIP RENEWAL FORM

We hope you will continue your membership. Please complete the renewal form below.

NOTE: You can now renew your IAOS membership online! Please go to the IAOS website at http://www.peak.org/obsidian/ and check it out!

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

___ Yes, I'd like to become a new member of the IAOS. A check or money order for the annual membership fee is enclosed (see below). Please send my first issue of the IAOS *Bulletin*.

___ Yes, I'd like to become a student member of the IAOS. I have enclosed either an obsidian-related article for publication in the IAOS *Bulletin* or an abstract of such an article published elsewhere. I have also enclosed a copy of my current student ID. Please send my first issue of the IAOS *Bulletin.*

Not convinced, but want to know more?

___ Please send me a complementary issue of the latest IAOS *Bulletin.*

NAME: ____

TITLE: ________________________ AFFILIATION:____

STREET ADDRESS: ____

CITY, STATE, ZIP: ____

COUNTRY: ____

WORK PHONE: ______________________________ FAX: ___________________________

HOME PHONE (OPTIONAL): ____

EMAIL ADDRESS: ____

My check or money order is enclosed for the following amount (please check one):
___ $20 Regular
___ $10 Student (include copy of student ID)
___ FREE Student (include copy of article for *Bulletin* and student ID)
___ $50 Institutional
___ $200 Lifetime

Please return this form with payment to:
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