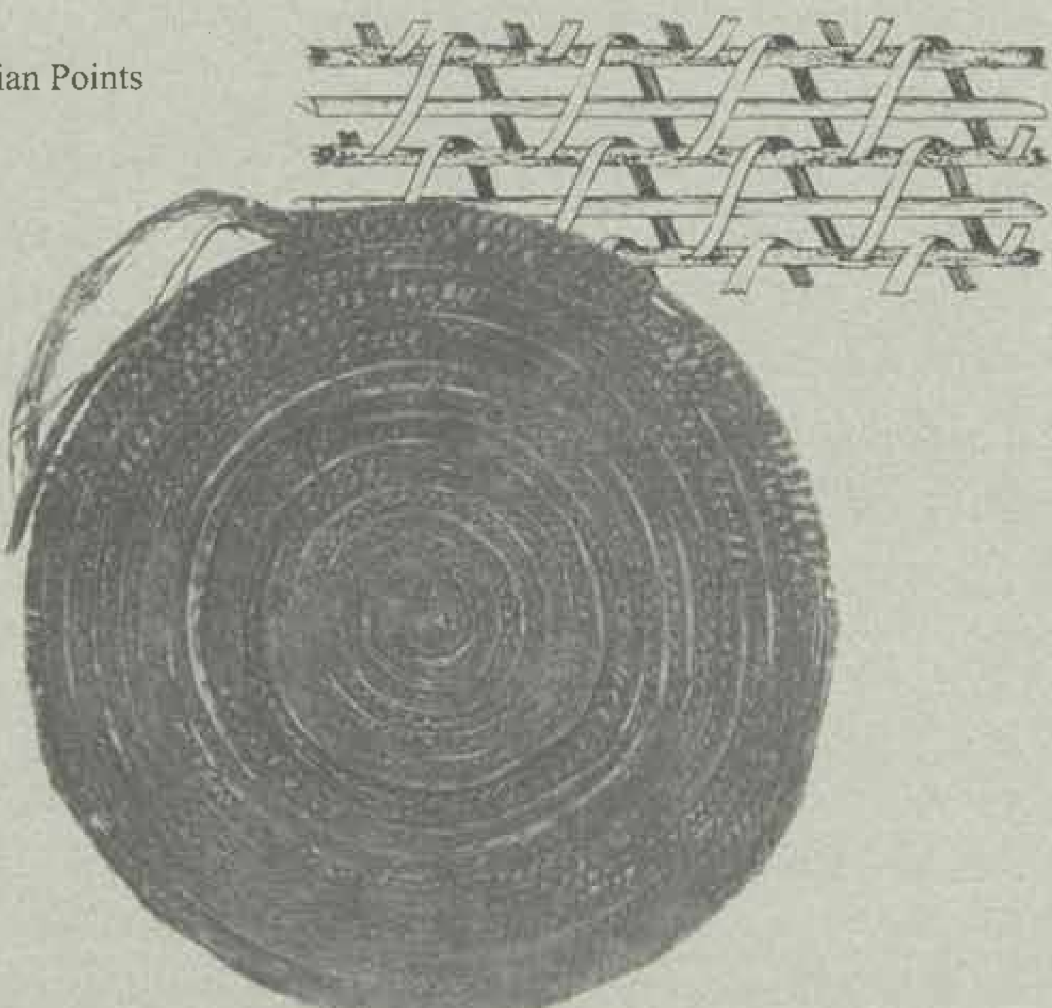
UTAH ARCHAEOLOGY
2002

In This Issue:

Special Discussion Feature:
Fremont Basketry and NAGPRA

Photo Essay:
Utah Paleoindian Points



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UTAH ARCHAEOLOGY 2002

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ERRATA

For Utah Archaeology 2001, Volume 14

Russell, Dann J. The Ogden High Graffiti Rock.

The font conversions for two symbols were inadvertently turned off, and should be corrected as follows:

The symbol for the Greek letter Ω, was printed as a W on page 41 and again on page 42. The text should read as follows:

Page 41:
3. All four contain one or more circles, each enclosing one or more "dots" with or without some form of a "+" inscribed inside the circle. Figures 1 and 4 contain a "Ω" inside a circle.

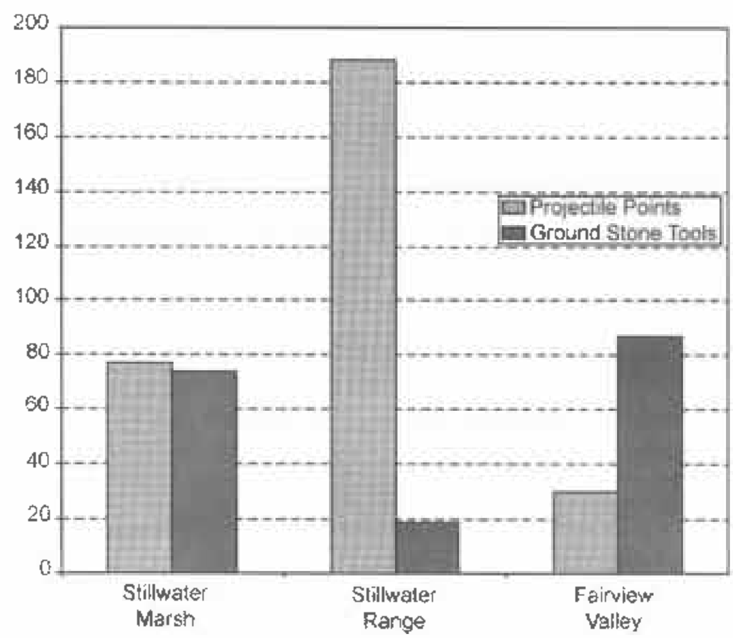
Page 42:
2. The "Ω" seen in Figures 1 and 4 is also the Greek symbol for the letter "omega."

The correct symbol for the 3 printed on page 42 should be ℨ

4. Figure 3 and 4 each contain a "ℨ" similar to an Apothecaries "scruple" (Webster's Ninth New Collegiate Dictionary 1985:1536).

Book Review of "Prehistory of the Carson Desert and Stillwater Mountains: Environment, Mobility, and Subsistence in a Great Basin Wetland," by Robert L. Kelly. Reviewed by David W. Zeanah.

The following figure was omitted from the review:



UTAH ARCHAEOLOGY
2002

Editors: Steven R. Simms, Utah Professional Archaeological Council
David Jabusch, Utah Statewide Archaeological Society
Editorial Assistant: Lara S. Petersen

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CONTENTS

Front Cover: A sample of Fremont basketry from Hogup Cave (courtesy of the Utah Museum of Natural History, Salt Lake City) and the construction features of the classic one-rod-and-bundle construction technique (Adovasio et al., this issue).

The illustrations used as endpieces throughout this volume show a range of basketry construction techniques found in Fremont contexts (Adovasio et al., this issue).

Message from the Editors

This issue includes, for the first time in *Utah Archaeology,* a Special Discussion Feature. The article "Fremont Basketry" anchors a discussion of the use of basketry to determine the relationship between the ancient Fremont culture and modern Native American tribes. This issue also continues the effort to publish a Photo Essay each year, and continues the Avocationist's Corner. As always, there are some interesting technical articles, and of course some book reviews.

The extra length of this issue placed a greater demand on everyone who produces the journal. Thanks to Lara Petersen, the Editorial Assistant who takes a variety of file types, tables and photographs, and digitally massages them to make the journal look good. Thanks to Kate Toomey, the member of the Editorial Advisory Board who donates her expertise as a "wordsmith" each year. Her eye and knowledge are crucial to our editorial process. The attention to detail does not end when the CD containing each issue leaves our shop. Thanks to Robert Scott and Square One Printing in Logan, for their commitment to quality from the digital phases right through the turning of the press.

Steven Simms, Editor for UPAC
David Jabusch, Editor for USAS

Special Discussion Feature

THE LINK BETWEEN THE FREMONT AND MODERN TRIBES

Nancy J. Coulam, United States Bureau of Reclamation, Upper Colorado Region, 125 South State St., Salt Lake City, UT 84111

Steven R. Simms, Department of Sociology, Social Work, and Anthropology, Utah State University, Logan, UT 84322-0730

The lead article in this issue of *Utah Archaeology* "Fremont Basketry," by James Adovasio, David Pedler, and Jeff Illingworth, anchors a discussion with a dual purpose. The synthesis of decades of study directed at Fremont basketry will be useful for readers who seek understanding of the Fremont from as many vantages as possible. The article is clearly written and illustrated, and the frank exposition enables the perspective, problem emphasis, and conclusions of the authors to be placed in the context of the literature on the Fremont.

There is however, a second purpose for this publication. The study of Fremont basketry is one of five reports prepared for the United States Bureau of Reclamation as part of a comprehensive evaluation of the cultural affiliation of Fremont in relationship to modern Native American tribes. Reclamation is charged with this task under the Native American Graves Repatriation Act of 1990 (NAGPRA). The study of Fremont basketry that appears here, as well as the other reports commissioned by Reclamation, illustrate that when it comes to human remains and cultural heritage, the past is with us in the present and some of the questions asked of scientists are shaped by current legal and political climates.

Adovasio, Pedler, and Illingworth's article is followed by a discussion. Catherine Fowler and Joyce Herold raise observations about the article and the relationship between NAGPRA and anthropological study. The authors then take their opportunity to reply. Finally, Forrest Cuch, Director of the Utah Division of Indian Affairs and Kevin Jones, State Archaeologist with the Utah Division of State History, were invited to contribute concluding insights from their unique vantage within state government. That perspective is authored by Kevin Jones.

NAGPRA AND COMPETING CLAIMS

NAGPRA provides a legal basis by which federally recognized Indian tribes may obtain custody of cultural items under the control of federal agencies and museums. When tribes claim items, it is generally based on "cultural affiliation" which NAGPRA defines as "a relationship of shared group identity which can be reasonably traced historically or prehistorically between a present-day Indian tribe...and an identifiable earlier group." [25 U.S.C. § 3001(2) (2003); 43 C.F.R. § 10.2(e) (2003)].

The Secretary of the Interior promulgated regulations implementing NAGPRA that agencies, museums, and tribes must follow if cultural affiliation is to be determined and cultural items repatriated. This is a multistep process. The first step is consulting with Indian tribes to determine the basis for each tribe's claim to particular cultural items. For this step, the United States Bureau of Reclamation's Upper Colorado Region consulted with over 30 tribes regarding cultural items in its museum collections. Among Reclamation's collections are Native American human remains and funerary objects classified by archaeologists as Fremont, specifically the Great Salt Lake and Uinta variants defined by Marwitt (1970).

Intensive consultations during the 1990s resulted in ten tribes claiming cultural affiliation with Fremont items under Reclamation's control. The claimant tribes include the Hopi Tribe, Kaibab Band of Paiute Indians, Northwestern Band of the Shoshone Nation, Paiute Indian Tribe of Utah, Pueblo of Laguna, Pueblo of Nambe, Pueblo of Zia, Pueblo of Zuni, Skull Valley Band of Goshute, and Ute Indian Tribe of the Uintah and Ouray Reservation.

At first, Reclamation (like other agencies) thought it could simply accept what has been called a "coalition claim," an interpretation that multiple tribes are equally related or affiliated with the cultural items. After watching the Hopi Tribe and Pueblo of Zuni dispute with the National Park Service over such a claim for Chaco Canyon cultural items, and after ongoing consultation with the claimant tribes, Reclamation realized that not only is it possible to separately evaluate the relationship between Fremont and each of the individual claimant tribes, it is legally mandatory to do so.

FREMONT AS AN IDENTIFIABLE GROUP

Archaeologists refer to an artifact or site as "culturally affiliated" when it can be assigned to a particular temporal period, like Fremont or "the Lovelock Culture." But NAGPRA's definition of cultural affiliation means there must be a shared identity between a present-day Indian tribe and an earlier group. Identifying the Paleoindian period or phases as an "identifiable earlier group" proved impossible in the Kennewick Man case (*Bonnichsen v. United States*, 217 F. Supp. 2d 1116 (D. Or. 2002). While Fremont is not as temporally distant from the modern claimant tribes as Paleoindian, the task may be almost as difficult.

Adovasio, Pedler, and Illingworth raise this issue when they note that ever since Morss (1931) coined the term Fremont for the prehistoric agriculturalists of central Utah, archaeologists have debated the nature, characteristics, origin(s), and fate(s) of this archaeological culture unit. The debate largely reflects changing research interests. From the 1930s to the 1970s, researchers worked on classifying the Fremont in time and space, and separating them from the contemporary archaeological culture units like Anasazi. From the 1980s to the present, an interest in using the archaeological record to explain the varied behaviors subsumed under the term Fremont has extended research to domains other than a concern with cultural labels and space-time systematics (Madsen and Simms 1998). Regardless of this shift towards behavioral research, NAGPRA ensures that questions about the identity of normative cultural groups and traditions will remain relevant. NAGPRA, like all law, is based on the definition (and enforcement) of societal norms.

To prove the existence of a normative group, NAGPRA requires two things: first, documentation of material culture items that are distinctive or definitive of the earlier group; and second, evidence that the earlier group is a biologically distinct population. Douglas Owsley, Richard Jantz, and physical anthropologist colleagues agreed to work on the latter task, while James Adovasio was asked to synthesize his long-standing argument that basketry serves to identify and distinguish the Fremont as an archaeological culture. Since the 1970s, Adovasio has argued that basket weaving is a complex behavior, necessarily transmitted across generations of localized kinship groups. Due to this mode of transmission, basketry signifies ethnicity and cultural identity. If Adovasio is correct, then analysis of prehistoric basketry provides an ideal tool for delimiting the existence of the identifiable earlier groups from which modern tribal claimants may be descendants.

Of course, basketry is only one tool, one material culture element, which may signify group membership. Aside from basketry, Adovasio and his colleagues conclude, along with Madsen and Simms (1998), that Fremont lifeways, settlement and subsistence patterns, rock art, and artifact inventories do not lend themselves to a clear definition of a normative, archetypical Fremont culture that persisted through time. While Adovasio, Pedler, and Illingworth's article, along with the others commissioned by Reclamation, touch on some of the broader theoretical issues related to the formation, maintenance, and creation of cultural identities, these studies are designed to evaluate whether Fremont are an identifiable group *for the purposes of NAGPRA compliance*. In other words, the Fremont identity that is being constructed for NAGPRA purposes is produced within a specific legal context characterized by contestation, normative-thinking, and power relations.

SHARED GROUP IDENTITIES

If the assembled archaeological and biological evidence support the existence of Fremont as an earlier group for NAGPRA purposes, then the next step in the repatriation process is to consult with the modern claimant tribes and work backwards through time to document what defines their common identity with Fremont, or in the words of *Bonnichsen v. United States*, what legitimizes the present-day group's authority to represent the interests of deceased tribal members. This step requires compilation of the "lines of evidence for cultural affiliation" which include archeology, geography, kinship, biology, anthropology, linguistics, folklore, oral tradition, history, or other information or expert opinion.

Adovasio and his colleagues were asked to contribute to the archaeological line of evidence by demonstrating or refuting that the Fremont and the claimant tribes belong to the same basket weaving tradition. They conclude that there is no relationship between the Fremont and the basketry traditions of the claimant tribes.

In addition to Adovasio, Pedler, and Illingworth's report, Michael Berry and Claudia Berry (2001) assessed chronometric evidence for shared group identities between the Fremont and the claimant tribes. They conclude the Fremont represent the northernmost expansion of Southwest agriculturalists and that Fremont is an identifiable earlier group for NAGPRA purposes from A.D. 600 to A.D. 1280. Like other Southwestern farmers, participants in the Fremont agricultural tradition moved south during the drought of A.D. 1280 to A.D. 1300. The Berrys argue that the Goshute, Paiute, Shoshone, and Ute migrated into the territories vacated by the Fremont, so these Numic speakers lack archaeological ties or descendant relationships with the Fremont. In this interpretation of the archaeological record, any or all of the Puebloan claimants, including the Hopi Tribe, the Pueblos of Zuni, Zia, Laguna, or Nambe, may have absorbed immigrant Fremont farmers from their southward migrations. Nevertheless, specific linkages from the prehistoric Fremont to modern Puebloan tribes are not evidenced in the archaeological record; in fact, establishing such linkages may not be theoretically or methodologically possible.

T. J. Ferguson (2001) synthesized lines of evidence including geography, oral history, anthropology, and folklore. His interpretation of these data is that all ten tribes have a shared socio-cultural identity with the Fremont, but documentation of how the tribes conceive of or trace their relationship with the northern Fremont is currently only available for the Hopi Tribe, Northern Ute Tribe, and Pueblo of Zuni.

Linguistically, the ten claimant tribes are speakers of Keresan, Tewa, Uto-Aztecan, and Zuni. The relationships between these language families and the Fremont were assessed by David Shaul (2001). The likelihood for shared language between the Fremont and these tribes depends on which linguistic method is applied. If age-area modeling is used, Shaul believes the Northwestern Shoshone and Northern Ute are the most likely descendants of the Fremont, but this is based on an assumption of continuity in the archaeological record, an assumption unsupported by the basketry and other archaeological evidence. If homeland studies are used, then Numic languages in general, along with Tanoan and Keresan speakers are the most likely descendants of the Fremont.

Biology is one of the more controversial lines of evidence for cultural affiliation. For nearly a century anthropologists have shown that race, language, and culture can vary independently of one another. There is little expectation among many anthropologists that biological variation will correspond with other ways of measuring group status because group identity is so plastic. Nevertheless, physical traits do vary and characteristics are passed on to descendants. For this reason, biology is one of NAGPRA's mandated lines of evidence. Evidence from mitochondrial DNA studies of the Fremont show them to be most strongly related to the Pueblos of Jemez and Zuni (Carlyle 2000). In addition to this DNA evidence, craniometric data evaluating the biological relationships between modern tribes and the Fremont are currently being synthesized by Douglas Owsley, Richard Jantz, and their physical anthropological colleagues.

APPLYING THE STANDARD OF PROOF: PREPONDERANCE OF THE EVIDENCE FOR FREMONT CULTURAL AFFILIATION

Once documentation of the lines of evidence for cultural affiliation is compiled, the final steps in the repatriation process consist of weighing the evidence, then transferring the cultural items to the affiliated tribe. The standard of proof that NAGPRA requires to evaluate the lines of evidence is a preponderance of the evidence. Following standard judicial guidance, preponderance of the evidence means proving the claim is more likely true than not true, more likely so than not so.

In the case of the northern Fremont cultural items under Reclamation's control, this final step has not yet been taken. Based on the evidence provided by Adovasio, Pedler, and Illingworth, the Fremont is an identifiable earlier group, but a group that is culturally unidentifiable. If the other lines of evidence from linguistics, geography, biology, kinship, anthropology, folklore, oral tradition, or tribal history lead to the same conclusion, the NAGPRA inventory process gives the tribes, agencies, and museums two options. The items could be retained until the requesting parties mutually agree upon the appropriate recipient, or the parties could await the promulgation of new regulations for the repatriation of culturally unidentifiable items. On the other hand, if the preponderance of the evidence leads to a conclusion that the Fremont are culturally identifiable, that same evidence may indicate the claim of one tribe appears truer than the claims of the others.

FREMONT BASKETRY

James M. Adovasio, David R. Pedler, and Jeff S. Illingworth, Mercyhurst Archaeological Institute
501 East 38th Street, Erie, PA 16546

Ever since the Fremont archaeological entity (Figure 1) was first defined by Morss (1931), the essential nature, salient characteristics, origin(s), and fate(s) of that entity have been the subjects of endless discussion and debate. Not surprisingly, much of the controversy initially centered around the relationship of Fremont to Formative cultures in the so-called Greater American Southwest, especially the Anasazi. As noted by Madsen and Simms (1998:266-277), well before Fremont had been formally defined by Morss, early collecting from sites that ultimately would be subsumed under Fremont produced artifacts which appeared to represent agricultural populations related to contemporaneous (but, at the time, unnamed) farmers occupying large portions of the American Southwest (Montgomery 1894:234).

Early excavations in the Fremont area, both before and immediately after World War I (Judd 1917, 1919, 1926), were at least partially directed toward exploring the posited relationship between horticultural populations in the eastern Great Basin and Colorado Plateau as well as those in the Southwest cultural region generally. In 1924, these soon-to-be-called Fremont manifestations were subsumed by Kidder (1924) into his larger Southwest culture area. At the first Pecos Conference in 1927, Fremont manifestations, still unnamed, were thought to be part of the northern edge or periphery of the Anasazi (Kidder 1927), a concept that would persist in varying guises for a long time. In this view, Fremont is considered a kind of "boondocks" or "Hooterville" Anasazi—marginalized, provincial, and culturally diluted, but nonetheless Anasazi.

Curiously, given Fremont's alleged Anasazi affinities, when Morss (1931) finally formally defined it as a cultural entity, he distanced himself and this "new" culture from the "backwoods Anasazi" perspective. Indeed, Morss viewed Fremont as a rubric to describe and incorporate materials and sites from the Fremont River-Muddy River area of south-central Utah and immediately contiguous areas to the north, excluding all other areas. Morss observed that Fremont was distinct from the Anasazi (on the basis of artifacts, basic subsistence orientation, and settlement pattern) and also from the agricultural groups on the eastern fringes of the Great Basin studied earlier by Judd. According to Morss, the Anasazi were fully sedentary horticulturalists while the Fremont were putatively far more mobile, at least seasonally, with a large foraging component to their basic subsistence strategy.

As correctly noted by Madsen and Simms (1998:268-269), Morss' view of Fremont cultural uniqueness was a minority perspective. The notion that Fremont represented an Anasazi outlier held sway in many quarters for a long time (e.g., Gillin 1938; Gunnerson 1962, 1969; Judd 1926; Steward 1933). The period between 1933 and the early 1950s saw the excavation of a number of eastern Great Basin horticultural sites which were considered to be both distinct from the Fremont (as defined by Morss) and Puebloid in the Anasazi-derivative sense (Smith 1941).

The taxonomy and external relationships of Fremont became still more murky with Steward's (1937) excavations in the Promontory Caves of northern Utah. Based on materials from these sites and the Black Rock

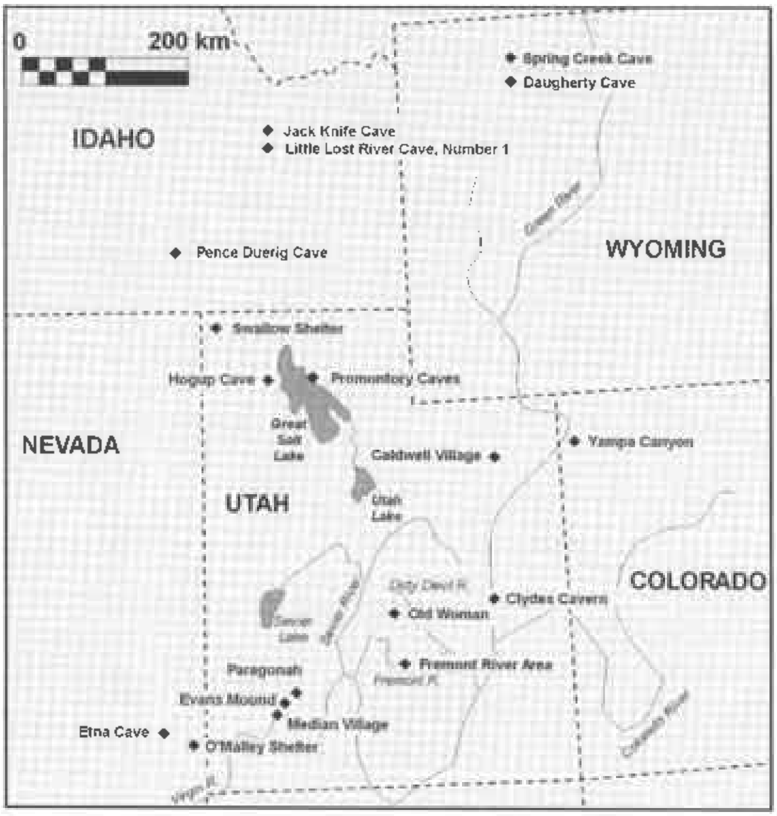


Figure 1. Map of Fremont sites yielding basketry discussed in text.

Caves, Steward (1937) concluded that a northern periphery manifestation of Southwestern Puebloid culture characterized by sedentary communities co-existed with a separate hunting and foraging culture he called "Promontory." According to Steward, the Promontory folk (who incidently spoke Athabaskan, a non-Puebloid language) were fully mobile hunters and gatherers and, hence, could not be the same people who occupied the horticultural villages (Steward 1937:82-87).

The idea that two or more separate, distinct, and penecontemporaneous cultures with different subsistence systems, settlement patterns, and even artifact repertoires occupied the eastern Great Basin and contiguous Colorado Plateau endured as a recurring theme from Steward's time to the present. However, Rudy (1953) explicitly denied the co-existence of two separate cultures based on limited cave excavations and somewhat more extensive archaeological reconnaissance. He also persisted in calling the Fremont "Puebloids." The Puebloid label was also favored by Wormington (1955) who, like Rudy, saw the Fremont primarily as settled horticulturalists, albeit with a large degree of hunting and gathering in their subsistence strategy.

By the mid-1950s, largely as a result of additional excavations and a symposium sponsored by the Society for American Archaeology, Fremont had shed its "Puebloid" and "northern periphery" personas for all but a handful of scholars (e.g., Gunnerson 1960; Meighan et al. 1956; Wormington 1955) who persisted in viewing Fremont through a Southwestern filter. Rather than being viewed as two separate cultures, Fremont was now seen as a regionally variable but distinct cultural entity with two expressions, the Fremont proper of the Northern Colorado Plateau and the so-called Sevier Fremont in the eastern Great Basin. Neither of these manifestations was very well defined, but both were believed to be variants of a cultural unit that was definitely not Puebloid or Anasazi-derived.

Once the independent taxonomic status of Fremont was conceded by all but a few diehards, such as

Gunnerson (1960), three parallel and more-or-less related questions came to dominate the Fremont research agenda. Precisely how much internal variation existed within Fremont? Where did this entity come from? Where did it go? From the outset, the answers to these questions were sufficiently ambiguous that any unanimity about the nature of Fremont quickly dissolved as yet more questions were posed.

Initially, all of the horticultural groups north of the Colorado River were included within the Fremont rubric, and the origins of this quite variable entity seemed clear-cut to most scholars (e.g., Jennings 1956, 1966, 1974; Jennings and Norbeck 1955; Rudy 1953; Taylor 1957; Wormington 1955). Since these groups were not Anasazi migrants or suburbanites, it was concluded that they must be the lineal descendants of local Great Basin/Colorado Plateau Archaic populations who were "Formativized" by the diffusion of domesticates and related technology from the Southwest. This seemed—and, in fact, still seems—eminently reasonable to many students of the Fremont, but two scholars (Aikens 1966; Gunnerson 1960) demurred from the local Archaic origins scenario almost immediately. Interestingly, both dissented for permutations of the same basic issue.

Though both Gunnerson and Aikens were willing to allow for some variability within Fremont, neither could accommodate Steward's (1937) Promontory folk under the rubric of Fremont without recasting the essential nature of the entire Fremont entity. For Gunnerson (1960), the Promontory culture was not Fremont at all. As noted above, he reserved Fremont for the more southerly sedentary horticultural populations which he presumed to be actual Anasazi who had moved north. According to Gunnerson, the Promontory folk were not only not Anasazi, they were not even locally derived. Instead, he believed they were related to an Athabascan-speaking group (as suggested by Steward [1937:87]), specifically, the Dismal River Apache, an intrusive, Plains-derived, proto-historic group (Gunnerson 1960:10).

Aikens (1966) took exception to Gunnerson's equation of Promontory and Dismal River Apache, but not on the grounds of cultural affinity. Rather, he questioned the *timing* of the Plains incursion. For Aikens, Promontory was Fremont but it was not locally generated. Instead, he viewed it as being derived from an ancestral incursion of Plains buffalo hunters that had occurred far earlier than the one posited by Gunnerson. Moreover, since Promontory was part of Fremont, by extension all of Fremont was ultimately Plains-derived. Aikens added another twist to this pan-Fremont Plains genesis argument. Not only did Fremont ultimately come from the Plains, after their Formative trajectory was spent, they went back there, merging with local Plains groups to become the Dismal River Apache (Aikens 1966:10). This was an exceptionally tidy scenario that also happened to be quite wrong.

For mainstream Fremont scholars, the origin of Fremont was local and the transformation of the Archaic hunting and gathering lifestyle was accomplished by grafting on to it the great triad of Southwestern cultigens without any substantial infusion of actual Southwestern populations. Though these scholars seemed to agree on the genesis of Fremont, they differed sharply on its demise. Some authorities (e.g., Jennings 1960; Rudy 1953) believed the Fremont were ultimately absorbed by the Numic speaking historic residents of the eastern Great Basin and adjacent Colorado Plateau. Others (Gunnerson 1969) believed they *were* the ancestral Numic speakers. A few, like Wormington (1955), opined that during the great Pueblo contraction, the Fremont drifted south and became the historic Hopi.

Largely as a consequence of an explosion in field research generated principally by archaeologists at the University of Utah and, to a lesser extent, the University of Colorado at Boulder and UCLA, a relatively large number of Fremont sites were excavated and published in the mid- to late 1960s and early 1970s. This research led directly to two major synthetic efforts aimed at addressing formal variability within the Fremont domain. The first, and somewhat lesser known of these works, is Ambler (1966) while the second, Marwitt (1970), has become the starting point for most discussions of Fremont variability to the present day (e.g., Cordell 1997; Fagan 1995; Madsen and Simms 1998). Both Ambler and Marwitt inflated the number of Fremont variants from the original two to five, which were labeled (following Marwitt [1970]), San Rafael, Uinta, Parowan, Sevier, and Great Salt Lake. The first two of these variants were located on the Colorado Plateau, while the other three were in the eastern Great Basin. The variants essentially subsumed all of the post-Late Archaic and pre-Numic hunting and gathering, horticultural manifestations—regardless of their degree of intensity—of the Colorado River and Virgin River regions, and included the Promontory culture within one of the variants (i.e., Great Salt Lake).

The variants were defined geographically on the basis of allegedly distinctive settlement patterns, architecture, subsistence economy, and especially on shared artifact constellations (notably pottery). The totality of these variants was explicitly taken to be a taxonomic unity fully equivalent to any of the major Southwestern Formative traditions (i.e., Anasazi, Hohokom, and Mogollon). Unlike these traditions, however, which were originally defined as unitary areal traditions and then sub-divided into branches or variants, Fremont was never defined as a formal entity but only as the sum of its parts.

Despite this serious taxonomic flaw, Marwitt's scheme was accepted by most Fremont scholars as reasonable. It was also apparent, however, even to its creator, that the internal boundaries between the variants were largely guesstimates and the external boundaries between any of the variants and the "outside world" were gradational and quite porous. Indeed, many of the hallmarks used by Marwitt (1970) to define his variants extended across internal boundaries into other variants and even outside the Fremont realm.

It also soon became clear that the putatively distinctive artifact constellations within each variant were largely illusory. Though flaked stone, ground stone, and ceramic artifacts occurred in all of the Fremont subdivisions, none of the constituent types within these durable artifact classes extended across the Fremont realm. In other words, it is almost impossible to find any type of durable artifact that occurs only in one variant, let alone among all of the Fremont, enabling its makers to be readily identified as Fremont.

By the mid-1970s, Fremont research had veered off into a number of alleys, the navigation of which would produce some interesting insights into, but ultimately would shed very little light upon the Fremont phenomenon. One line of investigation centered not on Fremont artifacts but, rather, on Fremont subsistence practices and adaptations in various ecological settings. Madsen (1979) and Madsen and Lindsay (1977) legitimately criticized the trait-based, five-fold classification of Marwitt, then proceeded to substitute an equally shaky scheme based on alleged differences in adaptive strategies.

Berry (1972) introduced a general systems approach to Fremont subsistence and settlement studies, providing a useful perspective but one which scarcely served to supply any profound insights into the reality of Fremont as a taxonomic entity or cultural construct. The same might be said for Madsen and Berry's (1975) excursion into occupation trajectories in the eastern Great Basin, in which it was suggested that a long hiatus separated Fremont from any possible local Archaic forebearers. Though this theme would ultimately be expanded (Berry 1982; Berry and Berry 1976) to include interruptions in the occupation of the entire Southwest, none of these admittedly interesting but now disproved notions served to elucidate much about the Fremont (or any of their Formative neighbors). Regrettably, at least in our view, a similar epitaph could be written for much of what has transpired since the initial dissatisfactions voiced with Ambler's (1966) or Marwitt's (1970) seminal classificatory efforts. Indeed, despite two decades of extensive excavations, several symposia, a host of academic and "gray literature" publications, the identity of Fremont is as elusive as it has ever been.

From about 1980 to the present, there has been a growing and questionable trend to attempt to characterize Fremont not in terms of what it is or was "culturally," but rather in terms of what it did behaviorally (Anderson 1983; Hogan and Sebastian 1980; Holmer 1980; Madsen 1979, 1982a, 1982b, 1989; O'Connell et al. 1982; Simms 1986, 1990). This "behavioral" or "know-them-by-their-deeds" approach is alleged by its proponents to be potentially more productive than traditional culture-historical reconstructions based on trait lists or, indeed, any other criteria.

Born of a real frustration with the inadequacy of previous efforts to characterize Fremont and leavened by more than two decades of theoretical upheaval in anthropological archaeology at large, some scholars now insist that defining a Fremont culture per se is a pointless "dead-end" exercise with no possibility of success. Instead, they offer a new grail—the characterization of Fremont by identifying and understanding the range of behavioral diversity subsumed by that label. This approach, logically, has led to a concomitant diversity in what might be said to define Fremont. As Madsen and Simms (1998:277) note: "[t]he dominant current view is that Fremont can be anything we want Fremont to be, and in several recent treatises, distinctions among researchers and research interests have been drawn as a way to accommodate eclecticism."

While we are sympathetic to the idea that novel insights may be gained by looking at the Fremont phenomenon through a behavioral lens, we do not for a moment concur that no coherent Fremont entity existed in culture-historical terms. Additionally, though we are in complete agreement that there are no pan-Fremont durable material culture traits, universally consistent architectural features, settlement or land use patterns, and subsistence strategies (nor, indeed, anything else), there is one class of non-durable items which all of the so-called Fremont variants produced which is unique. Moreover, this class of items results from highly standardized behaviors which do reveal a consistency of pattern evidently missing from all of the rest of what passes for Fremont. We refer, of course, to the basketry industry of the Fremont, whose composition, characteristics, uses, and production mechanics illuminate what Fremont may have been, where they came from, and perhaps where they went.

BASKETRY, BASKETMAKING, AND BASKET MAKERS

The term basketry as used here applies to several very different kinds of items. In addition to rigid and semi- rigid containers, matting, and bags, the term embraces forms as diverse as fish traps, hats, and cradles. Matting consists of items that are two-dimensional or flat, whereas baskets and many of the other forms are three-dimensional. Bags are intermediate forms because they are essentially two-dimensional when they are empty and three-dimensional when filled. As Driver (1961:159) points out, all of these artifacts can be treated as a unit because the overall technique of manufacture is the same. Specifically, all forms of basketry are manually assembled or woven without a frame or loom. Being woven, they are technically a class or variety of textile. Usually, however, that term is restricted to "cloth" fabrics with continuous-plane surfaces produced on or with the aid of some sort of auxiliary apparatus.

As is noted elsewhere (Adovasio 1977:1), it is generally accepted that basketry is divisible into three subclasses of weaves that are mutually exclusive and taxonomically distinct: twining, coiling, and plaiting. The potential number of technological types within each subclass is relatively great. The assignment of specimens to subclasses or types depends on the identification and quantification of shared attributes or clusters of attributes. Basketry attributes are features of manufacture, and their sum total *is* the individual specimen. Any single attribute is the direct product of a specific set of manipulation techniques which, as noted above and as discussed below, are highly standardized or culturally *prescribed* within *any* basket-making population (cf. Douglas 1937, 1939a, 1939b; Mason 1904).

Many attributes are employed to classify basketry. Such diverse criteria as object shape, rigidity (or conversely, flexibility) of the weave, and elements of decoration (to name but a few) have been used with widely varying degrees of success. We believe that subclasses or types of basketry should be defined exclusively by attributes of "wall" construction.

For the purposes of this discussion, any example of basketry is assumed to have several distinct parts, the most significant of which is its "wall" or main body. In a basketry container, the wall is easily distinguished from other parts such as the rim, selvage (or edge), and the center or point of starting. In other forms, however, this distinction may become arbitrary. In mats and other flat or atypical forms, the "wall" is the principal or major portion of the item and subsumes virtually everything that is not clearly "edge" or "center."

The wall or the main body of a specimen of basketry can be constructed by *only* three basic manipulative procedures or weaves, which correspond to the three major basketry subclasses. Specifically, a basket wall can be twined, coiled, or plaited or, very rarely, produced by some combination of these techniques. Although the basket wall is by no means the only important attribute of basketry, it is the basis of most modern analytical taxonomies.

Basketmaking is a learned behavior. Moreover, it is a nonuniversal craft that is normally but not exclusively the province of women (Driver 1961; Mason 1904). Basketmaking in aboriginal situations may be a very important aspect of local technology (see Andrews and Adovasio 1980; Andrews et al. 1986), or it may be relegated to the "bottom of the list" of "things to do or make." In either case, the basket maker's society maintains—consciously or otherwise—a set of relatively fixed standards of what is and is not locally "acceptable" basketry. These standards, which are manifested in the finished specimen (for the user population), and attributes (for the analyst), are normally passed to, and inculcated into novice basket makers at a very early age. Thereafter, they are reinforced by the novice's mentor, role models, immediate family, extended family, or some other such "standards of reference."

As with many crafts normally learned at a young age in traditional, non-western societies, basketmaking is oftentimes a highly conservative technological milieu within which change or innovation in the broadest sense of the term is usually minimal and almost always slow. Very rapid "turnovers" in preferred manufacturing techniques, finishing methods, decorative modes, forms, or configurations (which in turn reflect "turnover" in basketmaking standards) are exceedingly rare. Indeed, except in catastrophic contact situations normally involving a so-called traditional group and an industrialized "modern" western society, rapid changes in basketry technology *within* the same culture are virtually undocumented ethnographically and certainly prehistorically. Indeed, as will be shown later in this paper, where such rapid changes do occur archaeologically, they almost always reflect population replacement.

It is not our intention to imply that change in major or minor attributes does not occur within the basketry of any given group. Rather, we suggest that those modifications which do occur are generally undramatic and seldom involve more than a small percentage of the total constellation of construction attributes for any given basketry wall type.

Because of the manner in which knowledge about basketmaking is normally imparted from an older to an oftentimes much younger weaver of the same local kin group, the closest resemblances in the products of any two definable basketry manufacturing entities are those that reflect the teacher-student relationship. Although the initial attempts of the "novice" may at first appear to be but the crudest approximations of the "teacher's" work, there normally will be a certain resemblance even at this rudimentary level. As the novice gains greater skill, the degree of similarity to the "model" increases until the novice produces a culturally "acceptable" facsimile.

Unfortunately—or mercifully, depending on one's patience and perspective—space precludes a detailed discussion of the myriad processes and manipulations involved in the production of a "mixed" assemblage of twined, coiled, or plaited baskets. An example of the manufacturing process leading to a single coiled basket, however, perhaps would sufficiently illustrate that the complexity and number of individual choices on the part of the weaver exceeds by far those experienced in the production of any stone tool, or indeed, any ceramic vessel.

To produce one coiled vessel, the weaver must determine in advance the overall shape and size of the desired piece from a potential inventory of forms which literally is constrained only by the limitations inherent in the coiling technique itself. Next, and at the proper time of year, the weaver must select the appropriate kind and quantity of raw materials for the selected vessel form. While the inventory of potential raw materials in the Great Basin is relatively large, it has been demonstrated that only a small percentage of available plants was actually used for basketry manufacture in any subregion of the Great Basin (Adovasio 1986a:203).

The selection process for individual baskets may well involve different plant sources of different physical dimensions, colors, and properties for rods, stitches, bundles, or decorative embellishments. Non-plant materials such as feathers may also be required for the selected form.

After collection, the plant materials are sorted, soaked, or otherwise pretreated. They may also be decorticated, longitudinally split, or in the case of bundles, retted and twisted or even combined with other raw materials.

While the desired shape of the vessel in some ways controls or dictates the form of the work surface (i.e., the vessel surface into which the awl is inserted to make a path for the next stitch), it must be remembered that either concave or convex work surfaces may be evidenced in virtually *any* vessel form.

The center or point of initiation of the coiled basket may be one of at least four basic varieties (i.e., normal, oval, plaited, or overhand knot), it may be reinforced with accessory stitches or unreinforced, and it may or may not have a central aperture. The stitching or work direction may be right-to-left or left-to-right.

The basket wall of the vessel may be composed of individual coils that are closely spaced (close coiling) or physically separated (open coiling). There is also considerable choice involved in the selection of foundation material, the arrangement of foundation elements, and the type of stitch employed in their construction. For example, within the four major coiling foundation varieties (i.e., single element-rod, single element-bundle, multiple element horizontal, or multiple element stacked), over 100 varieties have been documented ethnographically and archaeologically (cf. Adovasio 1977; Mason 1904; Morris and Burgh 1941). Stitches may be simple or intricate, interlocking or non-interlocking, and may encircle and/or pierce the foundation. Stitches also may be accidentally or intentionally split on either one or both surfaces. The addition of new stitches via splicing involves dozens of possible permutations, as does the choice of designs, the execution of design mechanics, and, finally, the type and method of execution selected for the rim finish.

For any of this to make sense in the present context, it must be stressed that every aspect of this very complex operation is, to a very large degree, controlled by or constrained within a set of norms that is passed *en bloc* to the weaver by his or her instructor(s). The numerous choices inherent in the operation, from the collection and preparation of raw materials through the clipping of the very last rim stitch, are part-and-parcel of a learned behavior that is directed toward a very specific, well-defined end: the coiled vessel proposed several paragraphs above.

Obviously, there are variations in the exact methods of transfer or transmission of information on basketmaking from "master" to "novice" in aboriginal North American groups. Nonetheless, the existence of recognizable standards of manufacture, for all intents and purposes, is a universal among all basket-making populations. Indeed, at the turn of the present century, Mason noted that in basketry manufacture, "the form, technique and intricate patterns must all be fixed in the imagination *before* the maker takes the first step" (Mason 1900:57; emphasis added).

In fact, so "fixed" are these "forms, techniques and intricate patterns" that despite the complexities introduced by conscious or unconscious borrowing, trade, alien spouse acquisition, and/or the assimilation or capture of foreign or non-local weavers (see Mason 1904), *it is possible* for a student of ethnographic basketry to distinguish with relative ease the work of a Kawaiisu from that of a Kwakiutl or the products of a Hopi from those of a Hupa. Indeed, it is even possible to distinguish a vessel made by weavers of one group following the exact specifications and design of another group, as in the well-known case of Navajo "wedding trays" which, because of onerous ritual prohibitions, are now produced on order by Ute weavers. Though the basic shape and design of these trays is clearly "Navajo," all of the construction mechanics—including foundations, stitching, and splices—are recognizably Ute. An early Navajo-made wedding basket may bear a superficial resemblance to a Ute copy, but they are readily distinguishable when set side-by-side.

This is not to suggest that there is a *one-to-one* relationship between specific basket wall types alone and particular American Indian ethnic groups. The constellation of basket wall types as well as other construction attributes habitually used by any one group *can be distinguished*, however, from those employed by any other group if adequate and representative examples exist for comparison from both groups. Despite almost wistful protestations to the contrary, this is a hard fact recognized by scholars of perishable technology for nearly 100 years (see Barrett 1908; Dawson and Deetz 1965; Dixon 1902; Douglas 1937, 1939a, 1939b; Driver 1939, 1961; Driver and Massey 1957; Drucker 1937; DuBois 1935; Elsasser 1978; Essene 1942; Gifford and Kroeber 1937; Kelly 1930; Kroeber 1922, 1925; Mason 1904; O'Neale 1930, 1932; Voegelin 1942).

Having elaborated on the potential of basketry analysis in helping to define prehistoric cultural boundaries (both temporal and spatial), it is now appropriate to return to discuss the cultural significance of similarity and dissimilarity in basketry assemblages by examining some concrete examples.

In the following pages, the technical characteristics, distribution, origins, and demise of Fremont basketry are discussed, and comparisons are offered with earlier, contemporary, and later basketry assemblages from the same area. It should be noted that the senior author has examined virtually every piece of Fremont basketry in existence, in both public and private collections, and it is upon this analysis that the following comments are predicated.

TECHNICAL CHARACERISTICS

Two of the three major subclasses of basket weaves are represented in the Fremont basketry assemblage: coiling and twining. The third subclass, plaiting, is wholly absent. Over the course of the past 30 years, the senior author has examined all known examples of Fremont coiling and twining. The salient technical features noted for these items are presented below by subclass. (Those unfamiliar with the descriptive terminology employed herein are advised to consult Adovasio [1977].)

Coiling

Coiling is the numerically dominant subclass of Fremont basketry and is represented at all Fremont sites where basketry has been preserved. All extant examples of Fremont coiling were analyzed, where feasible, for the following attributes:

1. Basket wall (foundation) technique
2. Stitch type
3. Method of starting
4. Work direction
5. Work surface
6. Rim finish
7. Splice type
8. Decorative patterns and mechanics of decoration
9. Form
10. Wear patterns-function
11. Material

The results of the attribute analysis are presented below.

Basket Wall (Foundation) Technique. Eight basket wall or foundation techniques are represented in Fremont coiling (Table 1). The frequency of these techniques by site is presented in Table 2. As indicated, four foundation types (i.e., close coiling, half rod and bundle stacked foundation; close coiling, half rod and welt stacked foundation; close coiling whole rod foundation; and close coiling three rod bunched foundation) account collectively for 95.74 percent of the sample. Of these, one technique—close coiling, half rod and bundle stacked foundation—accounts for 50 percent of the entire sample. This particular foundation is represented at all but two Fremont sites and appears to be the preferred or standard Fremont coiling technique (see Adovasio 1970a, 1970b, 1971, 1974). The four remaining coiling foundations are statistically insignificant and,

Table 1. Coiled Basketry Types, Frequency, and Structural Schematics for Specimens in the Fremont Range.

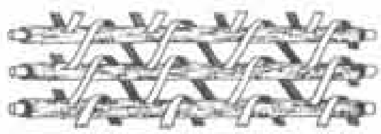
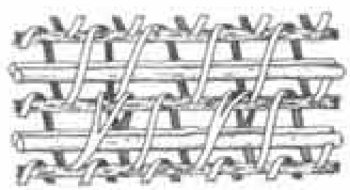
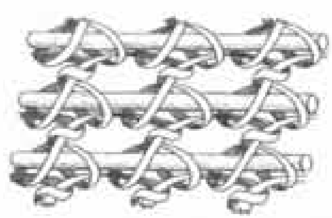
Basketry Type	)Frequency (%	c Structural Schemati
Close Coiling, Whole Rod Foundation, Interlocking Stitch	28.4	
Close Coiling, Half Rod and Bundle Stacked, Non-Interlocking Stitch	50.5	
Close Coiling, Whole Rod and Welt Stacked, Non-Interlocking Stitch	11.2	
Close Coiling, Three Rod Bunched, Non-Interlocking Stitch	5.3	
Close Coiling, Bundle Foundation, Non-Interlocking Stitch	1.4	
Close Coiling, Rod-in-Bundle, Non-Interlocking Stitch	0.7	
Close Coiling, Two Rod and Bundle Bunched, Non-Interlocking Stitch	1.0	
Open Coiling, Whole Rod, Intricate Interlocking Stitch	1.4	

Table 2. Fremont Coiling Foundation Types by Site

Site	Coiling Foundation Type								Total
	Close Coiling, Half Rod and Bundle Stacked	Close Coiling, Half Rod and Welt Stacked	Close Coiling, Whole Rod	Close Coiling, Three Rod Bunched	Close Coiling, Bundle	Close Coiling, Rod in Bundle	Close Coiling, Two Rod and Bundle Bunched	Open Coiling, Whole Rod	
Hogup Cave	9	4	1	5	—	—	—	—	19
Promontory Caves	7	—	5	—	—	—	—	—	12
Evans Mound	15	21	20	—	—	—	—	—	56
Median Village	1 (?)	—	—	—	—	—	—	—	1(?)
Paragonah	P	—	—	—	—	—	—	—	P
Caldwell Village	27	—	18	—	2	—	—	—	47
Fremont River Area	11	—	4	—	—	—	—	—	15
Yampa Canyon	25	P	31	—	—	—	—	—	56
Old Woman	2	—	—	—	—	1	—	—	3
Etna Cave	22	—	—	—	—	1	3	1	27
O'Malley Shelter	2	—	—	—	—	—	—	—	2
Little Lost River Cave No. 1	1	1	—	2	—	—	—	1	5
Pence Duerig Cave	5	2	—	—	—	—	—	—	7
Jack Knife Cave	—	3	—	—	—	—	—	—	3
Spring Creek Cave	—	—	1	—	—	—	—	—	1
Daugherty Cave	2	1	—	—	—	—	—	—	3
Clydes Cavern	9	—	—	—	—	—	—	2	11
Swallow Shelter	6	—	1	8	2	—	—	—	17
Total	144	32	81	15	4	2	3	4	285

as will be shown below, are probably intrusive.

Stitch Type. Five types of stitches occur in Fremont coiling. These include interlocking, noninterlocking, split intentionally on the non work surface, split on both surfaces, and intricate interlocking. Of these, the most common are noninterlocking, split intentionally on the nonwork surface, and interlocking. The latter stitch type is restricted entirely to whole rod foundation basketry that is sewn with no other type of stitch.

Methods of Starting. All extant Fremont coiled baskets have been initiated with a normal or continuous coil center (Table 3).

Direction of Work. In the vast majority of Fremont coiled baskets (80 percent), the sewing proceeds from right to left, though the reverse technique is not unknown.

Work Surface. All Fremont trays are worked on the concave surface, as are shallow bowls, whereas deeper bowls and carrying baskets are worked on the convex surface.

Rim Finish. Most Fremont coiled baskets are finished with self rims, though false braid rims either in a 1/1 or 2/2 herringbone do occur occasionally (see Table 3).

Splice Type. Marked preferences for specific splice types are readily discernible in Fremont coiling. In all instances, the preferred splicing techniques are identical to those employed by preceding Desert Archaic populations from the same area. Dominant types include fag ends and moving ends bound under, fag ends clipped short and moving ends bound under, and less commonly, fag ends and moving ends clipped short (see Table 3).

Decorative Patterns and Mechanics. Only two baskets in the entire sample are decorated in any way. These include a bowl fragment with a chevron design produced by sewing feathers onto the convex surface and a tray fragment with a single circuit of stitches which have been dyed red.

Form. The Fremont produced a wide range of vessel forms including very shallow circular trays, shallow to moderately deep globular bowls, and deep circular carrying baskets. Of these, the nearly flat tray is the most frequently encountered form.

Wear Patterns-Function. Analysis of wear patterns on Fremont coiling indicates that virtually 100% of the shallow trays were employed in parching, whereas the other forms seem to have been used for general storage and transportation. No indications of cooking in baskets are apparent. As noted elsewhere (see Adovasio 1970a, 1970b), half rod and bundle, close coiled baskets are naturally watertight due to the expansion of the bundle when damp; hence, the use of containers produced via this technique for water storage can be safely inferred.

Material. Throughout the range of the Fremont culture, the preferred material both for rods and stitching in the manufacture of coiled basketry was Salix. Bundles were generally composed of Apocynum or Asclepias or, more rarely, of Juniperus or Yucca.

Twining

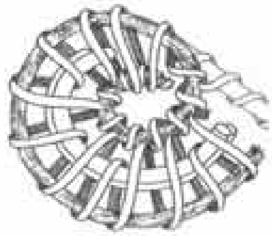
Basketry produced via twining techniques is relatively uncommon in most Fremont sites and frequently is not represented at all. All extant Fremont twining was analyzed for the following attributes:

1. Number and composition of warps engaged at each weft crossing
2. Number and composition of wefts
3. Spacing of the weft rows (open or close)
4. Twist of the weft rows (S or Z)
5. Method of starting
6. Insertion of new elements
7. Selvages
8. Form
9. Wear patterns-function
10. Decorative patterns and mechanics of decoration
11. Material

The results of this attribute analysis are presented below.

Construction Techniques. Seven basic twining techniques were employed by Fremont weavers (Table 4). The incidence of these techniques by site is presented

Table 3. Structural Schematics of Additional Fremont Coiling Techniques.

Name	Schematic
Normal (Continuous Coil) Center. (Shown on a Two Rod and Bundle Bunched Foundation.)	
Tapered Self Rim. (Shown on a Two Rod and Bundle Bunched Foundation.)	
False Braid (1/1 Interval) Rim. (Shown on a Two Rod and Bundle Bunched Foundation.)	
Splice with the moving end and the fag ends bound under.	
Splice with the moving end bound under and the fag end clipped short.	
Splice with the moving and fag ends clipped short.	

in Table 5. Only one technique, open diagonal twining with Z-twist wefts, occurs with any frequency, and then only at a single site. The remaining techniques occur in very limited numbers, and only one technique, open diagonal twining with S-twist wefts, occurs in as many as three sites. The greatest variety in twining is apparent in the assemblage from Yampa Canyon, where four techniques occur, followed by Hogup Cave and the Promontory caves, which are represented by three techniques each.

Warps are generally single elements in all types of simple twining and paired elements in all instances of diagonal twining. Wefts are inevitably paired in all types of twining (no examples of trebled or other multiple weft patterns have ever been found). Cordage is commonly utilized for wefts in the construction of matting. Though both S- and Z-twist wefts occur in Fremont twining, with notably marked preferences that vary from one site to another, S-twist generally predominates in the assemblage.

Space does not permit discussion of other construction details such as method of starting, insertion of new elements, and the like. For these particulars, the reader is encouraged to consult Steward (1937) and Burgh and Scoggin (1948). However, some comments on selvages are warranted.

Fremont selvages tend to be extremely varied; no one side or edge finish is clearly in the majority. At most sites, warps are simply truncated after the final weft row or folded back into the body of the fabric and then truncated. More elaborate end selvages occur in the Promontory caves' assemblages; these include a variety of reinforced edges sewn with cordage (see Steward 1937). Side selvages on mats invariably have weft rows folded down parallel to the lateral margins and sewn back to form the next weft row.

Form, Wear Patterns, and Function. The majority of Fremont twining is in the form of matting or, much more rarely, flexible bags. Rigid twined containers are virtually unknown. No diagnostic wear patterns are apparent on any type of twining, though frequent indications of mending, notably in the bags, attest to heavy use and subsequent re-use.

Decorative Patterns and Mechanics of Decoration. As with Fremont coiling, the use of any decorative embellishment, with the exception of modified selvages, is wholly lacking in the twining industry.

Material. Warps in Fremont twined matting are generally made of Scirpus americanus, or more rarely, Phragmites communis, Rhus trilobata, or Salix. Wefts are usually formed of Juniperus utahensis or, in the case of cordage wefts, Asclepias, Apocynum, or Artemisia. Salix is likewise used occasionally for wefts. In the production of bags, Scirpus again is the favored material for both wefts and warps.

DISTRIBUTION, CHRONOLOGY, AND INTERNAL CORRELATIONS

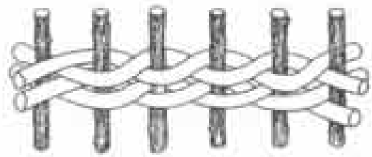
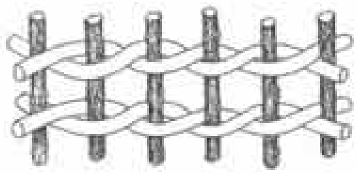
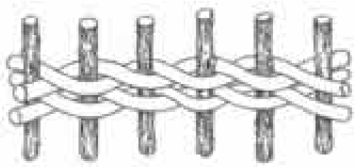
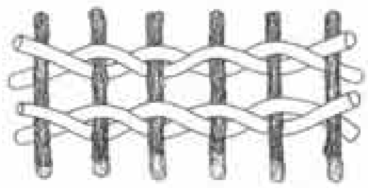
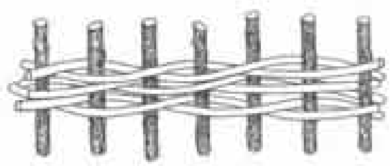
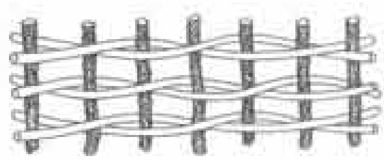
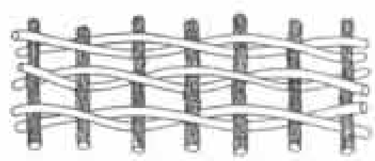
Distribution

Typical Fremont coiled basketry is represented in all five of the Fremont regional variants defined in Utah (see Marwitt 1970) as well as in southeastern Nevada and northwestern Colorado. Beyond the "normal" limits of the Fremont culture proper, Fremont coiling has been recovered in southern Idaho and southwestern Wyoming. As reported elsewhere (Adovasio 1972), Fremont coiling is virtually never encountered south of the Colorado or Virgin Rivers, nor is it known in northeastern Nevada. Fremont twining is severely limited in occurrence and is generally confined to northern Utah and northwestern Colorado. Although it is reasonable to conclude that twining was manufactured throughout the range of the Fremont, evidence to that effect is lacking.

Chronology

Coiled basketry was produced throughout the entire time span of the Fremont culture; that is, from ca. A.D. 400 to ca. A.D. 1300. The industry disappeared or was replaced by intrusive industries (see below) differentially, becoming extinct in the Uinta area ca. A.D. 950 and in other areas by the end of the thirteenth century. Presumably, twining was also produced over this time span, at least in the northern sections of the Fremont

Table 4. Twining Types, Frequency, and Structural Schematics for Specimens in the Fremont Range.

Type	Frequency (%)	Structural Schematic
Close Simple Twining, S-Twist Wefts	10.5	
Open Simple Twining, S-Twist Wefts	8.8	
Close Simple Twining, Z-Twist Wefts	unknown	
Open Simple Twining, Z-Twist Wefts	14.0	
Close Diagonal Twining, S-Twist Wefts	7.0	
Open Diagonal Twining, S-Twist Wefts	5.4	
Open Diagonal Twining, Z-Twist Wefts	54.4	

Note: Close Simple Twining, Z-Twist Weft is present, but the exact number of specimens is unknown.

Table 5. Fremont Twining Types by Site

Site	Twining Type							Total
	Close Simple Twining, S-Twist Weft	Open Simple Twining, S-Twist Weft	Close Diagonal Twining, S-Twist Weft	Open Diagonal Twining, S-Twist Weft	Close Simple Twining, Z-Twist Weft	Open Simple Twining, Z-Twist Weft	Open Diagonal Twining, Z-Twist Weft	
Hogup Cave	—	1	2	1	—	—	—	4
Promontory Caves	—	—	2	1	—	7	31	41
Evans Mound	—	—	—	—	—	—	—	—
Median Village	—	—	—	—	—	—	—	—
Paragonah	—	—	—	—	—	—	—	—
Caldwell Village	—	—	—	—	—	—	—	—
Fremont River Area	4	—	—	—	—	1	—	5
Yampa Canyon	2	—	P	—	P	—	P	2+
Old Woman	—	—	—	—	—	—	—	—
Etna Cave	—	4	—	1	—	—	—	5
O'Malley Shelter	—	—	—	—	—	—	—	—
Little Lost River Cave No. 1	—	—	—	—	—	—	—	—
Pence Duerig Cave	—	—	—	—	—	—	—	—
Jack Knife Cave	—	—	—	—	—	—	—	—
Spring Creek Cave	—	—	—	—	—	—	—	—
Daugherty Cave	—	—	—	—	—	—	—	—
Clydes Cavern	—	—	—	—	—	—	—	—
Swallow Shelter	—	—	—	—	—	—	—	—
Total	6	5	4+	3	P	8	31+	57

Note: P=presence of technique, but precise quantity unknown.

range.

Outside the Fremont "range" proper, notably in southern Idaho and Wyoming, Fremont-style basketry continued to be produced, and/or used after the decline of the industry in the eastern Great Basin and on the Colorado Plateau (Adovasio et al. 1982). The implications of this persistence are discussed more fully below.

Certain developmental trends are discernible over the 900-year period during which Fremont coiled basketry was produced. Notable among these are the gradual shift from mixed to almost uniformly right-to-left work direction, the increasing preference for half rod and bundle foundation over all others, and the increasing tendency to employ noninterlocking or intentionally split stitches on the nonwork surface.

As is discussed further below (see External Correlations), false braid rims appear on a few coiled baskets late in the Fremont sequence in the Parowan Valley. As these have no local Archaic forerunners, they are presumed to be one of the few Anasazi construction attributes which spread, perhaps, by spouse acquisition, north of the Colorado and Virgin Rivers.

At present, it is not possible to delineate any trends that may have been operative in the twining industry.

INTERNAL CORRELATIONS

Though not pronounced, regional preferences definitely existed among the various populations of Fremont basket makers. As Table 1 indicates, whole rod foundation coiling was somewhat more common in the Uinta Basin and the Parowan Valley than elsewhere. Half rod and welt stacked foundation likewise enjoyed differential popularity, again being common in the Parowan Valley and somewhat scarce, or absent, in other Fremont regional centers.

Preferences for specific stitch types are also discernible. Interlocking stitches are generally more common in the northern Fremont variants, whereas noninterlocking stitches are clearly favored in the south, particularly in the Parowan Valley.

The uneven distribution of S- and Z-twist wefts in the Fremont twining industry, as well as the generally northern distribution of twining, may also reflect regional specialization, though this conclusion is tenuous at best.

EXTERNAL CORRELATIONS

The basic affinities of Fremont basketry, both twined and coiled, are to earlier Archaic industries from the same area. *All* of the basic Fremont coiling attributes, including preferred foundations, stitch types, rim finishes, methods of starting, work directions, forms, material preferences, and particularly splice types, are duplicated in earlier Archaic assemblages from Utah. Similarly, *all* of the twining attributes may be observed in Archaic assemblages from the eastern Great Basin (Adovasio 1970a, 1970b, 1971, 1974, 1980a, 1980b, 1986a, 1986b).

Although the persistence of one or another of the aforementioned technical attributes from Late Archaic into Fremont times could be dismissed as fortuitous, their persistence *in toto* or as an integral constellation constitutes a powerful body of evidence that Fremont basketry and its makers are derived part and parcel and directly out of *local* Archaic industries and populations. Moreover, this technology is utterly dissimilar to basketry industries elsewhere in the Great Basin, the Southwest, and with one interesting and late exception, the Idaho Plateau. In short, whoever the ancestors of the Fremont were and whenever they entered the eastern Great Basin and contiguous Colorado Plateau, their basketry was genetically local in origin and not remotely derivable from any other source.

It should be stressed that it is completely immaterial whether there was an occupational hiatus between the end of the Late Archaic in the eastern Great Basin and the beginnings of Fremont (Aikens 1976; Madsen 1979; Madsen and Berry 1975). If the eastern Great Basin was uninhabited briefly or for a long interval prior to the crystallization of the Fremont (which, as noted above, few, if any, now believe), then the first Formative "colonists" in the area "returned" with a basketry technology *exactly* the same as that present in the area before the alleged hiatus.

In stark contrast to the Fremont-Late Archaic basketry "connection" is the general lack of technical ties to *any* later or contemporary industries. Upon cursory examination, one might conclude as Gunnerson (1969) has, that there is a close relationship between Fremont and Anasazi basketry. In point of fact, there is virtually no relationship between the perishable fiber industries of the Anasazi and Fremont. Contemporary Anasazi coiling techniques include numerous varieties of both close and open stitch types as well as multiple stitch and wrap permutations (Morris and Burgh 1941) never found among the Fremont. Additionally, there is a much greater range of foundation combinations than those employed by the Fremont. The standard Basketmaker foundation technique, two rod and bundle bunched, with non-interlocking stitches, *never* appears in Fremont sites, despite Gunnerson's (1969) allusions to the contrary; nor do any of the standard PI-PIII techniques ever appear in any frequency (Morris and Burgh 1941) in any part of the Fremont range. Unlike the Fremont, the Basketmaker-Anasazi weavers made extensive use of false braid rims, a variety of decoration devices, and employed splice types wholly unlike those to the north. Work direction is always right-to-left and favored forms include many types completely unknown in the Fremont area.

Morever, as the evidence from Sand Dune, Dust Devil, and Cowboy Caves (Jennings 1980; Lindsay 1986) indicates, the antiquity of the basic Basketmaker-Anasazi coiling techniques extends nearly as far as the basic Fremont varieties, thus indicating a separation of the two textile making areas for a very long period (Adovasio 1970a, 1972, 1974, 1975, 1980a, 1980b, 1986b). This separation is reinforced by the total absence of Basketmaker-Anasazi style twining or plaiting in the Fremont range throughout the co-existence of those two traditions.

While it is true that an occasional single specimen of probable Basketmaker-Anasazi coiling does occasionally appear in the southern periphery of the Fremont area (notably in the Parowan Valley), only *one* Fremont specimen has ever been noted in any collection from the Anasazi area, despite the thousands recovered. Similarly, though as noted above, false braided Anasazi rim finishes are occasionally evidenced in Parowan Valley Fremont coiling, they occur on otherwise Fremont specimens with no other Anasazi construction attributes. This parallels the occasional occurrence of half or whole rod and bundle stacked foundation baskets among the Virgin Branch Anasazi that appear to be badly executed and readily recognizable local copies of Fremont prototypes.

In short, the evidence derived from detailed comparative analysis of Fremont and Anasazi textiles indicates that not only are the two industries wholly unrelated, but also that they have been for a very long time.

Nor is there a relationship between Fremont basketry and that of any of the ethnographic cultures that claim to be derived from them. This specifically includes the Zuni and the Hopi as well as the Rio Grande Pueblos of Nambe, Zia, and Laguna. The basketry known from all of these groups has nothing in common with Fremont beyond the fact that all are manufactured via some kind of coiling (Tanner 1983). Moreover, it is clear that the ethnographic basketry of the above-listed culture groups, especially the Hopi and the Zuni, derive from ancient Anasazi roots or a mixed Anasazi/Mogollon substrate (Adovasio and Andrews 1985; Teiwes 1996).

The foregoing underscores the fact that no textile complex boundary is more sharply defined that the one separating the Fremont and the Anasazi. The sharpness of this boundary, incidentally, also holds for the descendants of both groups. The boundary to the west in the general direction of the Lovelock culture heartland is almost equally well defined with virtually no sharing of technology whatsoever (Grosscup 1960; Heizer and Napton 1970; Hester 1973).

As noted earlier, the situation to the north of the traditionally defined Fremont area is somewhat more ambiguous because early basketry is generally lacking, rare, or poorly dated. A few specimens of decidedly Fremont affinities have been recovered from late contexts in both the Idaho Plateau and Wyoming (Adovasio 1970, 1974; Adovasio et al. 1982). Butler (1981, 1983,

1986) suggests that these pieces demonstrate the existence of a Fremont-Shoshoni continuum and that, in effect, the basketry industry of at least some of the northern Fremont was directly ancestral to the basketry of the Numic speakers. Again, contrary to Butler's observations, connections between Fremont and Numic basketry industries are, in a word, nil.

As detailed at length in Adovasio and Pedler (1994:119-121), the ethnographic basketry of Great Basin populations, whether Numic or non-Numic-speaking (e.g., Washo), has been the subject of intense scholarly interest since the end of the last century (cf. Barret 1917; Fowler and Matley 1979; Kelly 1932, 1964; Lowie 1909, 1924; Mason 1885; Merriam 1902-1942; Park 1933-1940; Steward 1934, 1941, 1943; Stewart 1941, 1942; Zigmond 1978). While there is no volume-length compendium of ethnographic or prehistoric Numic basketry technology per se, Fowler and Dawson (1986) provide an excellent synopsis of the historic Numic basketry industries. Careful perusal of this highly detailed work and the others cited above clearly indicates that certain basketry types (*sensu stricto*), forms (i.e., configurations), and in some cases decorative embellishments are distinctively Numic and, moreover, form a coherent and ethnically sensitive body of material culture.

With the exception of the non-Numic Washo and perhaps the Ute, the basketry technology of the ethnographic Great Basin is dominated by twining, especially during the early Historic period, when coiling was either rare or nonexistent (Fowler and Dawson 1986). A minimum of 14 twined forms were produced by the Numic speakers of the Great Basin and immediately contiguous areas. Several of these forms occur in all or most of the basketry inventories of the various Numic groups (cf. Fowler and Dawson 1986:Table 2). These pan-Numic or, if we may be permitted the excess, pene-pan-Numic items include: open-twined burden baskets, twined cradles, open-twined winnowing/parching trays (except among the Ute), paddle-shaped twined seed beaters (except among the Plateau Bannock), close-twined water bottles (except among the Ute), and close-twined hats (except among the California-influenced Kawaiisu). Of these, the ubiquitousness of the twined paddle-shaped seed beater and deep triangular winnowing/parching tray are, as is correctly stressed by Bettinger and Baumhoff (1982:496-497), the perishable hallmarks of the ethnographic Numic speakers.

Both simple and diagonal (twill) twining are represented in the Numic perishable inventory, usually though not exclusively with S-twisted weft rows. Though there is some variation from group to group in terms of starts, over-and-under selvages, and specific vessel configuration, the twined products of the ethnographic Numic speakers are remarkably similar and "nearly uniform in forms, weaves, functions, and nomenclature" (Fowler and Dawson 1986:728).

More variation exists among ethnographic Numic coiling but, as has been noted by several researchers (Adovasio 1986a; Andrews et al. 1986; Fowler and Dawson 1986; Fowler and Matley 1979), Numic coiled vessels are unique in their attributes and forms. Fowler and Dawson (1986: Table 2) distinguish a minimum of 10 basic Numic coiling forms, none of which occur among all Numic speaking populations. Senior author Adovasio ([with Andrews] 1986b) has subdivided many of these basic forms into variants based on shape and finishing attributes, but again, none of these variants are as widely distributed as the major twining forms.

Of the major coiling forms, the most common are winnowing/parching trays, boiling baskets, and eating bowls with a relatively circumscribed range of variation. Numic coiling includes one rod (whole or halved), stacked (usually two rod), and bunched (three rod, with rods of equal size or the apex rod of a smaller diameter) foundation types as its most common components, with rare examples of other types such as three or four rod stacked and bundle foundations. Stitches are usually noninterlocking, although some work surfaces with intentionally split stitches do occur. Work surfaces are normally convex, and right-to-left work direction predominates. Method of starting is usually continuous coil and rims are of the self type. Splice types are simple but distinctive, with moving ends often bound under the apex rod in bunched and stacked foundation types and fag ends concealed and carried in the coil. Though not nearly so standardized as their twining, Numic coiling is individually and collectively distinctive.

While examples of ethnographic twining and/or coiling are known from all geographic areas and subareas historically occupied by Numic speaking groups, archaeological examples of basketry wares which may be confidently attributed to Numic speakers have a much more circumscribed distribution because of preservation factors. Bettinger and Baumhoff (1982:496-497) and Adovasio ([with Andrews] 1986b:50-86) summarize the occurrence of certain twined and coiled forms that are almost certainly of prehistoric Numic ascription. Twined seed beaters virtually identical to their ethnographic counterparts are reported from archaeological contexts in Death Valley (Wallace and Taylor 1955), the Mojave Desert (Campbell 1931), and the Coso Range (Panlaqui 1974), while triangular twined winnowing/parching trays are known from Colville Rock Shelter in the Death Valley area (Baumhoff 1953:193-194; Meighan 1953:177-178). More recently, a spectacular example of a triangular winnowing tray was recovered from the uppermost portal deposits at Danger Cave, Utah (Andrews and Adovasio 1988). In all cases, these specimens occur in post-A.D. 1000 contexts. Between these two geographic extremes, archaeological basketry specimens of clear Numic affinity are known from Dirty Shame Rockshelter on the extreme northern edge of the Great Basin (Adovasio et al. 1986) and a series of sites in the Monitor Valley, central Nevada (Thomas 1979, 1983).

Dirty Shame Rockshelter is located on the Owyhee Upland in extreme southeastern Oregon. The site lies on the northern end of the ethnographic range of the Numic speakers and contains archaeological materials spanning the period from ca. 7500 B.C. to A.D. 1600 (Adovasio et al. 1977; Aikens, Cole, and Stuckenrath 1977; Andrews et al. 1986; Grayson 1977; Hall 1977; Hanes 1977; Kittleman 1977). The excavations at Dirty Shame Rockshelter produced in excess of 3,000 vegetal artifacts that have been allocated to five classes including basketry, cordage, sandals, quids, and miscellaneous fiber perishables. Although perishables from all five classes were recovered from virtually all of the site's six stratigraphic zones, we are concerned here principally with a synopsis of the materials from Zone I, which produced dates ranging from A.D. 545 ± 70 to A.D. 1585 ± 80.

The perishable assemblage from Zone I includes representatives of four of the site's 12 cordage types and all but two of the site's 10 basketry types (see Andrews et al. [1986] for complete details.) These specifically include cordage Type I: One ply, Z-spun (3 specimens); Type II: One ply, S-spun (7 specimens); Type III: Two ply, S-spun, Z-twist (27 specimens); and Type IV: Two ply, Z-spun, S-twist (19 specimens). The basketry assemblage includes Type I: Close simple twining, Z-twist weft (2 specimens); Type II: Open simple twining, Z-twist weft (2 specimens); Type III: Close diagonal twining, Z-twist weft (2 specimens); Type IV: Open diagonal twining, Z-twist weft (4 specimens); Type VI: Close diagonal twining, S-twist weft (1 specimen); Type VIII: Close coiling, whole rod foundation, interlocking stitch (1 specimen); Type IX: Close coiling, two rod and welt bunched foundation, interlocking stitch (1 specimen); and Type X: Close coiling, half rod foundation, interlocking stitch (1 specimen). Interestingly, none of the site's major sandal types is represented in Zone I. A variety of miscellaneous perishables are also represented in Zone I, but space precludes any discussion of them here.

Although all four of the Zone I cordage types are represented virtually throughout the Dirty Shame sequence, this is *not* the case with the basketry types. Basketry Types I, II, III, IV, and VI do occur earlier in the occupational sequence, but the three coiling types (Types VIII-X) do not.

We believe that the coiling types are Numic in ascription and signal the arrival of the Northern Numic speakers (probably in the "person" of the Northern Paiute) to the study area. Comparative analysis of the meager Dirty Shame coiling assemblage indicates that two of the coiling foundations, whole (Type VIII) and half rod (Type X), though usually with non-interlocking stitches in contrast to the prehistoric types, are reliably reported for various populations of northern Numic speakers (see Kelly 1932; Steward 1934, 1941:241, 1943:372; Stewart 1941, 1942; Wheat 1967). Furthermore, other details of construction of the Dirty Shame coiling such as work direction, preparation of raw materials, and execution of splices conform and correspond to the same attributes in ethnographic Northern Paiute coiling. Although it is remotely possible that the constellation of coiling attributes represented in the Zone I Dirty Shame sample could be the product of some other linguistic and/or ethnic entity, we reject this unlikely possibility in the total absence of any supporting data for it.

Herein, it should be stressed that all of the other Zone I basketry types and most of their minor attributes of construction also are reported for one or another Northern Numic group, as are the four Zone I cordage types. We do not believe, however, that the non-coiling basketry evidence is conclusive proof of Northern Numic (specifically, Northern Paiute) affinities, as the assemblage is very small and fragmentary. It is noteworthy that the same basket wall types also are represented earlier in the sequence as well as in various non-Numic ethnographic populations such as the historic Klamath and Modoc. Unfortunately, it is not possible to specify whether any of the Zone I twining derives from forms typical of the Numic speakers. Significantly, all other Northern Great Basin coiling is confined to the post A.D. 800-900 period and is very similar in most respects to that reported for Dirty Shame Rockshelter.

For example, coiling in small quantities is known for this time period from the upper levels of Catlow Cave No. 1, the upper one-third of Roaring Springs Cave, from Tule Lake and Massacre caves, and possibly from Warner and the Guano Valley caves (Adovasio et al. 1976, 1977; Andrews et al. 1986; Cressman 1942). The general resemblance of coiling specimens from these sites to ethnographic Numic wares is convincing, and the former can be presumed to be direct ancestors of the latter (Adovasio 1974, 1986; Adovasio et al. 1976; Rozaire 1969). This, in turn, suggests that *all* of the late prehistoric Northern Great Basin coiling may be the result of the spread of the Northern Numic speakers.

Gatecliff Shelter and the smaller closed sites, Jeans Springs and Triple T Shelter, are located in the Monitor Valley of central Nevada just east of the small town of Austin (Thomas 1979, 1983). The perishable assemblage from these sites is described and discussed in Adovasio and Andrews (1983) from which the following comments are distilled.

The perishable assemblage from the Monitor Valley includes basketry, cordage, knotted fiber, and a variety of miscellaneous fiber constructions. The entire assemblage is ascribable to the period A.D. 1000-1400 (or later) and specifically subsumes four types of twining including Type I: Close simple twining, S-twist weft; Type II: Close diagonal twining, S-twist weft; Type III: Open and close diagonal twining, S-twist weft; and Type IV: Close sample and diagonal twining, S-twist weft. There is one type of coiling, Type V: Close coiling, three rod bunched foundation, non-interlocking stitch, and two types of cordage including Type I: One ply, Z-spun; and Type II: Two ply, Z-spun, S-twist. The miscellaneous fiber constructions include such diverse items as modified wood bound with cordage, interlaced twigs, wrapped grass bundles, and so on.

Despite the small size of the extant perishable assemblage recovered from the Monitor Valley, it is clear that the types and forms represented, as well as the raw materials and their methods of preparation, correspond on a point-by-point basis to the perishables produced in the ethnographic period by one or another group of Central Numic speakers (Adovasio and Andrews 1983). Furthermore, as is noted below, links in the perishable industry to other non-Numic ethnographic groups are nil. Neither are there any connections between the Monitor Valley basketry assemblage and contemporary or nearly contemporary Fremont assemblages to the east. Taken as a unit, the Monitor Valley perishables generally, and the basketry in particular, suggest that the Central Numic speakers had arrived in that portion of the Great Basin by A.D. 1000 or slightly later.

Within the Fremont realm, prehistoric Numic basketry is virtually non-existent until well after the Fremont collapse, but the earliest ethnographic specimens from this area bear absolutely no relationship to the basketry industry of the their Fremont predecessors. Put most simply, there is as great a technological discontinuity between the chronologically successive basketry industries of the Fremont and the Numic speakers as there is between the contemporaneous basketry industries of the Fremont, Anasazi, and Lovelock cultures. It should be stressed that this observation extends to the basketry industries of literally all of the ethnographic Numic speakers, both across and beyond the Great Basin, including the Paiute of Utah, the Kaibab Band of Paiutes, the Northwestern Band of Shoshone, the Skull Valley Band of Goshute, and the Northern, Southern, and Ute Mountain Utes, to name but a few of the extant groups.

CONCLUSIONS

Whereas the extant architecture, settlement patterns, subsistence practices, or durable artifact inventories of the Fremont do not lend themselves individually or collectively to the recognition or definition of a Fremont culture distinctive from and basically unrelated to contemporary groups like the Anasazi or Lovelock culture, this is *not* the case with the basketry data that is *of, in*, and *by* itself conclusive. As noted previously (Adovasio 1970a, 1970b, 1974, 1975, 1986b), and repeated ad nauseam to the present work, Fremont basketry, though it exhibits some internal variation, geographically and temporally, constitutes as a unit the most distinctive variety of prehistoric basketry in the entire Great Basin with the possible exception of the signature artifact of the Lovelock culture, Lovelock wickerware.

We reiterate with a growing sense of futility that because it is a long established fact (see Adovasio 1977; Adovasio and Gunn 1977; Adovasio with Andrews 1986b; Adovasio and Pedler 1994; Baumhoff 1957; Mason 1904; Rozaire 1969; Weltfish 1932;) that basketry is probably the most sensitive indicator of prehistoric or ethnographic cultural integrity in the artifactual record, and further, because *no* two unrelated prehistoric or ethnographic cultures *ever* produced exactly or even nearly the same kinds of basketry with the same range of construction attributes, the definition of a distinctive Fremont basketry industry is at once a recognition and delineation of a Fremont cultural entity.

More specifically, the basketry of the Fremont is as unique and taxonomically distinct as the basketry of the Anasazi, Hohokam, or Mogollon; hence it warrants in our jaded archaic, culture-historical perspective, the same level of taxonomic distinction as those entities. If Anasazi, Hohokam, or Mogollon are valid prehistoric cultures, so is Fremont.

Even though some, notably Madsen (personal communication, 2001) and Madsen and Simms (1998), think it strains credulity to define a prehistoric culture on the basis of a single industry or craft, namely basketry, this thesis is precisely our point. Simply stated, if it is accepted that Mono, Paiute, Panamint, Ute, Hupa, Havasupai, Yurok, Karok, or any other variety of ethnographic or prehistoric basketry can be taxonomically distinguished and recognized as the *ethnic signatures* of distinct cultural entities, so can Fremont basketry. In fact, given the demonstrated internal diversity within Fremont as regards other apparent aspects of its material culture, subsistence practices, and architecture, basketry presents itself as the best means to identify Fremont components.

As pointed out several times previously (e.g., Adovasio 1986b), the student of Fremont basketry is advised to consider the basketry of a well-known ethnographic, linguistic, and ethnic entity in the Southwest—the Apache. Despite the fact that great differences in most categories of material culture and subsistence processes are evident from band-to-band or tribe-to-tribe, particularly as one moves from west to east, the basketry of *any* or *all* of these groups is still recognizable as Apache (Douglass 1934; Ferg 1987; Tanner 1982, 1983). Additionally, though the basketry of one Apache speaking entity may differ significantly from another such entity (much more so than any of the Fremont varies from each other), a specialist cannot confuse Apache basketry with the basketry of any of its neighbors despite very close similarities not only in this craft but also many other aspects of material culture. Indeed, even in highly artificial situations such as the post-contact forced co-residence of the Yavapai on the San Carlos Apache reservation, the basketry of these two groups retained sufficient distinctive qualities to be readily separable (Tanner 1983:180).

While we are in no way suggesting any relationship whatsoever between Fremont and Apache or, indeed, Fremont and anyone else except for their direct Archaic forebears, we are stating that for comparative purposes, the Apache example is similar. By definition then, any band that makes Apache basketry is, per force, Apache, and any population that constructs Fremont basketry is Fremont, no matter what the disparity between their subsistence practices or, indeed, any other behaviors. To our collective knowledge, there exist no exceptions to this precept in the archaeological or ethnographic literature.

In retrospect, the salient features of Fremont basketry are:

1. Based on construction attributes, a Fremont basketry industry consisting of both twined and coiled wares can be distinguished in the archaeological record of the eastern Great Basin and the adjacent Colorado Plateau north of the Colorado and Virgin Rivers.

2. The Fremont basketry industry ranges in age from ca. A.D. 400-1250 within the Fremont range and slightly later to the north and northwest.

3. Fremont basketry is derivable *in toto* from locally antecedent Late Archaic industries.

4. Fremont basketry can be readily distinguished from the basketry of the Anasazi, Hohokam, Mogollon, or any penecontemporaneous Idaho or Great Basin foraging cultures and, hence, may be confidently used as an ethnic boundary signature of their makers.

5. Fremont basketry, specifically including the later Idaho and Wyoming specimens, exhibits no relationship whatsoever to the basketry of any of the Numic speakers or any other known ethnographic population. This explicitly includes the Numic-speaking Paiutes of Utah; the Kaibab Band of Paiutes; the Northwestern Band of Shoshone; the Skull Valley Band of Goshute; the Northern, Southwest, and Ute Mountain Utes; the Hopi; the Zuni; and the Pueblo tribes of Nambe, Zia, and Laguna.

COMMENTS ON "FREMONT BASKETRY" BY J.M. ADOVASIO, D.R. PEDLER, AND J.S. ILLINGWORTH

Catherine S. Fowler, Department of Anthropology, University of Nevada, Reno, NV 89557-0006

Adovasio, Pedler and Illingworth have assembled an impressive amount of data and argued persuasively from the perspective of basketry technology for: 1) a basic unity for the Fremont archaeological culture as presently defined; and 2) a lack of traceable relationships for that technology into any of the basketry technologies of the nine federally-recognized tribes (Skull Valley Band of Goshute Indians, the Hopi Tribe, Kaibab Band of Paiute Indians, Northwestern Band of the Shoshone Nation, Paiute Indian Tribe of Utah, Pueblo of Laguna, Pueblo of Nambe, Pueblo of Zia, Pueblo of Zuni, and the Ute Indian Tribe of the Uintah and Ouray Reservation) who are claiming Fremont affiliation under NAGPRA. In their introductory comments Coulam and Simms note the importance of establishing Fremont identity in setting up a potential claim situation, but also suggest that the question of affiliation will be decided on the "preponderance of the evidence." Other studies commissioned under NAGPRA in this case are examining data from chronometric evidence, geography, oral history, linguistics, folklore, and biology. Given that Adovasio, Pedler and Illingworth do an excellent job of establishing a "Fremont identity," and their evidence is equally compelling for rejecting specific affiliations, then it is obvious that the "preponderance of the evidence" for Fremont affiliations will not include evidence from basketry – at least not unless total reanalysis of the basketry technologies of the nine claimants turns up evidence that the authors have missed. Apparently there will not be an alternative of "no affiliation."

The distinct advantage imposed by the present study is that the senior author (Adovasio) has examined "virtually every piece" (p. 12) of basketry from sites with suggested Fremont affiliation – some 285 pieces of coiling and 57 pieces of twining. One pair of eyes and one brain have made a standard set of observations and judgments with a standardized methodology carefully developed through the years. This often is not the case with the basic analyses of other classes of material culture, such as lithics, ceramics, ground stone, and architecture, most of which in the Fremont case apparently have proved too variable to provide much of a definition.

Adovasio, Pedler and Illingworth make a compelling case that unlike some of these other technologies, basketry is based on a more complicated, standardized and culturally sensitive set of behaviors that is subject to a long period of tutelage. Thus it is potentially definitive, and more so than these other industries. While potters and flint knappers may feel that their technologies are equally complicated, there is little doubt that basketry requires many decisions and choices that make its mastery far from easy. The role of a tutor in training a pupil to choose quality materials, split, clean, store and prepare them, and then weave, splice and finish a specific shape is certainly vital. Skill in all aspects is individually perfected, but careful observation of a mentor can rarely be replaced by individual experimentation. I know of at least two cases where persons failed to properly develop skills in twining and ultimately abandoned it because they were right handed and attempted to learn the motions from a left handed weaver! Perhaps not everyone would have been so inhibited, but the role of a mentor can certainly be important. Probably for a very complicated set of reasons, basketry technology is thus an excellent mark of identity. But what is that identity ultimately? Is it cultural, sub-cultural, social, ethnic, linguistic, or what? That is the difficult issue that NAGPRA claims seem to pose.

The authors begin with an excellent review of the literature on Fremont, its history as a construct, and suggestions as to its ascent and demise. They then tackle the data on Fremont basketry, summarizing finds from some 18 sites from southern Nevada, Utah, central Idaho, eastern Colorado, and northern Wyoming. They do not attempt much in the way of chronometric differentiation of the sites and site areas, as apparently there is little that allows precise dating of these assemblages or the individual basketry specimens (no AMS ^{14}C dates). Rather, the block of Fremont sites, dating from roughly A.D. 400 AD to A.D. 1250, is treated as a unit for the purposes of analysis. They ultimately make observations on a few historical trends within the complex, as well as some regional differentiation.

The authors make an initial division of Fremont basketry into two classes: coiling and twining. It seems clear based on the numbers and distributions of pieces available for analysis that the Fremont basketry tradition is primarily a coiled one, with only a small amount of twining present (285 pieces of coiling from 18 sites versus 57 pieces of twining, most from one location). Based on what the authors feel is *the* primary criterion for definition, characteristics of the basket wall (foundation) (p. 9), Fremont coiling appears fairly uniform, with three common wall foundations characteristic, and one, close coiling half rod and bundle stacked, accounting for roughly 50 percent of the pieces. This type is present in 16 of the 18 sites analyzed. A second wall foundation that is likely to be technologically related to the first, close coiling half rod and welt stacked, accounts for another 11 percent and is found in seven sites. A third wall type, close coiling whole rod interlocking stitch, accounts for another 28 percent and is also found in seven sites. If a fourth wall type is added, close coiling three rod bunched non-interlocking stitch (five percent, three sites), more than 95 percent of all of the materials recovered is represented. Four additional wall foundation types are present in small numbers, and when combined account for roughly four percent of the total. While the amount of unity based on this criterion seems significant, is it really, and what might the variation mean?

An ethnographic analogy, such as one based on Elsasser's (1978:628-31) analysis of basketry construction in California, might be instructive here. Although I do not know whether Elsasser's analysis accounts for all types of baskets made in California, it is likely fairly thorough for at least the majority types. California basketry is very diverse, seemingly representing more kinds, shapes and techniques of construction than any comparable North American ethnographic area. The region is also culturally and linguistically diverse, and generally lacks pottery, which can and does often replace at least some uses of basketry. Thus, if anything, comparing California basketry with that of the Fremont area should maximize rather than minimize any diversity measures. The two areas are roughly comparable in size as well. However, it is hard to think of these comparisons as being anything but rough, as Fremont sites do not equal "tribes" in the California sense, and there are many environmental and historical issues that intervene. But the general exercise can be instructive.

Elsasser (1978:628-31) provides a table in which he summarizes the basketry characteristics for 23 cultural-ethnic divisions (language units, tribes, and tribelets) within California, representing no less than five linguistic stocks (Shipley 1978). Of the 22 for which basic data on the basket wall foundation in coiling are presented, he lists a total of nine types. Adovasio, Pedler and Illingworth list eight for Fremont. In California, there is no single wall foundation that includes the whole of the region. Only one, three rod bunched, is characteristic of more than half the groups, being found in 14 tribes. It crosses both tribal and major linguistic stock boundaries, and thus may well be an areal feature. In the Fremont area, the half rod and bundle foundation is present in all but two sites, thus providing more unity, but perhaps raising a question as to what that unity represents. Of California groups reporting more than one wall foundation type, only one has four (Sierra Miwok); three have three, six have two, and the remainder have one. The comparable figures for the Fremont area are: two sites with four, four sites with three, four sites with two, and the remainder with one. These Fremont numbers seem similar, if not a bit more diverse than those for California. Without more precise chronometric control, there is no way of knowing whether any or all of these Fremont types are contemporaneous or sequential. Adovasio, Pedler and Illingworth are dealing with some 850 years as opposed to roughly 150 for the California sample. It is also possible that some Fremont variants might be correlated with specific vessel forms and uses, as is certainly the case in California and elsewhere in ethnographic basketry. The authors tell us that the Fremont "produced a wide range of vessel forms, including very shallow circular trays, shallow to moderately deep globular bowls, and deep circular carrying baskets" (p. 15), but they do not correlate any of the wall types to any of these forms. Given that the sample includes many small fragments, this may not be possible, but it could be important.

In California, wall types other than three rod bunched, cross language and linguistic stock borders. Some appear to be geographically defined, such as the common use of bundle foundations in southern California, with two rod and splint found in adjacent, but linguistically distinct tribes in northern California, and three rod bunched in central California. Some foundations may also be correlated with certain linguistic stocks, but given the linguistic diversity across California, it is difficult to see this at work in the sample. However, none of the California foundation types is as odd or rare as half rod and bundle (and half rod and welt), which certainly must represent something unique about Fremont. Given the California data, I think the question remains open as to what that is.

The above comparison might seem a bit frivolous, given the different characteristics of the archaeological versus the ethnographic records, plus additional complications. What is intended here is only to remind us that based on this single criterion, if it were a situation comparable to California, we could well be dealing with the kind of ethnic and linguistic diversity that is represented there. Even with the unique wall Fremont wall construction type, there could still be multiple cultural, ethnic, and linguistic units represented. If either situation obtained, it would certainly defy any simple, single affiliation linkage, and could indeed take in all of the variety represented by the NAGPRA claimants. Further, given that the seemingly definitive wall construction technique does not persist into the ethnographic record, it is even less likely that the archaeological data presented here can be used in any positive way to resolve the competing claims.

Other basketry wall construction types found in Fremont materials persist to varying degrees in the baskets of several of the claimants as well as their neighbors. Tthey are, however, all common types with high frequencies. For example, close coiling three rod bunched is found among the Kaibab, borrowed from the Moapa, where it is much older, after 1900; close coiling, two rod and bundle bunched is a Navajo type. As I am sure the authors would concur, beyond these superficial similarities that doubtless have their own complicated histories, it is the remaining constellation of basketry features that ultimately become definitive of comparisons. These include the stitch type, starts, work direction, work surface, rim finish, splice type, decoration, form, wear and material, all of which they discuss. What is actually significant about any ethnographic basketry identification is ultimately that constellation, not a single criterion. When many features can be combined, the ethnic affinity of a single piece of basketry can be determined with certainty. The more features present, the better the identification, especially when it comes to overlapping criteria, such as can be seen in the small amount of California data presented here. With archaeological specimens, rarely is this total constellation present in any single piece. Thus, analysis becomes a matter of making separate observations on these various criteria and then trying to piece together a unified picture. In spite of their stress on wall type, it is from this total constellation that the authors present the strongest case for the distinctiveness of Fremont coiling, and the lack of specific affiliations with the claimants.

In sum, the data are rich and the arguments compelling, but the utility for NAGPRA purposes may be compromised by the nature of the archaeological record as well as the legal discourse. There are some things, including the nature of "Fremont identity" that seem to be beyond easy – and perhaps any – reach. But continued refinement and reworking of the data, as evidenced in this paper, always bring us a step closer.

COMMENTARY ON "FREMONT BASKETRY"

Joyce Herold, Denver Museum of Nature and Science, 2001 Colorado Blvd., Denver, CO 80205-5798

As a canastomaniac in the old style (born of Mesa Verde summers, crossed with Havasupai basket makers, and bred in Denver's American Indian art collections) how could I *not* be intrigued with a noted scholar's promise to use prehistoric basketry to "illuminate what Fremont may have been, where they came from, and perhaps where they went" (p. 9)?

J. M. Adovasio, D. R. Pedler, and J. S. Illingworth do not disappoint in "Fremont Basketry." They show us that analysis and interpretation of the Fremont basketry industry has much to contribute toward defining the origins and identity of Fremont Culture, while leaving in limbo its fate.

If "Fremont can be anything we want the Fremont to be" (Madsen and Simms 1998:277), the authors and I appear to agree on this: we want the Fremont basket to achieve the level of respect that it enjoyed in real life some thousand years ago. Would-be descendants and all students of human prehistory and history should have a chance to know this everyday object that embodies a disappeared world and its people.

OVERVIEW OF FREMONT BASKETRY

Baskets were crucial in the lives of American Indian ancestral cultures in the Great Basin and Colorado Plateau over an incredible span of some 10,000 years. From the vegetation around them, women (in all probability) of Archaic times coiled, twined, and plaited the baskets that contained water and foods from hunting and gathering activities. Basket making knowledge and techniques passed from generation to generation, and provided basic, adaptable tools for succeeding peoples, called by archaeologists the Fremont, from about A.D. 400 to 1250. The more or less sedentary horticultural existence enjoyed by Fremont people in scattered farmsteads and small villages of prehistoric Utah and the fringes of Colorado, Wyoming, Idaho, and Nevada may have represented an "oddity" or "aberration" (Marwitt 1986:161) in terms of maize subsistence economy and settlement. Nevertheless, foraging continued during the Fremont period, and the twined and coiled basketry long used for fruit, seed, and root gathering proved useful with little change for the needs of maize gardening over 850 years. The Fremont phenomena ceased near the end of the thirteenth century and different cultures of the Numic speakers came in, with different basketmaking ways.

As archaeologists have excavated and interpreted Fremont remains since 1931, fragile remainders have accumulated to evidence the once flourishing, but non-durable, basketry industry. Examination of every available fragment of basketry, including 285 specimens found at 18 basket-bearing Fremont sites in all the variant areas, has revealed to the authors of this article that the basketry has a unique consistency of pattern compared with other Fremont traits. Fremont basket composition, characteristics, uses, and production mechanics offer the possibility of new interpretations of basketry as an ethnic signature of Fremont cultures.

Today's claimants to this heritage should take pride in this revealed story of ordinary materials as extraordinary contributions to Western Interior native life. They will, however, find little cheer in the article's finding that Fremont basketry disappeared as a whole technology, probably without a trace, during the last 700 years. This pinpointing of a characteristic, but *extinct,* craft-art seems to offer only negative evidence for the NAGPRA-mandated tracing of cultural affiliations.

COMMENTARY ON GENERAL ASPECTS

I approach the subject of prehistoric peoples and their basketry from the insider-outsider position of a specialist in historic North American Indian basketry with roots in armchair Southwestern archaeology (Herold 1961) and experience wearing an ethnology-archaeology curatorial hat. From all those perspectives, I am in many respects at home with the authors' approaches and findings.

First, the authors' cultural-historical approach is certainly the appropriate lens to use in looking for identity shared between material culture and American Indian groups, whether prehistoric, historic, or present day. The analysis largely succeeds in its pointed attempts to show how technological principles, the basic ways for learning, making, and classifying baskets, transcend any culture and any period. These principles allow basket makers to utilize local natural materials in learned construction and design techniques that achieve their envisioned fabrics and containers. In context with their particular environment and cultural history, the weavers over time develop a characteristic basketry way which is distinguished from other bodies of basketry, even as small changes, introductions, and abandonments may modify the handed-down basketry way.

"Making basket" is what contemporary weavers among the Yurok and Karok people of northwestern California call it, applying this term to the whole familiar process of seasonal gathering and processing of materials, planning, and weaving (Israel 1996:5). Over 70 years ago the grandmothers and great-grandmothers of these weavers also consciously "made basket" according to the same rules, which had been passed down to them in turn (O'Neale 1932).

For over a hundred years basketry scholars, collectors, and the weavers themselves have pursued and found identifying features of various culturally distinctive basketry types. On the one hand, researchers pull the textiles apart, sometimes literally, to understand the components and mechanics, and, on the other hand, they scrutinize baskets as wholes, as complex integrations of attributes combined to make functional, aesthetic artifacts. Because they deal mostly with fragments of non-durables, archaeological basketry researchers emphasize the "pulling apart" kind of study, at which this article and the numerous previous publications of the senior author excel.

COMMENTARY ON THE ANALYSIS

The authors meticulously build their case from analysis of every available fragment of basketry: 285 specimens from 18 Fremont sites. When conducting ethnographic study of a variety of artifacts, I also start with individual artifact analysis. In basket study, the subclass of basket weave (that is, coiling, twining, or plaiting) is established first. Then one determines the components and/or structure (the technique) of each attribute (the type of foundation, stitch, work direction, form, decoration, and material). Basket wall technique has no rival as the most salient attribute, no matter the age, origin, or condition of the basketry.

Clarification of Fremont coiled basket wall terminology is needed for the major technique "half rod and bundle stacked" found in Fremont basketry, used in 50.5 percent of the specimens. In *Basketry Technology,* Adovasio (1977) sets the terminology by including "half rod and bundle" under common stacked foundations. He explains under the heading "Rod" that a rod "may consist of a stick, twig or reed, whether complete (whole) or split lengthwise (halved) with or without cortex," and urges examination of rods "to ascertain whether they are whole or halved" (Adovasio 1977:60, 61, 71). Fremont literature previous to Adovasio, Pedler, and Illingworth's present article often did not make the "whole" or "halved" rod distinction; referring only to "one-rod-and-bundle" in discussing the most characteristic Fremont basketry artifacts (e.g., Adovasio 1986a:202; Marwitt 1986:163). Are the terms identical? I fully appreciate the puzzling option facing classifiers, for actual Archaic or Fremont foundations (the few that I have inspected) appear to consist of a gradation of both fully rounded, whole sticks, and lengthwise split and smoothed half-sticks. A review of this variation, the history and current thinking about its classification, and closure on agreed (new?) terminology should be a priority for future publication (or, for recapitulation here if I have missed it).

A second attribute needing brief additional detail is "Rim." Is the Self Rim normally tapered at the end, as shown in Table 3? Also, more emphasis on forms would be helpful, possibly through cross-correlation of coiling and twining types with forms.

Worthy of special comment is the attribute "decorative patterns and mechanics of decoration." The absence of decoration on virtually all Fremont coiling and twining stands out. Although the simple presentation now can hardly go further than broad description of the two known decorated specimens, Fremont researchers may need to lay the ground for classification of layout, motifs, style, color, and ornamental stitches, in order to explore significant comparisons with the more decorative types of historic basketry and Southwestern prehistoric basketry.

After specimen by specimen attribute analysis, the characterization of Fremont (or any basketry) proceeds by grouping objects with similar attributes into a hierarchy, with wall technique usually primary. A basket making group may produce one or more wall techniques in combination with one or more types of basket start, stitches, rim, and so on. Adovasio, Pedler and Illingworth usefully refer to such a composite as "the constellation of basket wall types as well as other construction attributes habitually used by any one group" (p. 12). I can support their strong voice for viewing this constellation as learned behavior of great stability, yet possible change.

The authors are unfortunately reluctant to characterize the resultant whole baskets that Fremont women produced, which make up the Fremont constellation. The conservative nature of archaeology, arising perhaps from the fact that most archaeological specimens are small fragments, tends to reserve whole pictures for future, more complete evidence. I feel, nevertheless, that in the face of much evidence and pressing needs for communication with non-specialists and "descendants" contending for repatriations, the time has come for more direct communication of the objects in focus. We must know more than ascriptions such as "typical Fremont coiling" or "Fremont coiling" or "preferred coiling," and its definition as "close coiling, half rod and bundle stacked non-interlocking stitch." For example, I have had the temerity to characterize the most prevalent ("typical") Fremont basket, as follows:

> A shallow circular tray used for parching plant foods, coiled of a stacked foundation composed of a half rod (stick) of willow (*Salix*) surmounted by a bundle of plant fibers (*Apocynum* or *Asclepias*), sewn right to left from a normal coil start with non-interlocking stitches, with both ends of sewing splints bound under or fag ends clipped short, the finished (work) surface on the concave side toward the weaver, ending in tapered stitches of a simple rim stitched like the wall, and entirely un-decorated.

To this might be added information such as:

> Other coiled baskets for general storage, including water storage, and transportation, take the forms of shallow to moderately deep globular bowls and deep circular carrying baskets.

Twining should be summarized in a similar fashion. Finally, good illustrations of real or, in the case of most Fremont baskets, hypothesized reconstructions of whole baskets could be attempted to illustrate the main coiling and twining types.

COMMENTARY ON THE ARCHAEOLOGICAL ANALYSIS

I must leave to Fremont specialists the vital work of weighing the article's findings on the basketry industry's distribution, chronology, and internal and external correlations. Archaeologists need the focus on basketry brought by the article, I feel, and should join with Adovasio and his colleagues in directed assessment of Fremont basketry. *Is* it the most universally consistent, and indeed unique, feature of the Fremont phenomenon? *Does* basketry elucidate or delimit Fremont as well as, less than, or better than other material culture traits, such as architectural features, settlement or land use patterns, or, the most recent synthetic direction, behaviors? In any case, the field of Fremont research should, at last, be stimulated to overcome the evident neglect of accumulations of basketry data by incorporating basketry more systematically into theory and interpretation.

The latter perception/plea arises from my outsider-basketry researcher experience in preparing commentary. I sought as background a succinct professional summary that placed recent views of basketry within the "Big Picture" of Fremont archaeology. In common with other specialists, anthropologists, and the general public, I turned for state-of-the-art synthesis to the admirable national compendium *Handbook of North American Indians*. As we all acknowledge, a single article on the Fremont can no more exhaustively survey the Fremont than a Great Basin volume can cover Great Basin American Indian archaeology, ethnology and history. But was I wrong to expect more than a single sentence on basketry in a chapter devoted to Fremont cultures? Admittedly, what I found *was* a grand fanfare introduction to the subject, "Characteristic Fremont elements such as hide moccasins, one-rod-and-bundle basketry, incised stone tablets, and anthropomorphic figurines, along with less diagnostic artifacts commonly found in Fremont contexts, all appear in pre-Fremont (Archaic) contexts well before A.D. 400" (Marwitt 1986:163). While the chapter continued with horticulture and wild food resources presented as variable foundations of subsistence in Fremont regions, there was no further mention of how basketry must have been, and in fact, was essential to people living by either of their economies. Neither did I find references specific to basketry such as the report on Hogup Cave basketry and a Fremont basketry synthesis, that had been published many years before by Adovasio (1970b, 1975). Admittedly, other chapters in the Great Basin volume of the *Handbook of North American Indians* by Adovasio (1986a) and Fowler and Dawson (1986) did provide some background and historical perspective.

In trying to understand the apparent continuing neglect of basketry in Fremont theory and interpretation, if not in excavation and artifact analysis, I wonder if the non-durability of basketry is a major deterrent to its scientific recognition, for the evidence it offers is always incomplete. To liberally paraphrase Morris (on perishable objects from La Plata District Anasazi sites, which included only fragments of two baskets), "There can be no doubt that burned [Fremont] dwellings were as full of baskets ... as they were of pottery" (Morris 1939:117). What proportion of excavated Fremont sites yield basketry to date? Hard-won, usually fragmentary basketry must be pressed as far as it can go, which is perhaps further than some archaeologists believe it justifiably *can* go.

Again, I applaud the authors' synthesis as a platform for "going beyond." I join their plea for greater prominence of basketry's significant role in Fremont culture history. This could be a field that breaks through the common "women's work" status of basket making —somewhere in the buzzing backgrounds of life—and brings the basket maker and her art front and center.

ETHNOGRAPHIC COMMENTARY

The authors show that, while the theoretical "prototype" basket maker would be free environmentally and culturally to produce hundreds of variants of mats or three-dimensional textiles, the real basket makers of the Fremont worked in highly standardized or culturally prescribed materials and techniques. Like the Fremont women, historic basket-making populations have determined, largely for themselves, the ranges of choice. They have selected goals of basket form and function within the contexts of geography, society, economy, religion, trade, and many cultural-historical variables. They have integrated variations in materials and construction but have, over many years, largely systematized and simplified weaver choices. In her constant labor of providing containers and equipment for horticulture and foraging, an American Indian weaver deliberated little about which plant to cut and when, the way to prepare a foundation of such a flexibility and strength, the shape and size for practical carrying of any fruit or seed, and all the attributes she would produce in basket after basket.

An interview with an unidentified Great Basin basket maker *circa* 1995 documents the ongoing unconscious learning process:

> I ask her how a person could learn to make baskets. This is an inconceivable question to her, and to many of the other weavers. 'Nobody teach me how,' she says. 'I just knew by looking, and then trying it.' [A] young friend and helper, adds, 'It's just *in* her.' This is what makes a strong family tradition, the people say. This is why baskets are still being made (Fulkerson and Curtis 1995:45, 21).

Like the basket makers, whether Fremont women or others at earlier or later times, scholars have been able to rely on learned and patterned behavior: they bypass thousands of possible basket making ways to focus on a discrete number of materials, manipulations, and designs that are habitually used by any ethnic group. These attributes give the vital signs of a basket. This article tells us what is common knowledge in the ethnographic and art historic spheres: that traditions of basketry can be distinguished. Furthermore, they are linked in a technological and conceptual persistence over time and space. "This is the way to make basket among my people: it has worked, it will work." If you are a Pomo weaver, you choose from a range of complexity that dictates certain weaves suitable only for set forms and functions. If you live a few valleys north among the Yurok and Karok, the same twining serves for ceremonial hats as well as mush baskets. Both cultures — and many others in all parts of America — maintain clear basket making traditions practiced into the present. Habitual behaviors continue to mold basket making, for innovators are frequently those most experienced in the classics as well as those who consciously break away learning from elders, or have none left to watch.

To address modern tribe comparisons, the authors draw numerous valid lines and boxes around groups with shared constellations of basketry and contrast them with other easily distinguished traditions, such as Kawaiisu *vis a vis* Kwakiutl and Hopi *vis a vis* Hupa, all at far ends of geography as well as across the spectrum of basket making. These are valid, long-recognized contrasts in the broad picture of North American Indian basketry.

The article, however, in some cases draws the lines and boxes incorrectly. As comparisons with the Fremont cultures, several Western tribes are put forth as examples of groups whose basketry can be "taxonomically distinguished and recognized as the *ethnic signatures* of distinct cultural entities." (p. 25) While Mono, Paiute, Panamint, Ute, and Havasupai qualify, I suggest that Hupa, Yurok and Karok should stand not as separate groups but as one composite group, which qualifies as ethnic signature basketry. Investigators of these three northwest California river tribes since 1932 have agreed that their material culture is identical even though museum and private collections have materials aplenty labeled as Hupa or Yurok or Karok. O'Neale, the principal researcher, was so hopeful of validating rumored distinctions within the basketry that she tested tribal weavers on whether they had intuitive feelings for their own baskets (*à la* the recent Great Basin basket maker quoted above), or recognized personal markers, or idiosyncrasies. She concluded, "The fact is that they can tell a very few of their own baskets by design, none by workmanship. A predominant use of certain locally available materials and minor departures from the typical of a familiar region are clues, not determinatives" (O'Neale 1932:9). In such cases, documentation of exact origins is the only reliable classifier. Absent reliable collection data, some curators classify all baskets from this area as "Hupa Group" (Moser 1989: 34-6). Therefore, the corrected listing of Hupa-Yurok-Karok will teach the valuable lesson of joint sharing of ethnic signature baskets.

Drawing lines of connection between basket making groups and constellations of basketry can be particularly difficult when history has disrupted the learning process and pushed people apart and together. For example, basketry ethnic signatures formed and reformed during the Apache's varied experiences following their A.D. 1200 to 1500 arrival in the Southwest with the other Athapaskan people, the Navajos.

Based on the excellent synthesis of Apache basketry types by Whiteford (1988:45-65,78-92) and my specialization in Jicarilla Apache materials (e.g., Herold 1999), the authors should carefully reconsider their interpretation of Apache basketry. In summary,

> The baskets of the Apache groups differed from each other in the ways they were made, their shapes and their decorative designs, and none of them were like the baskets made by their cogenitors, the Navajos. [T]here is no evidence to support any conjecture that the Navajos and Apaches carried a basketmaking tradition with them into the Southwest. The diversity of techniques, styles, and designs among Southern Athapaskans is best explained by influences from neighboring tribes in the Southwest (Whiteford 1988:47).

Without going into detail, there are gulfs between the technology and design concepts of the Mescalero Apache semi-flexible natural yucca coiling in wide stacked foundation, the Jicarilla Apache sturdy three-rod or five-rod, aniline-dyed sumac and willow coiling, and the Western Apache fine, three-rod, complex patterned, black-decorated coiling. Wider sharing of the twining tradition can certainly be shown, however.

Furthermore, historic encounters between Apaches and non-related Southwesterners have left basketry that is not, in fact, readily separable. My research shows that Jemez Pueblo and Jicarilla Apache coiling shares identity in complex ways. Although some design characteristics are differentiated, San Carlos and Yavapai basketry cannot be distinguished by a single, reliable key. It requires specific information about maker tribal affiliations, and even this is complicated by mixed descent and shared designs (Whiteford 1988:96-98).

Finally, I point out that the Southern Paiutes have been even more important than Utes in providing the Navajos with ceremonial baskets, but they are not as readily differentiated from Ute examples as from the original Navajo baskets. Erosion of ceremonial restrictions and the learning of basket making today will affect even more this complex relationship between previously clear basketry constellations.

REPLY TO COULAM & SIMMS, FOWLER, AND HEROLD

J. M. Adovasio, D. R. Pedler, and J. S. Illingworth,
Mercyhurst Archaeological Institute, 501 East 38th Street, Erie, PA 16546

We are grateful for the thoughtful and useful comments provided by our fellow contributors to this issue of *Utah Archaeology*. Because there appears to be no fundamental difference in any of the expressed opinions with our central thesis, our response is brief.

It is evident that we all concur that Fremont is, or will soon be recognized as, an identifiable entity, both in culture-historical and in NAGPRA terms. We also apparently concur that at least one element in the establishment of a Fremont identity is its signature basketry tradition which, as Fowler notes, is primarily—but not exclusively—a coiling tradition. Both Fowler and Herold agree that the uniqueness of Fremont basketry is clearly a function of the innate complexity of the basket weaving process, the intimate relationship between mentor and student, and the regular expression of a constellation of ethnically distinctive attributes directly occasioned by cultural circumscription of the universe of choices available to individual basketmakers. Put another way, it seems that both Fowler and Herold believe—as we do—that baskets are not simply complex, multifunctional items but are also social documents (Adovasio and Illingworth 2002) which concretize Fremont agency in a perishable medium (Adovasio 2000).

In this regard, Herold rightfully asks why basketry, given its potency in identifying cultural entities, has been largely ignored in past assessments of the Fremont phenomenon. To this point we can only answer that basketry's absence from discussions of Fremont has not resulted from a lack of mention. A number of works spanning 30 years (Adovasio 1971, 1972, 1974, 1975, 1980b, 1986a, 1986b; Adovasio and Pedler 1999; Adovasio et al. 1982) have repeatedly attempted to stress the potential role of basketry in elucidating the Fremont identity issue, meeting only occasional, limited success or qualified concurrence (Janetski 1994; Jones 1994; Rhode and Madsen 1994).

We suggest two reasons for this lacuna. First and foremost is the tyranny of preservation noted by Herold. Fremont baskets are relatively scarce, especially when compared to the thousands of recovered Fremont pot sherds and tens of thousands of Fremont lithic artifacts. Second, at almost all reaches of archaeological inquiry there is a persistent failure to recognize the critical importance of perishable technology in the lives of prehistoric or even recent hunter-gatherer populations. Part of this bias relates to preservation, but it mainly owes to a basic unfamiliarity with roles that fiber, wood, leather, and other non-lithic/non-ceramic based industries played in the daily lives of ancient populations. This is scarcely a novel or new observation. Indeed, more than 50 years ago W. W. Taylor solidly demonstrated that where preservation permits, items made of fiber and wood constitute the overwhelming bulk of any excavated archaeological assemblage and that those items played pivotal roles in any group's subsistence activities (Taylor 1948, 1966). For whatever reason, the field has largely ignored these insights. We hope that the growing number of publications concerning prehistoric basketry, cordage, cordage byproducts, sandals, and other non-durable artifacts is an indication that the field at large is paying more attention to the role of these items in prehistoric societies. The creation of a Society for American Archaeology fiber perishable interest group (http://www.saa.org/Membership/i-fiber.html) is also a helpful step in this direction.

Although they agree with our basic premise that Fremont and, by extrapolation, other prehistoric cultural entities are ultimately recognizable as "groups" by their basketry, Herold and Fowler provide valuable insights into and pose useful questions about our interpretation of Fremont basketry. Fowler notes that ethnographic coiled basket wall types in California transcend ethnic and linguistic borders and therefore clearly characterize several different groups, which is indeed true.

However, Fowler goes on to point out that the majority of Fremont wall types (i.e., half or whole rod and bundle stacked or half rod and welt stacked) have much more circumscribed distributions, at least in comparison to their prehistoric neighbors. Nonetheless, we agree with Fowler's subsequent observation that it is not basket wall types per se, but rather, the entire constellation of related attributes (for example, method of starting, rim mechanics, splices, stitch and foundation preparation, and work direction), that distinguishes Fremont basketry.

Both Fowler and Herold offer potential refinements of our characterization and present understanding of the Fremont basketry industry. Herold stresses the need to clarify our terminology for and classification of Fremont basket wall technology, particularly in terms of whole and halved rods and the presence of a possible gradation between them. She also inquires about our characterization of rim finishes (tapered self versus non-tapered). While space precludes a detailed answer to these points, suffice it to say that relatively extensive primary data are available on both topics. Within Fremont assemblages there exist both half rod and bundle stacked foundations as well as the whole rod and bundle variation, with whole rods generally more common earlier as they are in Late Archaic assemblages and half rods more prevalent later. Additionally, both tapered and non-tapered self rims are evidenced in Fremont basketry, with tapered forms again occurring generally later. These issues will be explored in future publications and at the upcoming 68th Annual Meeting of the Society for American Archaeology in Milwaukee, Wisconsin.

Not so amenable to clarification, unfortunately, are other matters raised by Herold and Fowler. We refer specifically to: (1) our general inability to characterize the full range of Fremont vessel forms on the basis of generally small fragments, and (2) the rarity of decorated pieces which, as Herold notes, is itself a distinctive Fremont attribute. To these observations we can only add that we certainly agree that vessel form and the mechanics, type, and placement of any decorations are vital parts of the constellation of attributes that make virtually any group's basketry distinctive. Unfortunately, however, even remotely complete Fremont specimens are rare. Based on existing specimens, we certainly concur with Herold's view that the typical Fremont basket form is an undecorated shallow circular parching tray, as it was for their immediate Late Archaic predecessors.

Beyond issues of technology and form per se, both Herold and Fowler explore the nature of ethnographic basketry diversity in terms of how this issue may inform our archaeological reconstructions. Fowler's discussions of wall type borrowing are well taken and, indeed, as we have observed, the Virgin Branch Anasazi did occasionally "borrow" and/or imitate Fremont half rod and bundle coiling but with a *recognizably Anasazi* veneer of other construction attributes.

Herold's insights into recent ethnographic basket manufacture in California are also highly valuable. While we are pleased that most of our cited examples of ethnic identity via basketry, including both California and Apache cases, are congruent with Herold's view, further comment is warranted on several points. First, the apparent similarity between Hupa, Yurok, or Karok baskets, we believe, is primarily a function of the post-contact period, in a manner analogous to the apparent similarity between recent and contemporary plaiting made by the Seneca and that made by other peoples of the Iroquois Confederacy. While admittedly speculative, we believe that if extensive samples of pre-contact Hupa, Yurok, or Karok wares were available, they could be objectively distinguished from one another.

This same observation obtains for Herold's discussion of the basketry of the Athabaskan speakers, the Navajo and the Apache. Indeed, we agree wholeheartedly that it is very difficult—but not impossible—to draw "lines of connection" between individual basketmaking groups and specific constellations of attributes, particularly when history and geographic separation have disrupted the learning process. That is *precisely* what makes Fremont basketry so intriguing. Despite the fact that there are clearly several regional variants of Fremont and, furthermore, despite the fact that these entities interacted separately and occasionally collectively with a variety of neighbors, Fremont basketry is recognizable as a distinctive entity *throughout* its existence.

This fundamental fact is not contested by any of the commentators, although its significance in the context of NAGPRA claims is open to divergent opinions. Fowler concludes that the utility of basketry data in NAGPRA claims may be compromised by the incomplete nature of the archaeological record and by differing interpretations of the kind(s) of Fremont identity that the relative uniqueness of the basketry industry may suggest. Herold observes, at least in the Fremont case, that basketry offers no solace to potential claimants of Fremont materials while Coulam and Simms suggest that since a *preponderance* of evidence including, but not restricted to, basketry is required for any claim, that there will ultimately be a successful modern claimant for some Fremont affiliated material.

To these thoughtful observations we can only add the following. We certainly agree with Fowler that the utility of basketry in many NAGPRA claims is potentially limited due to issues of preservation as well as to divergent opinions over the probative significance of similarities or dissimilarities between the basketry industries of prehistoric and modern claimant groups. If one assumes that the obvious disparity between Fremont and any modern claimant's basketry precludes "identity" in NAGPRA terms, then one must agree with us and Herold that basketry provides no support to any modern claimant of Fremont materials. That said, however, there is merit to the Coulam and Simms position that some successful claimant may arise because a preponderance of evidence is legally required, even with the recent Jelderk's reversal of the Department of the Interior's earlier ruling on the affiliation of the Kennewick remains. In such a scenario, we can only restate that the preponderance of evidence will not include basketry ties between the Fremont and any claimants.

Finally, although we see no support for any NAGPRA claims on Fremont material based on basketry evidence, this is emphatically not to say that basketry may not provide vital support in other NAGPRA cases. Although long-term continuity in basketry traditions between modern and ancient groups separated by great temporal gulfs is admittedly very rare, there exists at least one such case, the 10,000+ year unbroken Coahuiltecan continuum in Northern Mexico (Adovasio 1974, 1980, 2003; Andrews and Adovasio 1980), and perhaps others as well.

We wish to close by extending our gratitude to our fellow commentators and, especially, to Nancy Coulam and Steve Simms for the opportunity to engage in this forum.

CONCLUDING COMMENTS: SCIENCE, NAGPRA, LAW AND PUBLIC POLICY

Kevin T. Jones, State Archaeologist, Utah Antiquities Section, 300 Rio Grande, Salt Lake City, UT 84101

Adovasio, Pedler, and Illingworth's "…jaded archaic, culture-historical"… analysis of the basketry tradition of the "Hooterville Anasazi" is a well-argued, strongly-asserted hardball thrown directly over the center of the NAGPRA home plate. Lacking the credentials of a basketry and textile specialist, I must defer discussion of the technical details of this missive, and accept with only a modicum of hesitation the articulate declaration that Fremont basketry hangs together as an identifiable and distinct technological tradition, that it has its roots in the earlier Archaic technologies of the area, and that it is distinct from and probably not closely related to the basketry traditions of contemporary Southwestern groups or the Numic-speaking historic tribes. This assertion comes as no surprise to students of the Fremont; Adovasio has been making more-or-less the same claim for many years (e.g., Adovasio 1970a, 1975, 1979). Some have pointed out that there may be some overly-enthusiastic championing of basketry as an ethnic indicator (e.g., Fowler, this volume; O'Connell, Jones and

Simms 1982), but cases where basketry indeed works as an ethnic badge, and cases where the relationship between basketry and ethnicity are more complicated can be identified by both sides.

So what are we to make of the observations by Adovasio et al? To a scientist, it stands as an unexplained linking of a group of observations made on artifacts—one piece of information to be used to understand the human experience in the region. It provides a valuable insight into the cultural and behavioral relationships of the prehistoric Great Basin and Colorado Plateau. It presents a set of facts and observations that can be incorporated into research, used as points of comparison with observations of other technological, behavioral, and cultural details, and evaluated through hypothesis-testing.

To a state official involved in evaluating lines of evidence with respect to repatriation claims, it provides something quite different. Rather then being simply an interesting observation, a clue about the past, something to be pondered, compared, and tested, it stands as a stark piece of evidence that can be used in formulating a legal argument for or against the claim by living people to control the remains and artifacts of those long since gone. It is no longer simply a piece of arcane trivia of interest to a handful of scientists, but an observation that can have significant effect on political relationships and legal decisions, and on the lives and livelihoods of tribes and their members, agencies and their employees, scientists, and even science itself. The data become evidence, the interpretations findings, the scientist a witness, and the outcome is not a debate, nor a cry for gathering more evidence, but a legal determination.

For the purposes of determining cultural affiliation, basketry evidence is integrated with other archaeological data, and then compared with such dissimilar items as the findings of the Indian Claims Commission, kinship, linguistics, biology, oral tradition, and folklore. These disparate lines of evidence are to be evaluated, and a determination made based on the preponderance of the evidence by each federal agency for each set of remains or identifiable earlier group. This is indeed a formidable task, one in which hard feelings and disagreements are likely to be expressed, and even deepened as a result of the proceedings.

To expect an agency to compare scientific data of several different kinds with stories and geography, and to come up with a reasonably sound determination of affiliation between the remains of an ancient human being and a living group is unrealistic. The task becomes even more unrealistic the greater the time span in question becomes. To calculate a preponderance of evidence by adding and subtracting the totals of categories such as oral history, basketry or genes is akin to comparing apples with apoplexy, or oranges with orgasms.

Putting the difficulty of the task aside for a moment, it is a relatively straightforward matter to interpret what I see as the meaning of the basketry for repatriation matters regarding the Fremont. Adovasio, Pedler, and Illingworth's study demonstrates that the evidence does not support continuity in basketry technology between Fremont cultural remains and the modern tribes of the area. Does this mean that the Fremont were a different biological or cultural entity than their successors who live in this region? Not necessarily, but it does indicate that at least one portion of the archaeological data can be used to argue for a lack of continuity, a lack of continuity that may more readily observed and argued from the perspective of basketry than from the perspective of other artifacts and other lines of evidence.

I welcome and applaud the Bureau of Reclamation's effort to gather the relevant lines of evidence. I do not envy them their task of seeking to determine what may constitute a preponderance of those lines of evidence. I am more and more convinced that the tasks set forth in NAGPRA, a law created with the best of intentions, are bound to result in decisions that violate the sensibilities of one or more of the participants—a scientist thinks it outrageous that a story from folklore is given equal weight with scientific data, while a traditionalist tribal member finds it inconceivable that sacred teachings are contested by counts of stitches in a basket.

Nevertheless, we must proceed, and in order to do the best for our constituents, our colleagues, our fields of study, and the cultures and tribes we represent and work with, we must do our best work, do it honestly and openly, and make the best decisions we can. I hope that we can find a way to keep NAGPRA from further driving a wedge between anthropologists and tribal people, two groups who have a long tradition of cooperation and understanding, and whose relationships are being tested more and more by this unwieldy and poorly-thought out law.

REFERENCES CITED

Adovasio, J. M.

1970a The Origin, Development and Distribution of Western Archaic Textiles and Basketry. *Tebiwa: The Journal of the Idaho State University Museum of Natural History* 13(2):1-40.

1970b Textiles. In *Hogup Cave*, by C. M. Aikens, pp. 133-135. Anthropological Papers No. 93. University of Utah Press, Salt Lake City.

1971 Some Comments on the Relationship of Great Basin Textiles to Textiles from the Southwest. *University of Oregon Anthropological Papers* 1:103-108.

1972 Basketry as an Indicator of Archaeological Frontiers. Paper Presented at the 37th Annual meeting of the Society for American Archaeology, Miami, Florida. Ms. on file, Mercyhurst Archaeological Institute, Erie, Pennsylvania.

1974 Prehistoric North American Basketry. *Nevada State Museum Anthropological Papers* 16:98-148.

1975 Fremont Basketry. *Tebiwa: The Journal of the Idaho State University Museum of Natural History* 17(2):67-76.

1977 *Basketry Technology: A Guide to Identification and Analysis.* Aldine Publishing, Chicago.

1979 Comment by Adovasio. *American Antiquity* 44:723-731.

1980a Prehistoric Basketry of Western North America and Mexico. In *Early Native Americans: Prehistoric Demography, Economy and Technology,* edited by D. L. Browman, pp.341-362. Mouton, The Hague.

1980b Fremont: An Artifactual Perspective. In *Fremont Perspectives*, edited by D. B. Madsen, pp. 73-74. Antiquities Section Selected Papers No.16.

1986a Prehistoric Basketry. In *Great Basin,* edited W. L. d'Azevedo, pp.194-214. *Handbook of North American Indians*, vol. 11, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

1986b (with R. L. Andrews) Artifacts and Ethnicity: Basketry as an Indicator of Territoriality and Population Movements in the Prehistoric Great Basin. In *Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings*, edited by C. J. Condie and D. D. Fowler, pp. 43-88. Anthropological Papers No. 110. University of Utah Press, Salt Lake City.

2000 Style Basketry, and Basket Makers: Agency Concretized in a "Perishable" Medium. Paper presented at the 33d Annual Chacmool Conference, Calgary, Alberta, Canada.

2003 Appendix C: Some Thoughts on the Chronology of Cueva Espontosa and the Cuatro Cienegas Basin. In *Sandals from Coahuila Caves with an Introduction to the Coahuila Project, Coahuila, Mexico: 1937-1941, 1947*, by W. W. Taylor, edited by N. J. Demerath, M. C. Kennedy, and P. J. Watson. Dumbarton Oaks, Washington, D.C. , in press.

Adovasio, J. M., R. L. Andrews, and C. S. Fowler

1982 Some Observations on the Putative Fremont "Presence" in Southern Idaho. *Plains Anthropologist* 27(95):19-27.

Adovasio, J. M., and R. L. Andrews

1983 Material Culture of Gatecliff Shelter: Basketry, Cordage and Miscellaneous Fiber Constructions. In *The Archeology of Monitor Valley 2. Gatecliff Shelter*, by D.

H. Thomas, pp. 279-289. Anthropological Papers 59(1). American Museum of Natural History, New York.

1985 *Basketry and Miscellaneous Perishable Artifacts from Walpi Pueblo, Arizona.* Ethnology Monographs No. 7. Department of Anthropology, University of Pittsburgh.

Adovasio, J. M., R. L. Andrews, and R. C. Carlisle
1976 The Evolution of Basketry Manufacture in the Northern Great Basin. *Tebiwa: The Journal of the Idaho State University Museum of Natural History* 18(2):1-8.

1977 *Perishable Industries from Dirty Shame Rockshelter.* Tebiwa: Miscellaneous Papers of the Idaho State University Museum of Natural History No. 7. Pocatello.

Adovasio, J. M., and J. C. Gunn
1977 Style, Basketry and Basketmakers at Antelope House. In *The Individual in Prehistory: Studies of Variability in Style in Prehistoric Technologies,* edited by J. C. Gunn and J. N. Hill, pp. 137-153. Academic Press, New York.

Adovasio, J. M., and J. S. Illingworth
2002 Style, Basketry, and Basket Makers Redux: Looking at Individuals Through a "Perishable" Prism. Paper presented at the 101st Annual Meeting of the American Anthropological Association, New Orleans.

Adovasio, J. M., and D. R. Pedler
1994 A Tisket, a Tasket: Looking at the Numic Speakers through the "Lens" of a Basket. In *Across the West: Human Population Movement and the Expansion of the Numa,* edited by D. B. Madsen and D. Rhode, pp. 114-123. University of Utah Press, Salt Lake City.

Aikens, C. M.
1966 Fremont-Promontory-Plains Relationships in Northern Utah. Anthropological Papers No. 82. University of Utah Press, Salt Lake City.

1976 Cultural Hiatus in the Eastern Great Basin? *American Antiquity* 41:543-550.

Aikens, C. M., D. L. Cole, and R. Stuckenrath
1977 *Excavations at Dirty Shame Rockshelter, Southeastern Oregon.* Tebiwa: Miscellaneous Papers of the Idaho State University Museum of Natural History No. 4. Pocatello.

Ambler, J. R.
1966 *Caldwell Village.* Anthropological Papers No. 84. University of Utah Press, Salt Lake City.

Anderson, D. C.
1983 Models of Fremont Culture History: An Evaluation. *Journal of Intermountain Archaeology* 2:1-27.

Andrews, R. L., and J. M. Adovasio
1980 *Perishable Industries from Hinds Cave.* Ethnology Monographs No. 5. Department of Anthropology, University of Pittsburgh.

1988 Perishables. In *The Silver Island Expedition: Anthropological Archaeology in the Bonneville Basin,* vol. 1, by D. B. Madsen. Ms. on file, Utah Division of State History, Salt Lake City.

Andrews, R. L., J. M. Adovasio, and R. C. Carlisle
1986 *Perishable Industries from Dirty Shame Rockshelter.* Issued jointly as University of Pittsburgh Ethnology Monographs No. 6 and University Oregon Anthropological Papers No. 34. Department of Anthropology, University of Pittsburgh, and Department of Anthropology, University of Oregon, Eugene.

Barrett, S. A.
1908 *Pomo Indian Basketry.* University of California Publications in American Archaeology and Ethnology No. 7(3). The University Press, Berkeley.

1917 The Washo Indians. *Bulletin of the Public Museum of the City of Milwaukee* 2(1):1-52.

Baumhoff, M. A.
1953 Minor Sites Excavated. In *Colville Rockshelter,* by C. W. Meighan, Appendix A. University of California Anthropological Records 12(5). Berkeley.

1957 Introduction. In *Basketry: A Proposed Classification,* by H. Balfét, pp. 1-21. Paper No. 47, Reports of the California Archaeological Survey No. 38. Department of Anthropology, University of California, Berkeley.

Berry, M. S.
1972 *The Evans Site.* Special Report, Department of Anthropology, University of Utah, Salt Lake City.

1982 *Time, Space, and Transition in Anasazi Prehistory.* University of Utah Press, Salt Lake City.

Berry, M. S., and C. F. Berry
1976 *Archaeological Reconnaissance of the White River Area, Northeastern Utah.* Antiquities Section Selected Papers No. 2(4). Utah Division of State History, Salt Lake City.

2003 *An Archaeological Analysis of the Prehistoric Fremont Culture for the Purpose of Assessing Cultural Affiliation with Nine Claimant Tribes.* Submitted to U. S. Bureau of Reclamation, Upper Colorado Region, Salt Lake City. University of Utah Press, Salt Lake City, in press.

Bettinger, R. L., and M. A. Baumhoff
1982 The Numic Spread: Great Basin Cultures in Competition. *American Antiquity* 47:485-503.

Burgh, R. F., and C. R. Scoggin
1948 *The Archaeology of Castle Park Dinosaur National Monument.* University of Colorado Studies, Series in Anthropology No. 2. University of Colorado Press, Boulder.

Butler, B. R.
1981 *When Did the Shoshoni Begin to Occupy Southern Idaho? Essays on the Late Prehistoric Cultural Remains from the Upper Snake and Salmon River Country.* Occasional Papers No. 32. Idaho Museum of Natural History, Pocatello.

1983 *The Quest for the Historic Fremont and a Guide to the Prehistoric Pottery of Southern Idaho.* Occasional Papers No. 33. Idaho Museum of Natural History, Pocatello.

1986 The Pottery of Eastern Idaho. In *Pottery of the Great Basin and Adjacent Areas,* edited by S. Griset, pp. 37-57. Anthropological Papers No. 111. University of Utah Press, Salt Lake City.

Campbell, E. W. C.
1931 *An Archaeological Survey of the Twenty Nine Palms Region.* Southwest Museum Papers No. 7, Los Angeles.

Carlyle, S. W., R. L. Parr, M. G. Hayes, and D. O'Rourke
2000 Context of Maternal Lineages in the Greater Southwest. *American Journal of Physical Anthropology* 11:85-101.

Cordell, L.
1997 *Archaeology of the Southwest.* 2nd ed. Academic Press, San Diego.

Cressman, L. C.
1942 *Archaeological Researches in the Northern Great Basin.* Publication No. 538. Carnegie Institution of Washington, Washington, D.C.

Dawson, L. E., and J. Deetz
1965 A Corpus of Chumash Basketry. *Annual Reports of the University of California Archaeological Survey* 7:193-276.

Dixon, R. B.
1902 Basketry Designs of the Indians of Northern California. *Bulletin of the American Museum of Natural History* 17(1):2-14.

Douglas, F. H.
1937 *The Main Divisions of California Indian Basketry.* Department of Indian Art Leaflets No. 83-84. Denver Art Museum, Denver.

1939a *Indian Basketry East of the Rockies.* Department of Indian Art Leaflet No. 87. Denver Art Museum, Denver.

1939b *Types of Southwestern Coiled Basketry.* Department of Indian Art Leaflet No. 88. Denver Art Museum, Denver.

Driver, H. E.

1939 *Culture Element Distributions, VI: Southern Sierra Nevada.* University of California Anthropological Records 1(2):53-154. Berkeley.

1961 *Indians of North America.* University of Chicago Press, Chicago.

Driver, H. E., and W. C. Massey

1957 Comparative Studies of North American Indians. *Transactions of the American Philosophical Society* 47:165-456.

Drucker, P.

1937 *Culture Element Distributions, V: Southern California.* University of California Anthropological Records 1:1-5. Berkeley.

DuBois, C. A.

1935 Wintu Ethnography. *University of California Publications in American Archaeology and Ethnology* 36:1-148.

Elsasser, A. B.

1978 Basketry. In *California*, edited R. F. Heizer, pp. 626-641. Handbook of North American Indians, vol. 8. W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Essene, F. J

1942 *Culture Element Distributions, XXI: Round Valley.* University of California Anthropological Records 8:1-97. Berkeley.

Fagan, B. M.

1995 *People of the Earth: An Introduction to World Prehistory.* Harper Collins, New York.

Ferg, A.

1987 *Western Apache Material Culture: The Goodwin and Guenther Collections.* University of Arizona Press, Tucson.

Fowler, C. A., and L. E. Dawson

1986 Ethnographic Basketry. In *Great Basin*, edited by W. L. d'Azevedo, pp.705-737. Handbook of North American Indians, vol. 11. W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Fowler, D. D., and J. F. Matley

1979 *Material Culture of the Numa. The John Wesley Powell Collection 1867-1880.* Smithsonian Contributions to Anthropology No. 26. Smithsonian Institution, Washington, D.C.

Ferguson, T. J.

2001 *Ethnographic Study of Nine Tribes: Cultural Affiliation with the Uinta and Great Salt Lake Variants of Fremont in Northern Utah.* Anthropological Research LLC, Tucson. Submitted to U. S. Bureau of Reclamation, Upper Colorado Region, Salt Lake City. University of Utah Press, Salt Lake City, in press.

Fulkerson, M. L., and K. Curtis

1995 *Weavers of Tradition and Beauty: Basketmakers of the Great Basin.* University of Nevada Press, Reno.

Gifford, E. W., and A. L. Kroeber

1937 *Pomo.* University of California Publications in American Archaeology and Ethnology No. 37(4). University of California Press, Berkeley.

Gillan, J.

1938 *Archaeological Investigations in Nile Mile Canyon, Utah, During the Year of 1936.* University of Utah Bulletin No. 28(11). University of Utah Press, Salt Lake City.

Grayson, D. K.

1977 *Paleoclimatic Implications of the Dirty Shame Rockshelter Mammalian Fauna.* Tebiwa: Miscellaneous Papers of the Idaho State University Museum of Natural History No. 9. Pocatello.

Grosscup, G. L.

1960 The Culture History of Lovelock Cave, Nevada. *University of California Archaeological Survey Reports* 52:1-71

Gunnerson, J. H.

1960 The Fremont Culture: Internal Dimensions and External Relationships. *American Antiquity* 25:373-380.

1962 Plateau Shoshonean Prehistory: A Suggested Reconstruction. *American Antiquity* 28:41-45.

1969 *The Fremont Culture: A Study in Culture Dynamics on the Northern Anasazi Frontier.* Papers of the Peabody Museum of Archaeology and Ethnology No. 59(2). Harvard University, Cambridge.

Hall, H. J.
1977 *A Paleoscatological Study of Diet and Disease at Dirty Shame Rockshelter, Southeast Oregon.* Tebiwa: Miscellaneous Papers of the Idaho State University Museum of Natural History No. 8. Pocatello.

Hanes, H. C.
1977 *Lithic Tools of the Dirty Shame Rockshelter: Typology and Distribution.* Tebiwa: Miscellaneous Papers of the Idaho State University Museum of Natural History, No. 6. Pocatello.

Heizer, R. F., and L. K. Napton
1970 *Archaeology and the Great Basin Lacustrine Subsistence Regime as Seen from Lovelock Cave, Nevada.* Contributions of the University of California Archaeological Research Facility No. 10. Department of Anthropology, University of California, Berkeley.

Herold, J. L.
1961 *Prehistoric Settlement and Physical Environment in the Mesa Verde Area.* University of Utah Anthropological Papers No. 53. University of Utah Press, Salt Lake City.

1999 Showing the Sun: Mythological-Ceremonial Foundations of Jicarilla Apache Basketry. *American Indian Art Magazine* 24(3):66-79.

Hester, T. R.
1973 *Chronological Ordering of Great Basin Prehistory.* Contributions of the University of California Archaeological Research Facility No. 17. Department of Anthropology, University of California, Berkeley.

Holmer, R. N.
1980 Fremont Versus Archaic Subsistence: Is There a Difference? Paper presented at the 17th Great Basin Anthropological Conference, Salt Lake City.

Hogan, P., and L. Sebastian
1980 The Variants of the Fremont: A Methodological Evaluation. In *Fremont Perspectives*, edited by D. B. Madsen, pp. 55-68. Antiquities Section Selected Papers No.16. Utah Division of State History, Salt Lake City.

Israel, C., compiler.
1996 *Baskets and Weavers.* Clarke Memorial Museum, Eureka, California.

Janetski, J. C.
1994 Recent Transitions in Eastern Great Basin Prehistory: The Archaeological Record. In *Across the West: Human Population Movement and the Expansion of the Numa*, edited by D. B. Madsen and D. Rhode, pp. 157-178. University of Utah Press, Salt Lake City.

Jennings, J. D.
1956 The American Southwest: A Problem in Cultural Isolation. In *Seminars in Archaeology*, edited by R. Wauchope, pp. 61-127. Memoirs No. 11. Society for American Archaeology, Salt Lake City.

1960 Early Man in Utah. *Utah Historical Quarterly* 28(1):3-27.

1966 *Glen Canyon, A Summary.* Anthropological Papers No. 81. University of Utah Press, Salt Lake City.

1974 *Prehistory of North America.* 2nd ed. McGraw-Hill, New York.

1980 *Cowboy Cave.* University of Utah Anthropological Papers No. 104. University of Utah Press, Salt Lake City.

Jennings, J. D., and E. Norbeck
1955 Great Basin Prehistory: A Review. *American Antiquity* 21:1-11.

Jones, K. T.
1994 Can the Rocks Talk? Archaeology and Numic Languages. In *Across the West: Human Population Movement and the Expansion of the Numa*, edited by D. B.

Madsen and D. Rhode, pp. 71-75. University of Utah Press, Salt Lake City.

Judd, N. M.

1917 Evidence of Circular Kivas in Western Utah Ruins. *American Anthropologist* 19:34-40

1919 *Archaeological Investigations at Paragonah, Utah*. Smithsonian Institution Miscellaneous Collections No. 70(3). Smithsonian Institution, Washington, D.C.

1926 *Archaeological Observations North of the Rio Colorado*. Bureau of American Ethnology Bulletin No. 82. U.S. Government Printing Office, Washington, D.C.

Kelly, I. T.

1930 The Carver's Art of the Indians of Northwestern California. *University of California Publications in American Archaeology and Ethnology* 24(7):103-119.

1965 [1932] Ethnography of the Surprise Valley Paiute. *University of California Publications in American Archaeology and Ethnology*. Reprinted: Krauss Reprint, New York.

1964 *Southern Paiute Ethnography*. Anthropological Papers No. 69. University of Utah Press, Salt Lake City.

Kidder, A. V.

1924 *An Introduction to the Study of Southwestern Archaeology with a Preliminary Account of the Excavations at Pecos*. Yale University Press, New Haven.

1927 Southwestern Archaeology Conference. *Science* 66:489-491.

Kittleman, L. R.

1977 *Preliminary Report on the Geology of Dirty Shame Rockshelter, Malheur County, Oregon*. Tebiwa: Miscellaneous Papers of the Idaho State University Museum of Natural History, No. 5. Pocatello.

Kroeber, A. L.

1922 *Basket Designs of the Mission Indians of California*. American Museum of Natural History Anthropological Papers No. 20(2). New York.

1925 *Handbook of the Indians of California*. Bureau of American Ethnology Bulletin No. 78. U.S. Government Printing Office, Washington, D.C.

Lindsay, L. M.

1986 Fremont Fragmentation. In *Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings*, edited by C. J. Condie and D. D. Fowler, pp. 229-252. Anthropological Papers No. 110. University of Utah Press, Salt Lake City.

Lowie, R. H.

1909 *The Northern Shoshone*. Anthropological Papers of the American Museum of Natural History No. 20(3). New York.

1924 Notes on Shoshonean Ethnography. Anthropological Papers of the American Museum of Natural History No. 2(2). New York.

Madsen, D. B.

1979 The Fremont and the Sevier: Defining Prehistoric Agriculturalists North of the Anasazi. *American Antiquity* 44:711-722.

1982a Get It Where the Gettin's Good: A Variable Model of Great Basin Subsistence and Settlement Based on Data from the Eastern Great Basin. In *Man and Environment in the Great Basin*, edited by D. B. Madsen and J. F. O'Connell, pp. 207-226. SAA Papers No. 2. Society for American Archaeology, Washington, D.C.

1982b Salvage Excavations at Ticaboo Town Ruin (42GA2295). In *Archaeological Investigations in Utah at Fish Springs, Clay Basin, Northern San Rafael Swell, Southern Henry Mountains*, edited by D. B. Madsen, and R. E. Fike. Cultural Resources Series No. 12. U.S. Bureau of Land Management, Salt Lake City.

1989 *Exploring the Fremont*. University of Utah Press, Salt Lake City.

Madsen, D. B., and M. S. Berry

1975 A Reassessment of Northeastern Great

Basin Prehistory. *American Antiquity* 40:391-405.

Madsen, D. B., and L. W. Lindsay
1977 *Backhoe Village*. Antiquities Section Selected Papers No. 12. Utah Division of State History, Salt Lake City.

Madsen, D. B., and S. R. Simms
1998 The Fremont Complex: A Behavioral Perspective. *Journal of World Prehistory* 12:255-336.

Marwitt, J. P.
1970 *Median Village and Fremont Culture Regional Variation*. Anthropological Papers No. 95. University of Utah Press, Salt Lake City.

1986 Fremont Cultures. In *Great Basin*, edited W. L. d'Azevedo, pp.161-172. Handbook of North American Indians, vol. 11. W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Mason, O. T.
1885 Basket-Work of the North American Aborigines. *Report of the United States National Museum for 1884*, pt. 3:291-306.

1900 Types of American Basketry. *Scientific American* 83:57-58.

1904 *Aboriginal American Basketry: Studies in a Textile Art Without Machinery*. Report of the United States National Museum for 1902. Smithsonian Institution Publication No. 128. U.S. Government Printing Office, Washington, D.C.

Meighan, C. W.
1953 *The Colville Rockshelter, Inyo County, California*. Anthropological Records No. 12(5). Berkeley.

Meighan, C. W., N. E. Coles, F. D. Davis, G. M. Greenwood, W. M. Harrison, and E. H. MacBain
1956 *Archaeological Excavations in Iron County, Utah*. Anthropological Papers No. 25. University of Utah Press, Salt Lake City.

Merriam, C. H.
1902- Basketry Collections Catalogue Cards.
1942 Ms. on file, Department of Anthropology Museum, University of California, Davis.

Montgomery, H.
1894 Prehistoric Man in Utah. *The Archaeologist* 8:228-234, 10:298-306, 11: 335-342.

Morris, E. H.
1939 *Archaeological Studies in the La Plata District, Southwestern Colorado and Northwestern New Mexico*. The Carnegie Institution of Washington, Washington, D.C.

Morris, E. H., and R. F. Burgh
1941 *Anasazi Basketry: Basket Maker II Through Pueblo II, A Study Based on Specimens from the San Juan River Country*. Publication No 533. Carnegie Institution of Washington, Washington, D.C.

Morss, N.
1931 *The Ancient Culture of the Fremont River in Utah*. Papers of the Peabody Museum of American Archaeology and Ethnology 12(3). The Peabody Museum, Cambridge.

Moser, C. L.
1989 *American Indian Basketry of Northern California*. Riverside Museum Press, Riverside, California.

O'Connell, J. F., K. T. Jones, and S. R. Simms
1982 Some Thoughts on Prehistoric Archaeology in the Great Basin. In *Man and Environment in the Great Basin*, edited by D. B. Madsen and J. F. O'Connell, pp. 227-240. SAA Papers No. 2. Society for American Archaeology, Washington, D.C.

O'Neale, L. M.
1930 Fieldnotes on the Basketry of Northwestern California (Yurok-Karok-Hupa). Ms. on file as *Hupa Notebooks* 3, University of California Archives, Berkeley, California.
1932 Yurok-Karok Basket Weavers. *University of California Publications in American Archaeology and Ethnology* 32:1-184.

Panlaqui, C.
1974 The Ray Cave Site. *Maturango Museum Monograph* 1:1-62. China Lake, California.

Park, W. Z.
1933-1940 Ethnographic notes on approximately 15 months of field work among the Northern Pyramid Lake, Walker River, Reno, Dayton, Carson Sink, Yerrington. Ms. in possession of C. Fowler, Department of Anthropology, University of Nevada, Reno.

Rhode, D., and D. B. Madsen
1994 Where are We? In *Across the West: Human Population Movement and the Expansion of the Numa*, edited by D. B. Madsen and D. Rhode, pp. 213-222. University of Utah Press, Salt Lake City.

Rozaire, C. E.
1969 The Chronology of Woven Materials from Seven Caves at Falcon Hill, Washoe County, Nevada. *Nevada State Museum Anthropological Papers* 14:181-186.

Rudy, J. R.
1953 *Archaeological Survey of Western Utah.* Anthropological Papers No. 12. University of Utah Press, Salt Lake City.

Shaul, D. L.
2001 *Linguistic Footprints of the Fremont Archaeological Culture.* Submitted to U. S. Bureau of Reclamation, Upper Colorado Region, Salt Lake City. University of Utah Press, Salt Lake City, in press.

Shipley, W. F.
1978 Native Languages of California. In *California,* edited by R. F. Heizer, pp. 80-90. *Handbook of North American Indians,* vol. 8, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Simms, S. R.
1986 New Evidence for Fremont Adaptive Diversity. *Journal of California and Great Basin Anthropology* 8:204-216.

1990 Fremont Transitions. *Utah Archaeology* 1990:1-19.

Smith, A. M.
1941 *Ethnography of the Northern Utes.* Papers in Anthropology No. 17. Museum of New Mexico Press, Santa Fe.

Steward, J. H.
1933 *Archaeological Problems of the Northern Periphery of the Southwest.* Museum of Northern Arizona Bulletin No. 5. Northern Arizona Society of Science and Art, Flagstaff.

1934 Two Paiute Autobiographies. *University of California Publications in American Archaeology and Ethnology* 33:423-438.

1937 *Ancient Caves of the Great Salt Lake Region.* Smithsonian Institution Bureau of American Ethnology Bulletin No. 116. U.S. Government Printing Office, Washington, D.C.

1941 *Culture Element Distributions: XIII, Nevada Shoshoni.* University of California Anthropological Records 4(2):209-259. Berkeley.

1943 *Culture Element Distributions: XXIII, Northern and Gosiute Shoshoni.* University of California Anthropological Records 8(3):263-392. Berkeley.

Stewart, O. C.
1941 Culture Element Distributions, XIV, Northern Paiute. *University of California Anthropological Records* 4(3):361-446. Berkeley.

1942 Culture Element Distributions, XVIII, Ute-Southern Paiute. *University of California Anthropological Records* 6(4):231-356. Berkeley.

Tanner, C. L.
1982 *Apache Indian Baskets.* University of Arizona Press, Tucson.

1983 *Indian Baskets of the Southwest.* University of Arizona Press, Tucson.

Taylor, D. C.
1957 *Two Fremont Sites and Their Position in Southwestern Prehistory.* Anthropological Papers No. 29. University of Utah Press,

Salt Lake City.

Taylor, W. W.
1966 Archaic Cultures Adjacent to the Northeastern Frontiers of Mesoamerica. In *Archaeological Frontiers and External Connections*, edited by G. F. Ekhom and G. R. Willey, pp. 59-94. Handbook of Middle American Indians, vol. 4, R. Wauchope, general editor, University of Texas Press, Austin.

1967 [1948] *A Study of Archaeology*. Arcturus Books, Southern Illinois University Press, Carbondale.

Teiwes, H.
1996 *Hopi Basket Weaving: Artistry in Natural Fibers*. University of Arizona Press, Tucson.

Thomas, D. H.
1979 *Archaeology*. Holt, Rinehart and Winston, New York.

1983 *The Archaeology of Monitor Valley 2: Gatecliff Shelter*. American Museum of Natural History Anthropological Papers No. 59. New York.

Voegelin, E.
1942 *Culture Element Distributions, XX: Northeast California*. University of California Anthropological Records 7(2):47-252. Berkeley.

Wallace, W. J., and E. S. Taylor
1955 Archaeology of Wildrose Canyon, Death Valley National Monument. *American Antiquity* 20:355-367.

Weltfish, G.
1932 Problems in the Study of Ancient and Modern Basket Makers. *American Anthropologist* 34:108-117.

Wheat, M. M.
1967 *Survival Arts of the Primitive Paiutes*. University of Nevada Press, Reno

Whiteford, A. H.
1988 *Southwestern Indian Baskets: Their History and Their Makers*. School of American Research Press, Santa Fe.

Wormington, H. M.
1955 *A Reappraisal of the Fremont Culture*. Proceedings No. 1. Denver Museum of Natural History, Denver, Colorado.

Zigmond, M. L.
1978 Kawaiisu Basketry. *Journal of California Anthropology* 5:199-215.

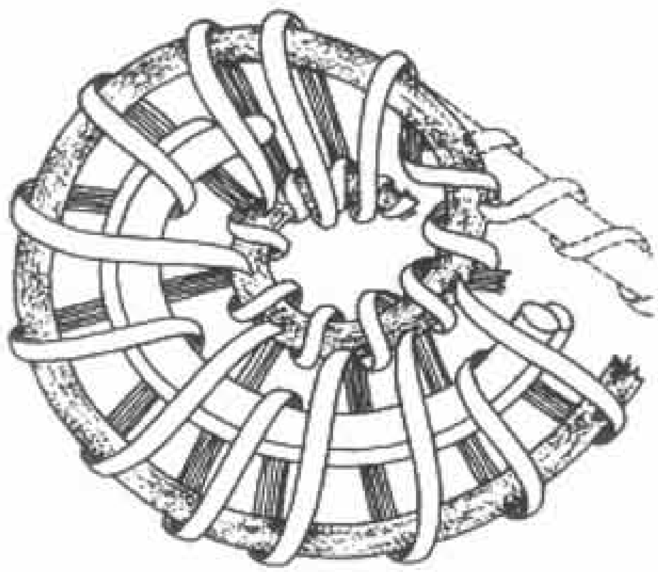


Photo Essay

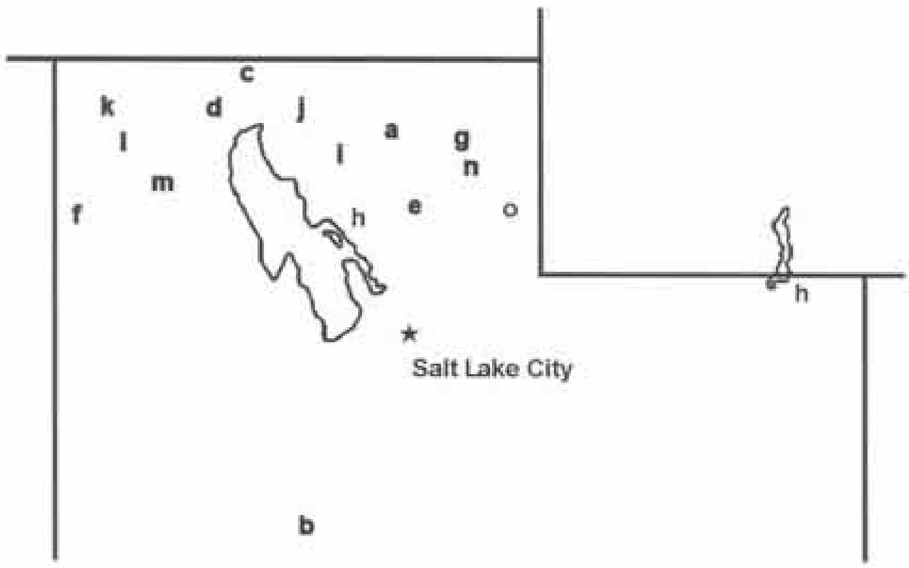
PALEOINDIAN POINT TYPES OF NORTHERN UTAH

Dann J. Russell, Promontory/Tübadüka Chapter, Utah Statewide Archaeological Society, 2581 W. 5000 S., Roy, UT 84067

Mark E. Stuart, Promontory/Tübadüka Chapter, Utah Statewide Archaeological Society, 2054 E. 6550 S., Uinta, UT 84405

Northern Utah residents have recovered a wide variety of Paleoindian and Paleoarchaic point types that belong to periods ranging from over 12,000 to 7000 B.P. or later. Some of these points have been documented individually (Russell 1993), but a collective grouping to describe and provide general provenience for them (Figure 1), as well as to present good-quality photographs seems appropriate. We organize the descriptions and photographs by point type, beginning with the earliest, and by the locality of finds. All of the specimens reported here were found on the surface. None of the sites or individual specimens is dated, either directly or through site context. However, age ranges are known for the types based on dates from sites in other regions, especially the Plains, and we report those age ranges in radiocarbon years (Pitblado 2003:Chapter 5). We also include descriptions and photographs of some unknown types in the hope that better documentation of variability in what may be early points may improve the typologies.

Figure 1. Map of Localities.



CLOVIS POINTS (12,000 TO 10,900 B.P.)

Clovis points are named for a site where they were first examined in 1932 near Clovis, New Mexico, and represent the oldest easily identifiable American culture. Clovis people hunted mammoth and bison. The typical Clovis point is leaf shaped, with parallel or slightly convex sides, a concave base, and ground basal edges. An easily identifiable feature is the flute, a large channel flake scar on both sides beginning at the base and extending upward, rarely exceeding half the length (Smith 2002:1).

Clovis point from locality a.
This point is made of grayish brown chert similar to that from the Green River area. The concave base has shallow flutes on both sides and is heavily ground one-half the way up the blade. The tip was reworked on the left portion of the blade. It was found at the edge of a plowed field overlooking the Bear River near Hampton Ford. Located near Collinston, Hampton Ford was a major crossing of the Bear River for many years, which perhaps was used prehistorically. The dimensions are 8.3 cm long and 3.1 cm wide.

FOLSOM POINTS (10,800 TO 10,500 B.P.)

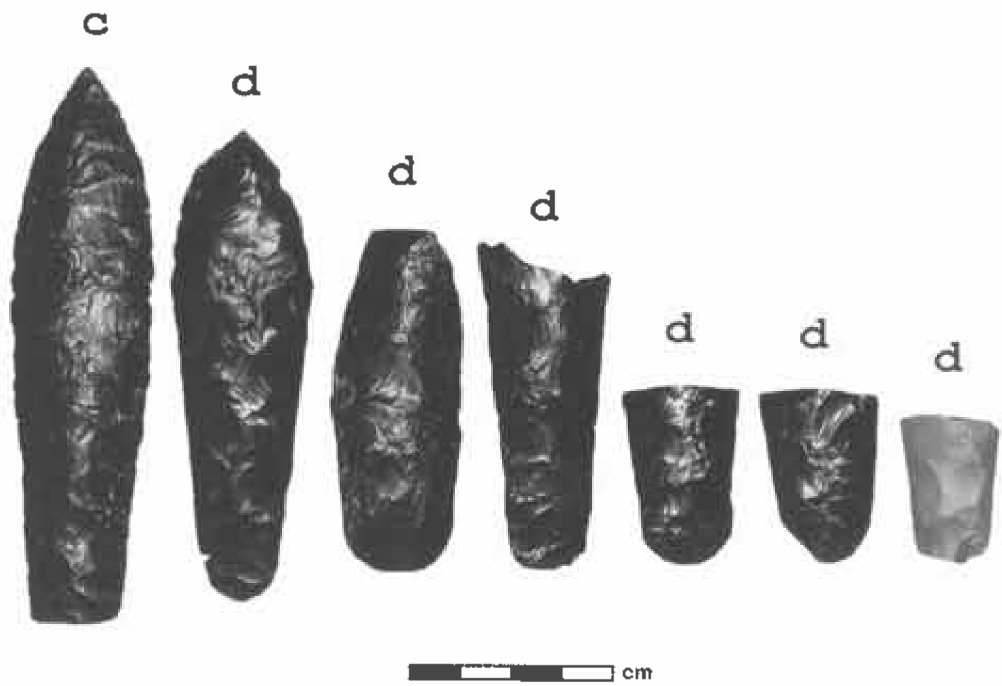
Folsom points are named after a bison kill site near Folsom, New Mexico that was discovered in 1926 by George McJunkin (Bostrom 2002:7). Folsom points are generally leaf shaped and smaller than Clovis points. The sides are parallel to convex, the base is concave, and they exhibit some basal edge grinding. Most are extremely thin, having pressure flaked retouched edges, and channel flutes on both sides running from the base to the tip.

b

Folsom point from locality b.
This Folsom midsection was found in the Cherry Creek area north of the Little Sahara Sand Dune Recreational Area. The material is an extremely fine, light tan chert, and has a glossy appearance that suggests heat-treating. It is very thin and shows a high quality of workmanship. The flutes may have extended from the base to the tip on both sides. The dimensions are 2.5 cm long by 2.2 cm wide.

HASKETT POINTS (10,500 TO 9350 B.P.)

B. Robert Butler named Haskett points after Parley Haskett, who discovered them at a site alongside a secondary road leading to a lake in Power County, southeastern Idaho (Butler1978:64; Russell 1993:79). There are two varieties of Haskett points. Type I Haskett points are broadest and thickest near the tip, which accounts for only one-third of the total point length. The stem, which accounts for the other two-thirds of the point, tapers in, and down to a thin and rounded end. The edges of the stem are usually heavily ground. Type II Haskett points are much longer than Type I, and are broadest and thickest midway from the tip to the base. The edges are uniformly excurvate and ground near the basal end. Both types exhibit broad, collateral flaking patterns.

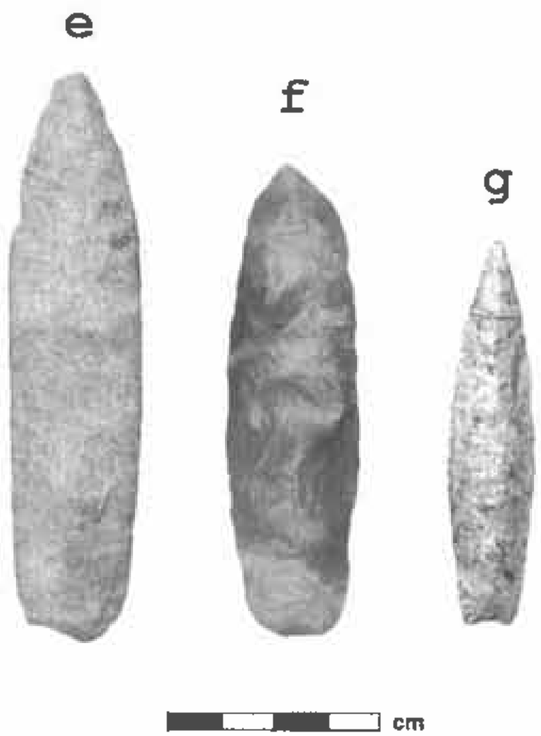


Haskett points from localities c and d.
The point from locality c, near Snowville, appears to be a typical Type I Haskett. It has broad collateral flaking scars, a heavily ground stem, and is the thickest in the one-third of its length from the tip. It is constructed of high quality jet-black obsidian. The base is missing. The dimensions are 11.4 cm long and 2.7 cm wide at the widest point.

The remaining six points and basal fragments are from locality d, north of Kelton. Several of these were reported and illustrated with pen and ink drawings in *Utah Archaeology* (Russell 1993:79). All are typical Type I Haskett points. The material for all specimens except the one on the far right is high quality obsidian. The non-obsidian specimen is made from an olive green chert. All show evidence of basal edge grinding. The specimen shown second from the left was missing its base when originally recovered, but the base was found and the pieces glued together for a photograph. Only a small nick on the lower left remains missing. This reconstructed Haskett is 9.7 cm long and 2.7 cm wide at its widest point. The specimen also shows evidence of re-sharpening, compared to the specimen to its left from locality c.

AGATE BASIN POINTS (10,500 TO 9600 B.P.)

F. H. Roberts named this type after specimens found at the Agate Basin site in 1916. Agate Basin points are long and slender with parallel or slightly convex sides. Bases can be convex, concave, or straight. In cross section, these points are lenticular in both length and width. They exhibit collateral flaking. Edges are ground from one-fourth to one-half the length beginning at the base (Roberts 1962:90).



Agate Basin points from localities e, f, and g.
The point from locality e was found during a period of extremely low water level on the North Fork Arm of Pineview Reservoir above Ogden. Made from cream-colored quartzite, the lower one-third of its basal edge is heavily ground. It exhibits beautiful collateral flaking and is 10.5 cm long by 2.4 cm wide.

The point from locality f was found in the Pilot Range in eastern Nevada. It is made of light brown and tan chert. The base is heavily ground with the tip showing definite reworking. The sides are slightly convex and in cross section, it is lenticular in both length and width. The collateral flaking is broad and random. The dimensions are 8.5 cm long and 2.5 cm wide.

Locality g is in the Ant Flats area of Monte Cristo in Cache County. This point is made from a creamy white chert similar to that found at an extensive lithic quarry site located near the East Fork of the Little Bear River. One side is badly weathered, obscuring the collateral flaking that is more evident on the other side. The base is concave and is ground one-third of the way up. Several other bases similar to this have been found in the same area. The dimensions are 7.1 cm long and 1.5 cm wide.

HELL GAP POINTS (10,450 TO 9350 B.P.)

The Hell Gap point type is named for a site near Guernsey, Wyoming. Very similar to Type I Haskett points, the edges are always incurvate from the base to a point about two-thirds of the way to the tip. The last one-third of the point is the widest and the points typically have a blunt tip. There is no regular flaking pattern and the flakes feather out in the middle of a lenticular cross section. Like Agate Basin points, the base can be convex, straight, or concave. Basal edge grinding can extend over 50 percent of the edge (Pitblado2003:89).

h

Hell Gap point from locality h.
This point was reportedly found at a low water level in the Antelope Flats area at Flaming Gorge Reservoir. It is made from a pinkish-brown fine-grained quartzite and shows evidence of basal edge grinding. The widest point is approximately two-thirds of the distance from the base to the tip. It is thinner than a Haskett point, and lenticular in cross section. The tip is somewhat blunt and the base is straight to slightly concave. The flaking pattern is collateral and shallow, with no identifiable median ridge. The dimensions are 9.9 cm long and 2.8 cm wide at its widest point.

BIRCH CREEK POINTS (11,000 TO 7200 B.P.)

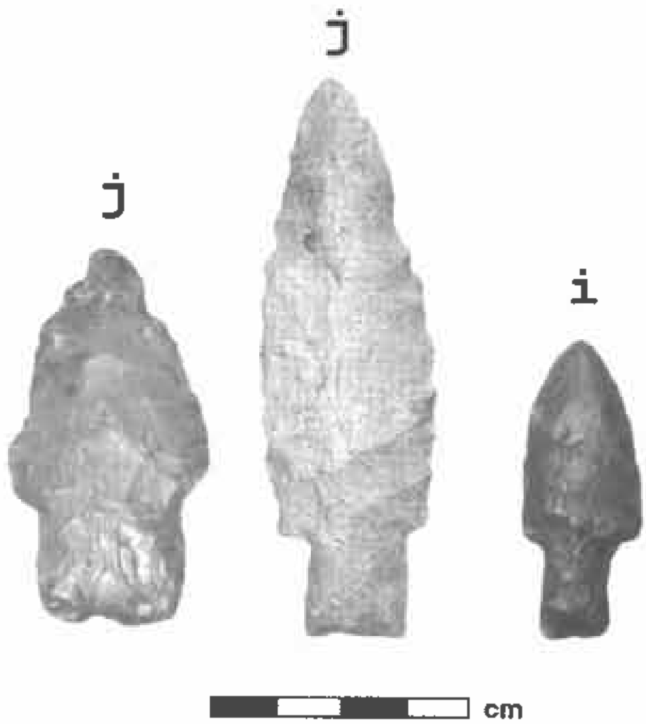
Birch Creek points derive their name from the Birch Creek Valley in Idaho. They contain a short tip section, a long, parallel-edged basal section that is heavily ground, and a broad, flat, slightly oblique base. The entire point has broad collateral flaking scars which feather at the midline on both faces so that the point has a smooth lenticular cross section lacking a median ridge (Butler 1978:62-64).

i

Birch Creek point from locality i.
This point was found in the vicinity of Connor Spring in the Blue Springs Hills north of the Great Salt Lake. It is made from gem quality red chert with occasional streaks of blue. It has collateral flaking, and is heavily ground; so much so, that it appears to be stemmed, and could possibly be taken as a Type I Scottsbluff point. Because of its smooth lenticular cross section, which lacks a median ridge, here it is classified as a Birch Creek point. It is 5.3 cm long and 1.5 cm wide.

ALBERTA POINTS (9900 TO 8600 B.P.)

There is no type-site for Alberta points. The name was suggested by H. Marie Wormington to describe several surface finds in Alberta and Saskatchewan (Wormington 1957:134). This style of point was first found *in situ* at the Hell Gap site in Wyoming. Wormington also observed that Alberta points, "are commonly found in sites that yield Scottsbluff points, and they resemble them sufficiently that it seems probable that there is some close relationship" (Wormington 1957:134). The points exhibit collateral to transverse parallel flaking, a short stem with parallel sides, abrupt shoulders, a lenticular to diamond-shaped cross section, and a somewhat blunted tip.



Alberta points from localities j and i.
The Alberta point on the left from locality j appears to have been sharpened several times and was finally discarded. Found in the Blue Creek area near Thiokol, it is made out of a yellow-orange agate. It has collateral flaking, a short stem with parallel sides, abrupt shoulders, and a blunted tip (probably due to the re-sharpening). It is 5.7 cm long and 3.0 cm wide.

The large point in the center was also found in the Blue Creek area. It was in two pieces and was glued for photography. The joint is visible, and runs from the lower left shoulder to the upper right midsection. It is reported that the break was modern, but the specimen also shows some prehistoric damage near its somewhat blunted tip. The stem is short, parallel sided, and with the typically abrupt shoulders. Made from a light creamy tan chert, the dimensions are 9.5 cm long and 2.7 cm wide at its widest.

The point on the right is from locality i, the Connor Spring area, where the point was found along the Gilbert shoreline of Lake Bonneville/Great Salt Lake. It is made from yellow-red agate and shows a collateral flaking pattern. Although smaller than the other specimens, the stem is heavily ground and exhibits very abrupt shoulders. The dimensions are 4.6 cm long and 1.9 cm wide.

GREAT BASIN STEMMED POINTS (10,700 TO 7550 B.P.)

Great Basin Stemmed points cover a wide variety of Late Pleistocene-Holocene point forms across the west. Tuohy and Layton (1977:2) introduced the term and they wrote, 'a convenient, stop-gap taxonomic device has been concocted (by two of us) to assist in our hour of need…We decided to assign all of the early stemmed point forms…to a newly coined 'Great Basin Stemmed Series' of projectile points." These points are highly variable, ranging in size from small to large, with random to collateral flaking patterns. They contain a basal stem, usually long, with parallel to convergent sides, and shoulders that are smooth to abrupt.

Great Basin Stemmed points from localities k, l, and m.
The point on the left is from locality k, near Grouse Creek. Made from black ignimbrite, and is weathered. The base is ground, and the tip shows signs of an impact fracture. This point has the characteristics of a Lake Mojave point, a type defined by Charles Amsden (1937) from terraces bordering Lake Mohave in southeastern California. Lake Mohave points are often lozenge-shaped, with long contracting stems and rounded bases (Heizer and Hester 1978:12). The base of this specimen is somewhat straight, however, with some basal thinning as found in Pinto Basin points. Thus, it may be of the "Lake Mohave-Pinto" tradition (Heizer and Hester 1978:13). The dimensions are 3.9 cm long and 2.2 cm wide.

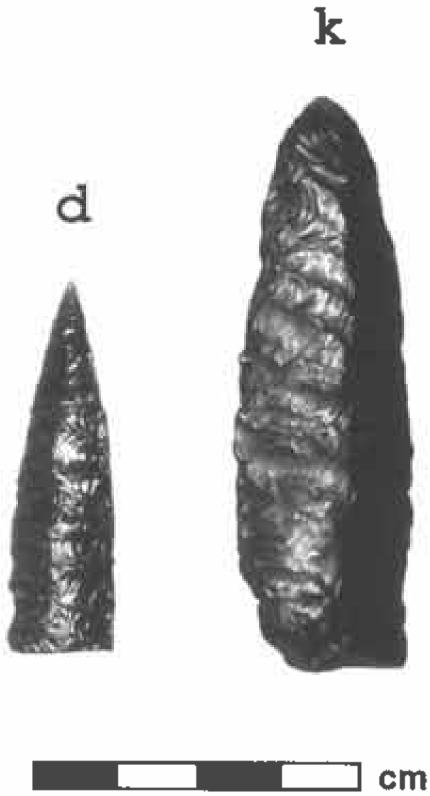
The point from locality l was found in a dune field along the Gilbert Shoreline of Lake Bonneville/Great Salt Lake, near the sinks of Dove Creek and Muddy Creek southwest of Park Valley. It is made from black ignimbrite and is badly weathered. The tip was resharpened, probably several times, and the stemmed base is heavily ground. Other than lacking a rounded stem, it has the general appearance and flaking pattern of a Lind Coulee point (Pitblado 2003:92-97). The dimensions are 4.6 cm long and 3.4 cm wide.

The tip shown second from right is from locality m, where it was found in an eroded dune field near Hogup Cave. It is made from moderately glossy ignimbrite. It is fairly thin and may be produced from a large secondary flake instead of a bifacial preform. Only the uppermost portion of a stem remains, but it shows basal grinding. A type cannot be assigned, but if it is similar to the point to its right, it could be a Cougar Mountain or Parman point (Pitblado 2003:92-97). The dimensions are 4.2 cm long and 2.2 cm wide.

The base shown on the far right was also found in locality m. It is made of the same ignimbrite, but exhibits a higher quality of craftsmanship. It has a uniform, convex cross section, and pronounced basal grinding. It may be a Cougar Mountain or Parman point (Pitblado 2003:92-97). The dimensions are 2.8 cm long and 1.9 cm wide.

EDEN POINTS (9500 TO 8200 B.P.)

Eden point types are part of the Cody Complex, but are narrower and that lack the prominent stem of a Scottsbluff point (Wormington 1957:267. The type locality for Eden points is the Finley Site, named after O. M. Finley, and located near Eden, Wyoming. Any insets that define a stem are most likely the result of basal grinding. Flaking patterns are usually collateral to transverse, creating a pronounced median ridge that is often diamond-shaped.

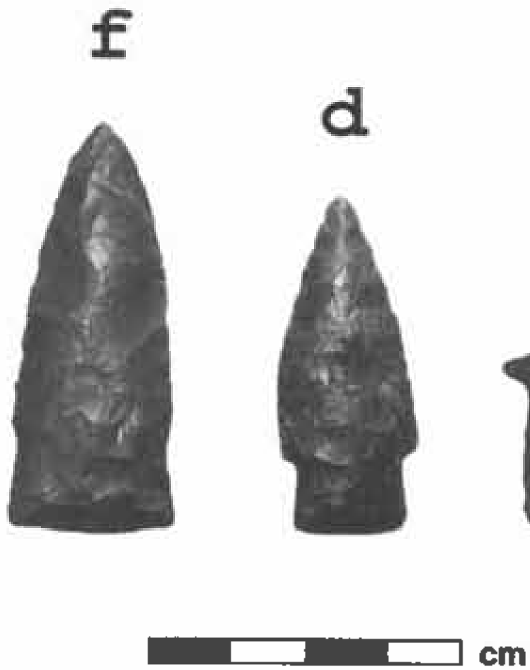


Eden points from localities d and k.
The tip fragment is from locality d, north of Kelton, where it was found in an alkaline wash surrounded by greasewood and short sagebrush. The material is high quality, glassy, transluscent obsidian similar to that found near Malad, Idaho. It has a definite median ridge, a cross section approaching a diamond shape, and well-defined parallel transverse flaking scars. The dimensions are 4.5 cm long by 1.2 cm wide at the break.

The point on the right is from locality k in the Grouse Creek Mountains. Made from black ignimbrite, it is narrow, shows both transverse and oblique parallel flaking with a prominent median ridge, and a cross section that is diamond shaped. The base has been snapped, but there are signs of basal grinding. The dimensions are 6.9 cm long and 2.1 cm wide.

SCOTTSBLUFF POINTS (9400 TO 8300 B.P.)

Scottsbluff points take their name from the type-site, the Scottsbluff Bison Quarry in western Nebraska (Pitblado 2003:81). Wormington found points at this site and designated them "Type I" specimens (Wormington 1957:137). Type I Scottsbluff points have triangular or parallel-sided blades, small shoulders, and broad stems. Flaking patterns range from transverse parallel to irregular, and cross sections are thick ovals. Basal edge grinding is common. Type II Scottsbluff points are similar to Type I, but exhibit wider triangular blades, thinner, lenticular cross sections, and well-defined shoulders.



Scottsbluff points from localities f, d, and m.
The point from locality f was found in the foothills of the Pilot Range in eastern Nevada. It appears to be a Type I Scottsbluff due to its broad stem and small shoulders. It is made from a high quality olive green chert. Some reworking is suggested. The dimensions are 5.2 cm long and 2.1 cm wide at the base.

The point from locality d, north of Kelton, was found in a dune field mixed with greasewood and short sagebrush. It appears to be a Type II Scottsbluff because of its thin, lenticular cross section, smaller stem, and defined shoulders. The material resembles a brown, marbled chert found in western Wyoming. The glossy appearance suggests this material was heat-treated. The dimensions are 4.3 cm long and 1.8 cm wide.

The basal fragment is from locality m, and was found in the same dune field near Hogup Cave as the Great Basin Stemmed points shown above. It appears to be a Type II Scottsbluff because of its defined shoulders. It is made from basalt and is basally ground. The dimensions are 2.4 cm long and 1.9 cm wide at the base.

JIMMY ALLEN AND FREDERICK POINTS (9350 TO 7900 B.P.)

Jimmy Allen and Frederick points are distinct because of their oblique flaking pattern, and parallel to slightly divergent basal sides (Pitblado 2003:112). Named for the James Allen site in eastern Wyoming, Jimmy Allen points are lanceolate in shape, and have a uniform, lenticular cross section, with thin, sharp, regular edges. The lateral edges are usually parallel at mid-section and a deeply pronounced concave base. The basal corners are rounded and the flaking pattern is parallel oblique (Mulloy 1959:114). The Hell Gap site in Wyoming is the type site for the Frederick point (Pitblado 2003:112). Characteristics of the Frederick point are the same as the Jimmy Allen, except that the concave base is not as pronounced.

Jimmy Allen and Frederick points from localities n, o, m and h.
The basal fragment at the left was found in locality n, the Monte Cristo area of northeastern Weber County. Made from white quartzite, it has the deep concave base typical of a Jimmy Allen point that forms prominent ears. It was ground and exhibits fine parallel oblique flaking. The dimensions are 2.7 cm long and 2.0 cm wide.

The basal fragment from locality o was found at the head of Echo Canyon near Castle Rock. Classified here as a Frederick point, it has parallel oblique flaking, and a slightly concave, ground base. It is made from a tiger chert similar to that found in southwestern Wyoming. The dimensions are 2.8 cm long and 2.4 cm wide.

The fragment from locality m is from same area near Hogup Cave as the Great Basin Stemmed and Scottsbluff points above. It is also made of basalt. It is classified as a Frederick point because of its concave base and parallel oblique flaking pattern. It shows evidence of basal edge grinding. The dimensions are 2.6 cm long and 2.1 cm wide.

The fragment from locality h was found on the alkaline salt flats of the Harold Crane Wildlife Management Area northwest of Ogden. The point was near an oxbow of an old creek channel, possibly associated with the mouths of the Bear River or Willard Creek. Made out of ignimbrite, it does not show any evidence of grinding; perhaps it was broken during the manufacturing process and never finished with grinding. It has a concave base with parallel oblique flaking, hence is classified as a Frederick point. The dimensions are 2.7 cm long and 2.3 cm wide. The crescent shown in a later section of this article was found only several feet away.

ANGOSTURA POINTS (9700 TO 7550 B.P.)

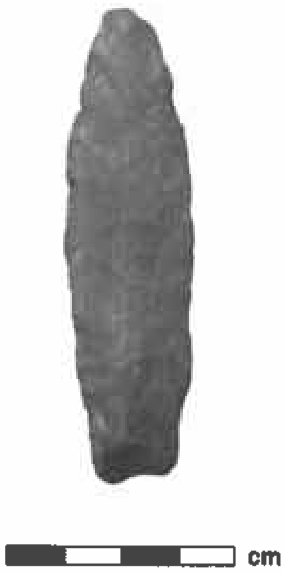
Angostura points are named after the Angostura Reservoir near Hot Springs, South Dakota. Originally known as "Yumas", they are long and slim with a straight, or slightly concave base. These points are often stemless, and grinding typically occurs on the sides, not on the basal edges. The flaking pattern is usually parallel oblique, with long, narrow, shallow scars running from upper left to lower right (Russell 1962:82; Pitblado 2003:113).

Angostura point from locality d.
This midsection fragment was found near a slightly elevated mound covered with greasewood and sagebrush northwest of Kelton. The material is a tan and brown chert similar to that found near the fresh water springs in the Liberty to Avon divide area between Ogden Valley and Cache Valley. The midsection has a symmetrical lenticular cross section and excellent parallel oblique flaking scars running from upper left to lower right. The dimensions are 4.1 cm long by 1.8 cm wide.

LOVELL CONSTRICTED POINTS (9350 TO 7700 B.P.)

The Lovell Constricted point type was proposed by W. M. Husted to describe lanceolate points that are medium to large, with lenticular cross sections, and convergent toward the base (Pitblado 2003:100). The points are crudely flaked, from parallel to oblique, or even randomly. The bases are slightly concave, ground, and have pronounced stems that give them a "waisted" appearance. They are similar to a Pryor Stemmed point except that their edges are not beveled, and they lack a parallelogram shaped cross section (Pitblado 2003:99).

n



Lovell Constricted point from locality n.
This point was in a lithic scatter in the Monte Cristo area. It is made of a gray-olive green chert similar to that used for other points found in northwestern Utah. The point is heavily weathered, almost obliterating the collateral to random flaking pattern. It is lenticular in cross section, convergent towards the base, with no apparent edge beveling. The base is slightly concave, stemmed, and ground. The dimensions are 8.1 cm long by 2.2 cm wide.

CRESCENTS (9000 TO 7000 B.P.)

Crescents are found along the margins of ancient lake beds in the Great Basin and the Mohave Desert, often in association with other Paleoindian and Paleoarchaic stone artifacts. At the Sunshine Well locality in eastern Nevada, crescents were part of assemblages dating between 7,000 to over 9,000 B.P. (Hutchinson 1988:303). These flaked tools are crescent or half moon in shape. Also known as Great Basin Transverse points, the wear patterns often seen in the center concavity once suggested a specific use: "crescent-like arrowheads or bolt-heads, with a broad hollowed edge, were used in hunting in the Middle Ages, and some are preserved in museums. The Roman Emperor Commodus is related to have shown his skill in archery by beheading the ostrich when at full speed with crescent-headed arrows" (Heizer and Hester 1978:15). Crescents are highly variable, and wear frequently occurs on both the concave and convex edges. Sometimes the ends are tanged or spurred and thought to be hafted, sickle-like knives. Crescents were thus most likely a form of chipped stone tool that could be employed for multiple purposes (Hutchinson 1988:315-316).

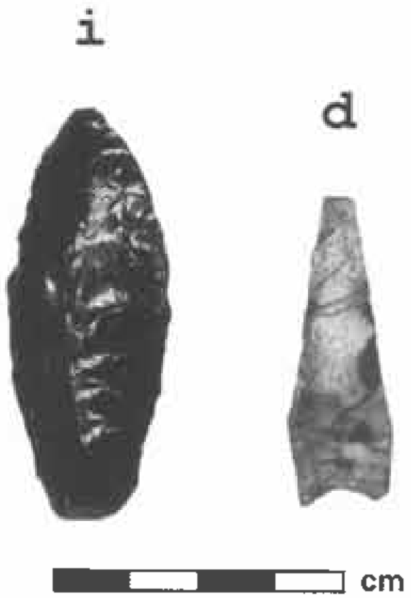
Crescents from localities l, a, and h.
The crescent from locality l was found in a sand dune field near the sinks of Grouse Creek. It is made from high quality yellowish-gold agate with a dark stripe. The dimensions are 4.9 cm long and 1.6 cm wide.

This crescent from locality a was found in the same area as the Clovis point shown above, near the Hampton Ford on the Bear River. It is made from brownish-black chert similar to that found in the Green River, Wyoming area. Both ends show use-wear as possible gravers. The dimensions are 4.1 cm long and 1.6 cm wide.

The crescent from locality h was found in association with the Frederick point shown above. As previously stated, both were found near an old creek channel, possibly associated with the present day Bear River or Willard Creek. It is made from an opaque black ignimbrite. The dimensions are 4.0 cm long by 1.4 cm at its widest point.

UNKNOWN POINTS

Many Paleoindian and Paleoarchaic points do not readily fit into known types. These points often have characteristics of several different types, or vary too much from any known type, and thus avoid typing simply because they are so unusual. The following points are from localities that yield some of the other early points shown here, but could not be grouped into any known type. They may be similar in age to the early types from these areas, and we show them here with the hope that as more unusual specimens are reported, a typology might be constructed.



Lanceolate points from localities i and d.
The point from locality i was found along the Gilbert Shoreline of Lake Bonneville/Great Salt Lake, near Connor Spring. It is made of black obsidian and has a slightly ground base. The tip was reworked and the entire blade shows signs of several resharpenings. It may be of the Western Pluvial Lakes Tradition (Willig, Aikens, and Fagan 1988:408). It is 5.6 cm long and 2.3 cm wide.

The point from locality d near Kelton, was found only three meters away from Scottsbluff point shown above. The material appears to be a marbled tan and brown chert similar to that found near Cedar Hills, Wyoming, in the Flaming Gorge area. The appearance is dull, lacking the glossiness often associated with heat-treating. The tip appears to be missing and basal grinding is pronounced. Perhaps it was refurbished for use as a point, or a drill. The dimensions are 4.3 cm long by 1.4 cm wide at the base.

Fluted point from locality d.
This point was found in the Wildcat Hills area near Kelton, and in some respects resembles a Windust point (Pitblado 2003:102). It has definite flutes on both sides with pressure flake scars intruding into the flute. This may indicate that it is a reworked remnant of a Clovis base. It has an incurvate cutting edge and is made of high quality, opaque, black obsidian. The dimensions are 5.6 cm long and 3.0 cm wide.

DISCUSSION

According to David G. Anderson and Michael K. Faught (2002:3),

> . . . comparatively little is known about Paleoindian settlement and occupation in many parts of the New World. A number of sites have been excavated and many Paleoindian artifacts have been documented on local scales. When such data are compiled in larger frameworks, however, they can tell us important things. Fluted and other lanceolate projectile points are currently the most unambiguous diagnostic indicators of Paleoindian occupation. Information about their occurrence is one way, short of excavation and absolute dating procedures, that we can estimate the extent and magnitude of these early occupations. By recording information about Paleoindian projectile points, including enough descriptive data to recognize subtypes or varieties, we should eventually accumulate enough information to document local Paleoindian settlement patterns, and changes in these patterns over time. Equally important, we may come to better recognize landform types or specific sites where undisturbed assemblages may occur.

The specimens shown here suggest the wide variety of Paleoindian occupation in northern Utah. Most western states contain vast public lands, and these represent a potentially large resource to the archaeological community. We hope that by demonstrating the presence of widespread Paleoindian cultural resources in Utah, archaeologists, as well as state and federal agencies, will give greater attention to documenting and studying the Utah record of the earliest period of human occupation in the Americas.

REFERENCES CITED

Amsden, C. E.
1937 The Lake Mohave Artifacts. In *The Archaeology of Pleistocene Lake Mohave: A Symposium.* Southwest Museum Papers, No. 11, pp. 51-97. Los Angeles.

Anderson, D.G., and M. K. Faught
2002 North American Paleoindian Projectile Point Database. Retrieved November , 2002 from: http://www.anthro.fsu.edu/research/paleo/paleoind.html.

Bostrom, P. A.
2002 Time Line Index for Stone Age Artifacts. Retrieved November 11, 2002 from: http://www.lithiccastinglab.com.

Butler, B. R.
1978 *A Guide to Understanding Idaho Archaeology*, 3rd ed., *The Upper Snake and Salmon River Country.* Idaho State Historic Preservation Office, Boise.

Heizer, R. F., and T. R. Hester
1978 *Great Basin Projectile Points: Forms and Chronology.* Ballena Press, Socorro, New Mexico.

Mulloy, W.
1959 The James Allen Site Near Laramie, Wyoming. *American Antiquity* 25(1):112-116.

Pitblado, B. L.
2003 *Late Paleoindian Occupation of the Southern Rocky Mountains: Early Holocene Projectile Points and Land Use in the High Country.* University Press of Colorado, Boulder.

Roberts, F. H. H.
1962 1961 Excavations at Agate Basin, Wyoming. *Plains Anthropologist* 7:89-91.

Russell, D. J.
1993 Running Antelope: A Paleoindian Site in Northern Utah. *Utah Archaeology* 6:79-85.

Russell, V. Y.
1962 *Indian Artifacts.* Johnson Publishing Company, Boulder Colorado.

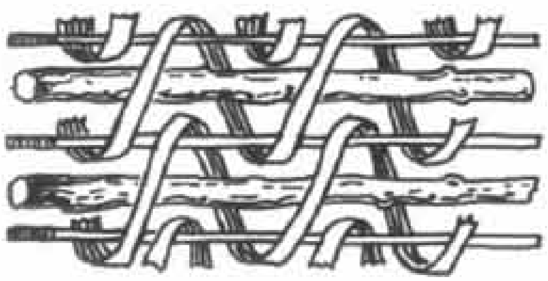
Smith, C. R.
2002 *Clovis Complex.* Retrieved November 9, 2002 from: http://www.cabrillo.cc.ca.us/~crsmith/clovis.html.

Tuohy, D. R., and T. N. Layton
1976 Towards the Establishment of a New Series of Great Basin Projectile Points. *Nevada Archaeological Survey Reporter*

10(6):1-5.

Willig, J. A., C. M. Aikens, and J. L. Fagan
1988 *Early Human Occupation in Far Western North America: The Clovis-Archaic Interface.* Nevada State Museum Anthropological Papers, No. 21, Carson City.

Wormington, H. M.
1957 *Ancient Man in North America.* Denver Museum of Natural History Popular Series No. 4.



INSTITUTIONAL CONSTRAINTS ON SOCIAL AND ECONOMIC FLUIDITY IN FARMER-FORAGER SYSTEMS: BIOARCHAEOLOGY AND THE SEXUAL DIVISION OF LABOR IN PREHISTORIC UTAH

Jason Bright, Department of Anthropology, University of Utah, Salt Lake City, UT 84112.

The Formative period in the eastern Great Basin is marked by considerable economic and social variation, as individuals cycled in and out of farming and foraging modes. Such cycling may have been difficult, because the two economic options include contrasting social institutions that may clash, and therefore inhibit change. The sexual division of labor is one such institution that may vary between the two ends of the subsistence cycle. However, bioarchaeological data suggest that men and women were able to maintain broad similarities in the sexual division of labor, whether farming or foraging. Being able to maintain their interests in this regard across the economic spectrum loosened social constraints to switching, and facilitated economic cycling.

During the Formative Period (ca. A.D. 400-1300) in the eastern Great Basin and Colorado Plateau a mix of farmers and foragers practiced a diverse suite of subsistence options (Madsen and Simms 1998; Upham 1994). Economic ptions included: 1) mixing aspects of both economies at once, 2) cycling between the two economies over the course of an individual's life, or 3) remaining active in one mode or the other, but exchanging food, labor, and other items, resulting in mixed diets.

Options 1 and 2 are similar, in that individuals actively participate in each economic strategy. Option 3 is different because foragers are distinct from farmers, but connected through exchange. The first two options can be taken together as "enmeshed" subsistence practices, in order to emphasize that individuals actively participate in both subsistence economies. The remaining option can be thought of as "symbiosis" (Madsen and Simms 1998), where exchange is the common mechanism that provides farmers with wild foods and foragers with agricultural products.

Madsen and Simms (1998:283-289) highlight the importance of identifying archaeological manifestations of these different strategies. Teasing apart enmeshed farmer-forager systems from symbiotic systems in the archaeological record may be difficult, because each practice leads to a mixed faunal and floral record, diverse technologies, and a combination of site types and settlement patterns. Likewise, evidence of mixed diets from available stable carbon isotope data (Coltrain and Stafford 1999; Coltrain and Leavitt 2002) cannot, by itself, separate cycling from symbiosis (Simms 1999:45).

An institutional approach to farmer-forager archaeology holds the potential for accomplishing this. Institutions constitute the agreed upon "rules of the game" (North 1990:3) that determine rights, rules, and obligations between group members. Because institutions are constructed to solve local problems of interaction and encourage economic performance, they may vary widely between different economies (North 1990).

If we can identify archaeological manifestations of institutions that differ between farming and foraging economies, then we are in a position to identify contexts of enmeshed subsistence systems from symbiotic systems for the following reason: In enmeshed farmer-

UTAH ARCHAEOLOGY 15(1)2002
pp. 67-83

forager systems, one expects consistency between farming and foraging institutions as a result of consistent economic switching and mixing. Otherwise, institutional contrasts between farming and foraging may inhibit cycling. In symbiotic settings, one may expect distinct differences in farmer and forager institutions, because farmers and foragers remain relatively distinct, but connected through exchange.

Many institutions vary between farmers and foragers. Examples include leveling mechanisms common to foragers which encourage sharing and redistribution, and inhibit the accumulation and inheritance of material wealth (Wiessner 1997). These mechanisms are largely absent from farming societies. Here, I focus on the sexual division of labor because it often varies between the two economies, and leaves direct, bioarchaeological evidence (e.g., Bridges 1989; Brunson 2000; Larsen 1995; Ruff 1999). I focus on differences between male and female cortical bone loading in farming and foraging contexts. Because cortical bone deposition can be encouraged by common, repeated use of limbs, it can identify differences in the sexual division of labor.

FARMERS, FORAGERS, AND THE BIOARCHAEOLOGY OF SEXUAL DIVISIONS OF LABOR

One institution individuals use to assign and schedule responsibilities and obligations of economy is the sexual division of labor, which allocates tasks of subsistence, manufacture, maintenance, and production. Differences in public and private chores are also structured by the sexual division of labor, which has an important role in determining many social relationships.

Foragers

Ethnographies of Great Basin foragers (e.g., Steward 1938) suggest that women's tasks commonly include gathering wild foods as well as teaching and tending children. These activities often kept women relatively close to home. Men commonly involve themselves in more public tasks of hunting for sharing, and visiting friends and relatives at great distances. Men also organized rabbit and game drives and associated public feasts by seeking the contributions of individuals from other camps. In this task they travel far and wide, uniting bands across great distances.

This general pattern is apparent in other cases. Sugawara (1988) shows that among the central Kalahari San, men are more active than women in visiting friends and kin, and are likely to travel farther. Cashdan (1980:731) shows that among the //Gana in the Central Kalahari Game Reserve, men are up to four times more likely to visit individuals outside the reserve, at greater distances than women. Women however, are more active across the smaller distances within the reserve. Further, during the summer of 2000, I was struck by how often Tjimba forager men in northwest Namibia make long distance trips to visit friends and relatives, and to organize meetings between headmen of distant regions. In one trip, a man covered more than 100 km in a matter of days to visit a wife, and to collect on a debt. He remained at home only a few days before departing again. In this region, men seem constantly on the move.

When men's public roles take them further afield, their patterns of logistic mobility may contrast with that of women. Men's greater degree of travel, especially when traversing rugged terrain, should leave traces in the physical skeleton. Indeed, Great Basin anthropology has embraced bioarchaeology as a useful medium for exploring the sexual division of labor in prehistory.

Hemphill (1999:284-285) reports that men from the Malheur Lake and Stillwater skeletal series exhibit elevated levels of osteoarthritis, especially older men. The onset of osteoarthritis occurs earlier in males than it does in females, and males exhibit faster progression of osteoarthritis throughout the entire skeleton. In a similar study, Brunson (2000:7) found corroborating evidence of sex-based differences in logistic mobility in the Great Salt Lake wetlands sample. She reports that articular surfaces in the leg (hip, knee, and ankle joints) and lumbar vertebrae bear arthritic lesions more often in men than women. Moreover, men's lesions are often more severe than women's lesions. Brunson attributes this difference to higher male logistic mobility (2000:9). Ruff (1999:314-315) finds that men in Great Basin skeletal series often exhibit evidence of heavier biomechanical loading in lower limb bones than do women, and exhibit greater cortical area (1999:299-301). Again, this suggests that men had higher logistic mobility. All of these lines of evidence are consistent with ethnographic descriptions of sex-based differences in logistic mobility from the Great Basin.

Farmers

Archaeological and ethnographic sources from across North America indicate that men's logistic mobility is less pronounced in settled agricultural settings (Bridges 1989; Larsen 1993; Ruff 1999). In these contexts, tasks such as clearing and tending fields and maintaining more substantial housing seem to keep men closer to home. If farming makes long-range hunting trips less frequent, men's logistic mobility is further reduced. Moreover, when the demands of agricultural life select for kin and other relations to live closer together, this also decreases male logistic mobility.

This is not to say that there are no differences between men's and women's logistic mobility in agricultural communities, but relative to women, men seem to engage in shorter, or less frequent, logistical forays in agricultural communities. In this regard, the sexual division of labor takes a different form than we commonly see among hunter-gatherers. Ruff (1999) presents bioarchaeological data from several North American contexts showing that foragers often exhibit greater sexual dimorphism in lower limb mechanical loading than do members of agricultural groups (Figure 1). This suggests that the dichotomy between men and women in logistic mobility patterns is weaker among farmers than among foragers.

Important for the present study, Ruff finds that differences between men and women are more pronounced in the Great Salt Lake wetlands series than any other sample he discusses (1999:316-317), despite wide variation in the amount of corn consumed by Great Salt Lake area inhabitants (Coltrain and Stafford 1999). This underscores the important point that it is the *way people allocate labor* that places different demands upon their skeletons. Men in the Great Salt Lake wetlands were highly active in terms of logistic mobility, whether subsisting on wild or agricultural foods.

Applications to Enmeshed versus Symbiotic Farmer Forager Systems

Bioarchaeology should be able to identify institutional constraints on cycling between farming and foraging, and the sexual division of labor because patterns of logistic mobility are reflected in bone morphology. This leads to some testable hypotheses for enmeshed and symbiotic farmer-forager relations.

In a setting of enmeshed farmer-forager relations, where cycling is frequent and expected, individuals will maintain great similarity in the sexual division of labor. By maintaining consistency in this particular institution, one contrast between farming and foraging economies is lifted. Bioarchaeological evidence should indicate patterns of greater male logistic mobility relative to females, no matter what the local subsistence base might be.

In a setting of symbiosis, where cycling is less frequent, farmers and foragers are more likely to negotiate relatively distinct institutions. Thus, we would expect to see two distinct patterns in the sexual division of labor that co-vary with mode of production. Farmers in symbiotic settings should exhibit bioarchaeological evidence of reduced male logistic mobility, while foragers should maintain patterns of high male logistic mobility.

To test these hypotheses, I compare bioarchaeological data from a number of Great Basin foraging contexts to data from Great Basin farming contexts. If the general pattern of men's logistic mobility is similar, it suggests that Great Basin "farmers" maintained consistency in the sexual division because they were cycling between modes that required maintenance of kin networks and hunting patterns. If patterns of the sexual division of labor vary between Great Basin farmers and foragers, then this suggests that farmers did not engage in frequent cycling, and may have created

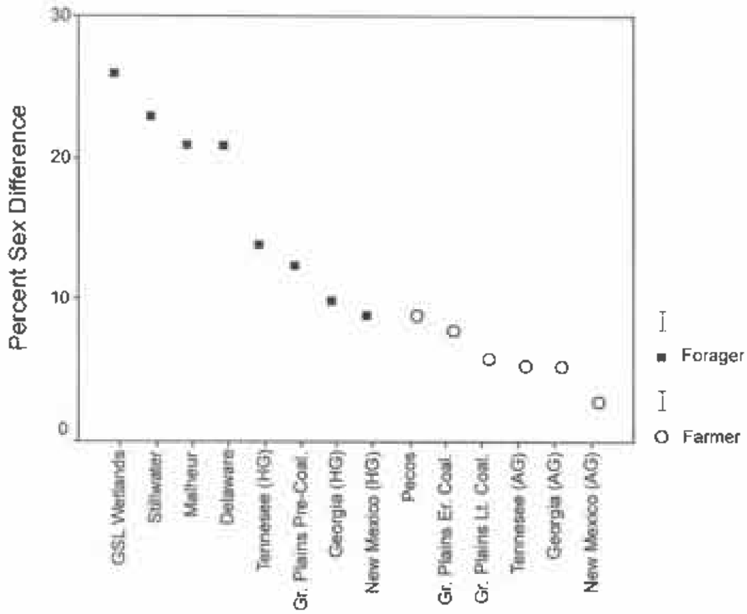


Figure 1. Percent sex differences in biomechanical loading between farmers and foragers (from Ruff 1999).

symbiotic relationships with neighboring foragers. In this way, an institutional approach to farmer-forager systems holds potential for identifying contexts of enmeshed versus symbiotic relationships.

MATERIALS AND METHODS

The above-mentioned studies employ measures of osteoarthritis, joint wear, bone lesions, and biomechanical loading to assess mobility. Another part of human skeletal anatomy that responds to repeated activity is cortical bone.

Cortical Bone and Behavior

Cortical bone is the compact outer layer of bone that surrounds the medullary cavity and sponge-like cancellous bone that provides much of the support and strength of a bone (Figure 2). Cortical growth proceeds by depositing new material on the periosteal (outer) surface, and cortical bone resorption occurs along the endosteal (inner) surface, but the rates at which each happens can vary.

Increasing loads placed on bones, and the increased blood flow from physical activity, or repeated use of a limb enhances the growth of cortical bone. For example, Kirk et al. (1989) find that increased physical activity increases cortical bone density in pre-menopausal, long-distance running women. Gilsanz et al. (1997) discuss the role mechanical loading plays in determining cortical bone density in young children. Hatch et al. (1983) report on archaeological samples with differences in cortical thickness between individuals of differing social status, based upon the physical demands common to different sociopolitical positions. Comparisons between chimps, gorillas, and early hominid cortical bone attest to the bipedality of the latter, because an erect posture places a greater load on lower limb bones (Ohman et al. 1997).

Age plays a significant role in cortical bone maintenance (see Brockstedt et al. 1993; Kaur and Jit 1990). In adolescence, periosteal bone is added while endosteal bone is lost, leading to increased cortical thickness. Through much of adulthood, normal bone deposition

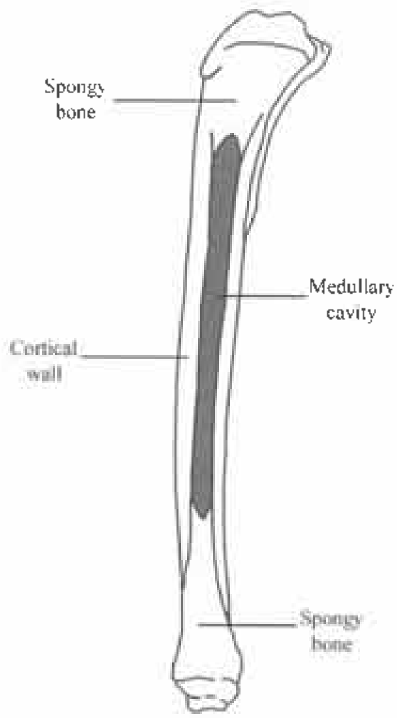


Figure 2. Drawing of a tibia identifying cortical wall, medullary cavity, and spongy (cancellous) bone.

and resorption lead to relative stability in cortical thickness and medullary width, and male and female cortical development appears to be similar (Kaur and Jit 1990:Figures 5 and 6). With increasing age, endosteal resorption occurs more rapidly than does periosteal growth, resulting in a wider medullary cavity and thinner cortical bone (Hatch et al. 1983). By 30-40 years of age, male and female cortical development begins to diverge more widely as bone resorption accelerates in post-menopausal women (Kirk et al. 1989).

Dietary stress also inhibits cortical growth and hastens resorption as the body remodels old bone in response to nutritional shortages. Hummert (1983) finds that low percentages of cortical area in prehistoric subadults that may be nutritionally deficient are consistent with values found in modern, malnourished children. Pfeiffer and King (1983) attribute decreases in cortical bone to dietary stress in two Iroquoian ossuary samples.

Although dietary stress can affect cortical bone, it is probably not significant in this sample. Bright and Loveland (1999) report low frequencies of all the pathologies they studied in the Great Salt Lake wetlands sample, suggesting that dietary shortages were not common. Andrews (1972) presents pathological data for some of the individuals included in the non-wetlands sample studied here, and while frequencies are higher than in the wetlands setting, they do not indicate severe nutritional or dietary stress.

Finally, general robusticity, such as sexual dimorphism, can affect cortical bone values. For that reason, these data are presented as cortical bone index values, as outlined below.

To calculate cortical index (CI), cortical bone thickness (C) is determined by subtracting the width of the medullary cavity (M) from the total width of the bone shaft (T). To control for the affect of dimorphism in robusticity mentioned above, cortical thickness is divided by the width of the total bone shaft, such that $C \div T = CI$. All measurements are taken at mid-shaft, except on tibiae, where the measurements are taken two-thirds

Figure 3. Location of sites and areas discussed in text (modified from Grayson 1993:21).

of the way towards the distal end. This provides a simple measure of cortical development that controls for differences in general size and robusticity between the sexes, and which has been used successfully elsewhere (Martins et al. 1987).

Most analyses are limited to lower limb bones, as those elements respond to repeated activities that include walking and traveling. Upper limb bone data are presented for the entire sample for comparison. However, the farmer sample includes too few upper limb bones for statistical tests between males and females within the group, so comparisons between farmers and foragers are limited to lower limbs. Within these elements, the fibula is a non-load bearing bone that may not respond to repeated activities in the same way that femora and tibiae will. Unless otherwise indicated statistical tests are two-tailed t-tests.

The Sample

The sample for analysis includes 63 individuals from 32 farmer and forager sites across Utah (Figure 3). Forager samples are drawn from the Great Salt Lake wetlands series (n = 32 individuals). Stable carbon isotope data (Coltrain and Leavitt 2002:Table 15; Coltrain and Stafford 1999) as well as bioarchaeological data indicate switching between farming and foraging in this sample (Simms 1999). To further underscore "typical" forager patterns, comparisons are made to the Malheur and Stillwater (Figure 1) skeletal series, which are from exclusively forager contexts (Oetting 1999; Schoeninger 1999).

Farmer samples are drawn from more temporally and spatially scattered sites across Utah (n = 31 individuals). These come from larger sites such as Caldwell Village, Evans Mounds and the Coombs Site, where stable carbon isotope data suggest heavy reliance on corn agriculture (Coltrain 1993; Coltrain and Leavitt 2002), or from similar sites. It is important to note that this sample includes individuals from a number of sites typically glossed as "Fremont" as well as "Anasazi," because the general wisdom is that the Anasazi phenomenon includes considerable reliance on corn.

Seven of the individuals are sub-adult, but were originally aged as no less than 15 years old and are thus included in the sample. Individuals of indeterminate age-at-death or sex are excluded. Elements that could not be accurately identified, or were too fragmentary to measure, are also excluded.

RESULTS

The analysis results in several observations and Table 1 presents cortical bone index data for all limb bones. These observations are:

1. Male femora and tibiae exhibit greater cortical bone development than do females, and for most elements the difference is statistically significant (Table 2).

2. The general pattern of increased male cortical bone development in lower limbs is apparent in the forager and farmer sub-samples, although sample sizes are reduced when breaking the sample down by economy (Table 3).

3. Within either sex, cortical bone indices for lower, load-bearing limbs do not vary significantly by economy, although farmers exhibit slightly less cortical bone development (Table 3).

Table 4 presents these data in a way consistent with those reprinted from Ruff, and shown in Figure 1. The relative difference in cortical development by sex for each economy is shown. For example, a value of 30 percent indicates that females are on average 30 percent less robust than males for that element. Although the relative difference between the sexes in cortical bone index values are not as pronounced as in Ruff's data, they still range between 10 to 20 percent, consistent with foraging populations across North America. Note that this holds true for the farmer sub-sample.

The analysis also results in several minor observations. Although age can affect cortical bone development, it does not seem to introduce significant bias to this sample. Cortical bone loading does not differ significantly between old adult and young adult samples in lower limbs (Table 5). There is a slight trend towards greater cortical loading in upper limb bones among the younger individuals, suggesting some degree of cortical bone resorption among the elderly in this sample. Differences are rarely significant between age groups, however, and they are limited to upper limbs only. Sub-adults were excluded from Table 5 because only seven included in the sample.

Notice, also, that upper limbs usually do not differ significantly between the sexes (Table 2). This owes, in part, to very small sample sizes. If any trend is apparent, it is that females are more heavily loaded in the upper limbs. Further, differences between the sexes are more pronounced in right side elements than in left side elements (Table 2).

DISCUSSION

The potentially confounding factors of age and physiological stress do not seem to have a significant effect on these data, thus it is likely that these data represent a real sex-based difference in logistic mobility patterns in both farming and foraging contexts. If patterns of sex-based logistic mobility in farming contexts are similar to patterns of sex-based logistic mobility in foraging contexts in the Great Salt Lake wetlands and elsewhere in Utah, then the sexual division of labor remained consistent across different modes of production.

Table 1. Cortical Index Data for all Individuals in the Sample.

Site	Site Name	Burial	Age at Death	Sex	Economy	Right Femur	Left Femur	Right Tibia	Left Tibia	Right Fibula	Left Fibula	Right Humerus	Left Humerus	Right Ulna	Left Ulna	Right Radius	Left Radius
42BO36	Hogup Cave	294	18-34	M	Forager	—	0.21	—	—	—	—	—	—	—	—	—	—
42BO579		64	18-34	M	Forager	0.23	0.19	0.15	0.20	—	—	0.23	0.22	—	—	0.23	0.30
42BO599		68	35+	M	Forager	0.23	0.23	0.14	0.15	—	—	0.10	0.15	—	0.06	—	—
42BO73		60	Adult	F	Forager	—	—	—	—	0.29	—	0.12	—	—	—	—	—
42BO73		61	35+	F	Forager	0.26	0.27	0.13	0.13	0.08	0.31	0.25	—	0.25	0.30	—	0.13
42BO73		63	Adult	F	Forager	0.25	—	—	—	—	—	—	—	—	—	—	—
42BO74		73	35+	M	Forager	—	—	—	—	—	—	—	—	—	—	—	—
42DV8		326	18-34	M	Farmer	0.24	—	—	0.23	—	—	—	—	—	—	—	—
42EM3		9	3.00	F	Farmer	0.25	—	0.13	—	—	—	—	—	—	—	—	—
42EM4		25	35+	M	Farmer	0.24	—	—	0.19	—	—	—	—	—	—	—	—
42EM4		4	18-34	F	Farmer	—	—	0.18	—	—	—	—	—	—	—	—	—
42GA34		636	18-34	M	Farmer	0.26	—	0.24	—			—	—	—	—	—	—
42GA540		40	35+	M	Farmer	—	0.25	—	—	—	—	—	0.23	—	—	—	—
42GA540		41	15-17	F	Farmer	0.24	—	0.23	—	—	—	—	—	—	—	—	—
42IN124	Median Village	73	35+	M	Farmer	—	—	—	—	—	—	—	—	—	—	—	—
42IN40	Evans Mounds	11	35+	F	Farmer	—	0.28	—	0.25			—	—	—	—	—	—
42IN40	Evans Mounds	227	35+	M	Farmer	0.23	0.24	0.13	0.17	—	—	—	—	—	—	—	—
42IN40	Evans Mounds	220	35+	M	Farmer	—	0.23	—	0.14	—	—	—	—	—	—	—	
42IN40	Evans Mounds	311	18-34	F	Farmer	—	0.27	—	0.19	—	—	—	—	—	—	—	—
42IN40	Evans Mounds	10	15-17	M	Farmer	—	0.25	—	0.18	—	—	—	—	—	—	—	—
42JB2	Nephi Mounds	77	35+	F	Farmer	—	0.26	—	0.16	—	—	—	—	—	—	—	—
42MD180	Pharo Village	83	35+	F	Farmer	0.29	—	0.20	—	—	—	—	—	—	—	—	—
42SA454	Steer Place	386	15-17	M	Farmer	0.21	—	0.17	—	—	—	—	—	—	—	—	—
42SA544	Horsefly Hollow	84	15-17	M	Farmer	0.25	—	—	—	—	—	—	—	—	—	—	—
42SA738	Ivy Shelter	400	18-34	M	Farmer	0.22	0.23	0.18	0.15	—	—	—	—	—	—	—	—
42SA738	Ivy Shelter	381	35+	F	Farmer	0.25	—	0.18	—	—	—	—	—	—	—	—	—
42SA738	Ivy Shelter	219	35+	M	Farmer	0.17	—	0.10	—	—	—	—	—	—	—	—	—
42SL29		185	15-17	M	Farmer	—	0.25	—	—	—	—	—	—	—	—	—	—
42SV5	Snake Rock Village	124	18-34	M	Farmer	—	0.27	—	—	—	—	—	—	—	—	—	—
42SV5	Snake Rock Village	123	18-34	F	Farmer	—	—	—	—	—	—	0.15	—	—	—	—	—

42UN95	Caldwell Village	39	18-34	F	Farmer	0.28	—	0.20	—	—	—	—	—	—	—	—	—
42UN95	Caldwell Village	89	18-34	M	Farmer	0.25	—	0.18	—	—	—	—	—	—	—	—	—
42UN95	Caldwell Village	91	18-34	M	Farmer	0.24	—	0.19	—	—	—	—	—	—	—	—	—
42UN95	Caldwell Village	92	18-34	M	Farmer	0.25	—	0.14	—	—	—	—	—	—	—	—	—
42UN95	Caldwell Village	95	35+	M	Farmer	0.19	—	0.11	—	—	—	—	—	—	—	—	—
42UN95	Caldwell Village	193	35+	M	Farmer	0.24	—	—	0.20	0.21	0.25	—	—	—	—	0.23	0.22
42WB34	Injun Creek	112	18-34	M	Farmer	0.25	—	0.19	—	—	—	—	—	—	—	—	—
42WB34	Injun Creek	601	15-17	F	Farmer	0.27	—	0.20	—	—	—	—	—	—	—	—	—
42WB48		3	18-34	M	Forager	0.27	0.24	0.22	—	0.34	0.30	0.20	0.21	0.30	0.34	0.22	0.23
42WB48		4	Adult	Unk.	Forager	0.29	—	—	—	—	—	—	0.14	—	—	0.23	—
42WB48		5	Adult	M	Forager	—	0.29	—	—	—	—	—	—	—	—	—	—
42WB48		6	Adult	F	Forager	0.27	0.32	—	—	—	—	0.10	0.15	—	0.21	—	—
42WB185		14	35+	F	Forager	0.29	0.29	0.21	0.20	—	0.24	0.13	0.12	—	—	0.28	—
42WB185		15	35+	F	Forager	—	—	—	—	—	—	—	0.16	—	—	—	—
42WB269		20	18-34	Unk.	Forager	0.28	0.22	0.20	0.10	0.24	—	0.16	—	—	0.19	0.21	—
42WB269		21	18-34	F	Forager	0.26	—	—	—	0.25	—	—	0.25	0.31	—	—	—
42WB269		23	18-34	F	Forager	0.26	—	—	—	—	—	—	0.21	—	—	—	—
42WB269		25	Adult	Unk.	Forager	—	—	—	—	—	—	0.11	—	—	—	—	—
42WB269		27	18-34	M	Forager	0.25	0.25	0.13	0.20	—	0.27	0.19	0.18	0.32	0.27	0.27	0.27
42WB269		28	35+	M	Forager	0.28	0.29	0.19	0.19	—	0.23	0.23	0.23	—	0.21	0.20	0.14
42WB269		30	Adult	Unk.	Forager	—	—	—	—	—	—	0.27	—	—	—	—	—
42WB282		31	Adult	M	Forager	—	—	—	—	—	—	—	0.11	—	—	—	—
42WB286		32	35+	Unk.	Forager	0.27	0.28	0.19	0.18	0.23	0.30	0.18	—	—	0.25	0.20	—
42WB304		33	Adult	F	Forager	—	—	—	—	—	—	—	0.18	—	—	—	—
42WB311		41	18-34	M	Forager	—	—	—	—	—	0.28	—	—	—	—	—	—
42WB320		43	18-34	M	Forager	0.23	—	—	—	—	0.21	0.17	—	—	0.27	—	—
42WB322		45	Adult	Unk.	Forager	0.31	0.27	—	—	—	—	—	—	—	—	—	—
42WB323		46	Adult	Unk.	Forager	0.27	0.42	—	—	—	—	—	—	—	—	—	—
42WB324		47	35+	F	Forager	0.25	0.25	0.23	0.19	0.19	0.20	0.12	0.15	—	0.25	0.28	0.27
42WB324		53	18-34	F	Forager	0.34	0.33	0.27	0.25	0.35	0.31	0.13	0.17	0.27	0.26	0.27	—
42WB324		55	18-34	F	Forager	—	—	—	0.30	0.18	0.20	—	0.24	—	—	—	—
42WB324		56	18-34	F	Forager	0.30	0.30	—	—	—	—	—	—	—	—	—	—
42WB324		58	18-34	F	Forager	0.27	0.26	0.20	0.20	0.31	0.31	0.21	0.19	—	0.29	0.27	0.24
42WB325		59	Adult	Unk.	Forager	0.25	—	—	—	—	—	—	—	—	—	—	—

Table 2. Cortical Bone Index Data by Side and Sex.

Element	Male (n)	Female (n)	Significance
Right Side			
Femur	0.27 ± 0.02 (16)	0.23 ± 0.03 (21)	.000
Tibia	0.19 ± 0.04 (12)	0.16 ± 0.04 (16)	.060
Fibula	0.24 ± 0.09 (7)	0.26 ± 0.07 (3)	.723
Humerus	0.15 ± 0.05 (8)	0.18 ± 0.04 (7)	.208
Ulna	0.28 ± 0.03 (3)	0.31 ± 0.01 (2)	.245
Radius	0.28 ± 0.08 (4)	0.22 ± 0.03 (6)	.005
Left Side			
Femur	0.28 ± 0.03 (10)	0.25 ± 0.03 (15)	.004
Tibia	0.21 ± 0.05 (9)	0.18 ± 0.03 (12)	.138
Fibula	0.26 ± 0.05 (6)	0.26 ± 0.04 (7)	.908
Humerus	0.18 ± 0.04 (10)	0.19 ± 0.05 (7)	.787
Ulna	0.26 ± 0.04 (5)	0.23 ± .10 (6)	.539
Radius	0.21 ± 0.07 (3)	0.23 ± 0.06 (5)	.731

An explanation for this consistency is economic cycling. In other words, from a forager's perspective, men kept being men and women kept being women, no matter how the local resource base varied. Lacking ethnographic analogy for prehistoric farmer-forager systems in Utah, we may turn to descriptions of similar systems in other parts of North America to flesh out this picture in more human terms. Trigger (1990:130-131) identifies differences in men's and women's public and private roles among the Iroquois of Ontario that are salient with reference to physical demands:

> The division of labor was overwhelmingly along gender lines...Men cleared new fields, built houses, hunted, fished, traded, waged war, and conducted the public affairs of their communities, tribes and confederacies. Women grew and harvested crops, gathered firewood, cooked, looked after children, and engaged in craft production... In all of these activities there was a strong emphasis on work teams made up of individuals of the same sex.
>
> While men frequently engaged in activities that took them far from their communities, women rarely ventured beyond their clear ings unaccompanied by men.

Despite the distinction in activity patterns that should be expressed in skeletal attributes, Trigger (1990:132) also observes:

> While men and women led separate lives, there is no evidence that women were inferior to men in Iroquoian societies.

Table 3. Cortical Bone Index Data by Side, Sex and Economy.

	Element	Sex (n)	Mean	Significance*
Forager				
	Right femur	male (10) female (7)	0.28 ± 0.03 0.25 ± 0.02	.038
	Left femur	male (7) female (7)	0.29 ± 0.03 0.25 ± 0.04	.041
	Right tibia	male (5) female (6)	0.21 ± 0.05 0.17 ± 0.03	.102
	Left tibia	male (6) female (5)	0.21 ± 0.06 0.18 ± 0.02	.183
Farmer				
	Right femur	male (6) female (14)	0.26 ± 0.02 0.23 ± 0.03	.003
	Left femur	male (3) female (8)	0.27 ± 0.09 0.24 ± 0.02	.004
	Right tibia	male (7) female (10)	0.19 ± 0.03 0.16 ± 0.04	.094
	Left tibia	male (3) female (7)	0.20 ± 0.05 0.18 ± 0.03	.242

In this case, and others, men and women pursued different interests that led them to different lifestyles in many respects. One result of this division of labor was a sex-based difference in logistic mobility. A similar division of labor seems to have operated among prehistoric farmers and foragers in Utah.

These results imply that Basin/Plateau farmer-forager systems may represent a mosaic of enmeshed subsistence economies more than they represent symbiotic, exchange relationships between distinct islands of farmers and foragers. Results do not mean that symbiotic relationships were absent, however. The presence of corn remains at Hogup Cave, for example, suggests exchange between farmers and foragers over a significant distance (Aikens 1970; Janetski 1997). Rather, these findings indicate that enmeshed subsistence practices were common enough to be expressed in human anatomy. Contexts where symbiosis should not be expected in Utah skeletal samples are Fremont and Anasazi residential farming bases where reliance on corn was higher than in the Great Salt Lake wetlands case. In those cases, symbiosis may have been more occasional or temporary.

Although only one potential institutional constraint on economic and social fluidity is discussed here, these results hold implications for other aspects of social organization, and for the archaeology of adaptively diverse farmer-forager systems in general. Two topics of immediate interest that should reflect institutional differences between enmeshed and symbiotic farmer-forager strategies involve the creation and maintenance of ethnic identities (Janetski 1990; Jones 1994), and the construction of space at camps and villages (Hillier and Hanson 1984; Widlok 1999).

Table 4. Percent Sex Difference [(male CI - female CI) ÷ female CI) x 100] Between Farmers and Foragers Lower Limb Bones (load-bearing bones only).

Group	Element	Percent Sex Difference
Forager		
	Right femur	12.0
	Left femur	16.0
	Right tibia	19.0
	Left tibia	16.7
Farmer		
	Right femur	13.0
	Left femur	12.5
	Right tibia	18.8
	Left tibia	11.1

Ethnic Boundaries in Farmer-Forager Systems

Modern farmer-forager systems with symbiotic relationships suggest that ethnic distinctions are often drawn along economic lines (e.g., Bahuchet and Guillaume 1982; Grinker 1994; Smith 1998). In these settings, ethnic contrasts between farmers and foragers often reflect different groups' economic niche, and reinforce relevant stereotypes, even though the boundaries themselves may be plastic (Figure 4). In more enmeshed economic settings, such as the Great Basin results reported here, ethnic identities may not correlate with mode of production at all. This may be analogous to the case described by Vierich (1982) for the Basarwa of the Kalahari Desert, in Botswana, southern Africa.

Had results of this study implied symbiosis more than meshing, then we would predict economically bounded representations of identity; perhaps differences between large farming villages and the smaller forager camps around them. Given the implication of considerable economic flexibility in eastern Great Basin farmer-forager systems, we may instead anticipate that archaeological reflections of ethnic identities will cross-cut the mode of production.

The Organization of Space

The second topic involves the organization of space at camps or villages (e.g., Hillier and Hanson 1984; Widlok 1999). In cases of enmeshed farmer-forager systems, institutions that promote egalitarian ethics of sharing and redistribution may remain consistent across economic transitions, much the same way that the sexual division of labor does. In symbiotic systems, there may be strong contrasts between the two modes, such that forager institutions promote redistribution, while farmer institutions commonly foster hoarding and greater accumulation of material wealth.

Therefore, in enmeshed farmer-forager settings, the layout of camps and villages should encourage openness and easy access to everyone and everything. In symbiotic settings, there should be contrasts in this regard between farming and foraging settlements. Forager camps should emphasize openness and easy access, but at farming villages space should be more private, with access across the settlement more regulated.

An example of what this means is found in the "social permeability maps" developed by engineers to regulate the flow of people in buildings during emergencies.

Table 5. Cortical Bone Index Data by Side and Age.

Element	35 + (n)	18-34 (n)	Significance
Right Femur	0.25 ± 0.04 (14)	0.26 ± 0.02 (17)	.772
Left Femur	0.26 ± 0.03 (12)	0.24 ± 0.03 (10)	.106
Right Tibia	0.17 ± 0.05 (12)	0.18 ± 0.03 (13)	.475
Left Tibia	0.18 ± 0.04 (13)	0.19 ± 0.06 (8)	.593
Right Fibula	0.21 ± 0.10 (5)	0.26 ± 0.06	.359
Left Fibula	0.26 ± 0.04 (7)	0.26 ± 0.06	.942
Right Humerus	0.16 ± 0.06 (7)	0.18 ± 0.03	.282
Left Humerus	0.17 ± 0.04 (7)	0.21 ± 0.03	.035
Right Ulna	0.26 ± 0.01 (2)	0.31 ± 0.10	.019
Left Ulna	0.22 ± 0.08 (6)	0.27 ± 0.05	.270
Right Radius	0.24 ± 0.04 (6)	0.24 ± 0.03	.872
Left Radius	0.19 ± 0.07 (4)	0.25 ± 0.03	.126

Widlok (1999) for instance, presents contrasts of this sort between between Hai□om forager camps and Ovambo farmsteads in northern Namibia (Figure 5). He demonstrates that forager camps are often open, with all areas easily accessible, whereas farmsteads are more spatially regulated, preventing easy access to important areas.

The spatial organization of some Fremont sites such as Five Finger Ridge (Talbot et al. 2000) and Baker Village (Wilde and Soper 1994) may represent settings with more private space, with little emphasis on openness and easy access. Perhaps in settings such as these, frequent cycling was not as common as elsewhere. While only a suggestion, the discussion here shows the potential of this line of research, and suggests some testable hypotheses using an institutional approach to understanding farmer-forager systems.

CONCLUSIONS

Great Basin anthropology has uncovered several biological indications of a sexual division of labor in which males appear more logistically active than females. This pattern is common to hunter-gatherer societies but contrasts with many farming societies across North America. This study finds that forager-like patterns of sex-based differences in logistic mobility are common across predominantly foraging as well as predominantly farming contexts in the Great Salt Lake wetlands, and in some other Fremont and Anasazi cases with residential farming bases in Utah.

The implication of these findings is that an important economic institution, the sexual division of labor, remained consistent regardless of whether subsistence was weighted toward wild or agricultural foods. Tasks necessary to both farming and foraging appear to be integrated into existing patterns of labor and logistic mobility. This loosened the constraints on economic and residential cycling. It appears that individuals moved among these systems over the course of their lives. It also appears that task integration occurred across public and private roles, also loosening constraints on economic and residential cycling.

These findings and their implications provoke questions beyond the dialectic of wild versus agricultural subsistence bases, to focus more upon the social institutions that may encourage or inhibit subsistence cycling and mixing in an economically and socially plastic environment.

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REFERENCES CITED

Andrews, J.
1972 *The Paleopathology of the Eastern Great Basin Fremont Population.* Unpublished Master's thesis. Department of Anthropology, University of Utah, Salt Lake City.

Aikens, C. M.
1970 *Hogup Cave.* Anthropological Papers No. 93. University of Utah Press, Salt Lake City.

Bahuchet, S. and H. Guillaume
1982 Aka-Farmer Relations in the Northwest Congo Basin. Translated by S. M. Van Wyck. In *Politics and History in Band Societies*, edited by E. Leacock and R. Lee, pp. 189-212. Cambridge University Press, New York.

Bridges, P. S.
1989 Changes in Activities with the Shift to Agriculture in the Southeastern United States. *Current Anthropology* 30:385-394.

Bright, J. R. and C. J. Loveland
1999 A Biological Perspective on Prehistoric Human Adaptation in the Great Salt Lake Wetlands. In *Prehistoric Lifeways in the Great Basin Wetlands: Bioarchaeological Reconstruction and Interpretation,* edited by B. E. Hemphill and C. S. Larsen, pp. 103-116. University of Utah Press, Salt Lake City.

Brunson, E.
1999 Osteoarthritis, Mobility and Adaptive Diversity Among the Great Salt Lake Fremont. *Utah Archaeology* 13:1-14.

Brockstedt, H., M. Kassem, E. F. Eriksen, L. Mosekilde, and F. Melsen
1993 Age and Sex-Related Changes in Iliac Cortical Bone Mass and Remodeling. *Bone* 14:681-691.

Cashdan, E. A.
1980 Property and Social Insurance among the //Gana. In *2nd International Conference on Hunting and Gathering Societies*, pp. 717-734. Départment d'anthropologie, University of Laval.

Coltrain, J. B.
1993 Fremont Corn Agriculture: A Pilot Stable Carbon Isotope Study. *Utah Archaeology* 6:49-56.

Coltrain, J. B. and S. W. Leavitt
2002 Climate and Diet in Fremont Prehistory: Economic Variability and Abandonment of Maize Agriculture in the Great Salt Lake Basin. *American Antiquity*: 67:453-485.

Coltrain, J. B. and T. W. Stafford, Jr.
1999 Stable Carbon Isotopes and Great Salt Lake Wetlands Diet: Toward an Understanding of the Great Basin Formative. In *Prehistoric Lifeways in the Great Basin Wetlands: Bioarchaeological Reconstruction and Interpretation,* edited by B. E. Hemphill and C. S. Larsen, pp. 55-83. University of Utah Press, Salt Lake City.

Gilsanz, V., A. Kovanlikaya, G. Costin, T. F. Roe, J. Sayre, and F. Kaufman
1997 Differential Effect of Gender on the Sizes of Bones in the Axial and Appendicular

Skeletons. *Journal of Clinical Endocrinology and Metabolism* 82:1603-1607.

Grayson, D. K.
1993 *The Desert's Past: A Natural Prehistory of the Great Basin.* Smithsonian Institution, Washington D. C.

Grinker, R. R.
1994 *Houses in the Rain Forest: Ethnicity and Inequality Among Farmers and Foragers in Central Africa.* University of California Press, Berkeley.

Hatch, J. W., P. S. Willey, E. E Hunt, Jr.
1983 Indicators of Status-Related Stress in Dallas Society: Transverse Lines and Cortical Bone Thickness in Long Bones. *Midcontinental Journal of Archaeology* 8:49-71.

Hemphill, B. E.
1999 Wear and Tear: Osteoarthritis as an Indicator of Mobility among Great Basin Hunter-Gatherers. In *Prehistoric Lifeways in the Great Basin Wetlands: Bioarchaeological Reconstruction and Interpretation,* edited by B. E. Hemphill and C. S. Larsen, pp. 241-289. University of Utah Press, Salt Lake City.

Hemphill, B. E. and C. S. Larsen
1999 *Prehistoric Lifeways in the Great Basin Wetlands Bioarchaeological Reconstruction and Interpretation.* University of Utah Press, Salt Lake City.

Hillier, B. and J. Hanson
1984 *The Social Logic of Space.* Cambridge University Press, New York.

Hummert, J. R.
1983 Cortical Bone Growth and Dietary Stress among Sub-Adults from Nubia's Batn el Hajar. *American Journal of Physical Anthropology.* 62:167-176.

Janetski, J. C.
1990 Ethnicity in Post-Formative Ceramics in the Eastern Great Basin. In *Hunter-Gatherer Pottery from the Far West.* edited by J. M. Mack, pp. 54-66. Nevada State Museum Anthropological Papers No. 21, Carson City.

Jones, S.
1994 *The Archaeology of Ethnicity: Constructing Identity in the Past and Present.* Routledge Press, London.

Kaur, H. and I. Jit
1990 Age Estimation from Cortical Index of the Human Clavicle in Northwest Indians. *American Journal of Physical Anthropology* 83:297-306.

Kirk, S., C. F. Sharp, N. Elbaum, D. B. Endres, S. M. Simons, J. G. Mohler, and R. K. Rude
1989 Effect of Long-Distance Running on Bone Mass in Women. *Journal of Bone and Mineral Research* 4: 515-522.

Larsen, C. S.
1995 Biological Change in Human Populations with Agriculture. *Annual Reviews in Anthropology* 24:185-213.

Larsen, C. S. and R. L. Kelly
1995 *Bioarchaeology of the Stillwater Marsh: Prehistoric Human Adaptation In the Western Great Basin.* American Museum of Natural History. Anthropological Papers No. 77, New York.

Madsen, D. B. and S. R. Simms
1998 The Fremont Complex: A Behavioral Perspective. *Journal of World Prehistory* 12:255-336.

Martins, D. L. A. L. Magennis and J. C. Rose
1987 Cortical Bone Maintenance in an Historic Afro-American Cemetery Sample from Cedar Grove, Arkansas. *American Journal of Physical Anthropology* 74:255-264.

North, D. C.
1990 *Institutions, Institutional Change and Economic Performance.* Cambridge University Press.

Oetting, A. C.
1999 An Examination of Wetland Adaptive Strategies in the Harney Basin: Comparing Ethnographic Paradigms and the Archaeological Record. In *Prehistoric Lifeways in the Great Basin Wetlands: Bioarchaeological Reconstruction and Interpretation,* edited by B. E. Hemphill and C. S. Larsen, pp. 203-218. University

of Utah Press, Salt Lake City.

Ohman, J. C. T. J. Krochte, C. O. Lovejoy, R. P. Mensforth, and B. Latimer
1997 Cortical Bone Distribution in the Femoral Neck of Early Hominids: Implications for the Locomotion of *Australopithecus afarensis*. *American Journal of Physical Anthropology*. 104:117-131.

Pfeiffer, S. and P. King
1983 Cortical Bone Formation and Diet Among Protohistoric Iroquoians. *American Journal of Physical Anthropology* 60:23-28.

Ruff, C. B.
1999 Skeletal Structure and Behavioral Patterns of Prehistoric Great Basin Populations. In *Prehistoric Lifeways in the Great Basin Wetlands: Bioarchaeological Reconstruction and Interpretation*, edited by B. E. Hemphill and C. S. Larsen, pp. 290-320. University of Utah Press, Salt Lake City.

Schoeninger, M. J.
1999 Prehistoric Subsistence Strategies in the Stillwater Marsh Region of the Carson Desert. In *Prehistoric Lifeways in the Great Basin Wetland: Bioarchaeological Reconstruction and Interpretation*, edited by B. E. Hemphill and C. S. Larsen, pp. 151-166. University of Utah Press, Salt Lake City.

Smith, A. B.
1998 Keeping People on the Periphery: The Ideology of Social Hierarchies Between Hunters and Herders. *Journal of Anthropological Archaeology* 17:201-215.

Simms, S. R.
1999 Farmers, Foragers and Adaptive Diversity: the Great Salt Lake Wetlands Project. In *Prehistoric Lifeways in the Great Basin Wetlands: Bioarchaeological Reconstruction and Interpretation*, edited by B. E. Hemphill and C. S. Larsen, pp. 21-53. University of Utah Press, Salt Lake City.

Steward, J. H.
1938 *Basin-Plateau Aboriginal Sociopolitical Groups*. University of Utah Press, Salt Lake City.

Sugawara, K.
1988 Visiting Relations and Social Interactions Between Residential Groups of the Central Kalahari San: the Hunter-Gatherer Camp as a Micro-Territory. *African Study Monographs* 8:173-211.

Talbot, R. K., L. D. Richens, J. D. Wilde, J. C. Janetski and D. E. Newman
2000 *Excavations at Five Finger Ridge, Clear Creek Canyon, Central Utah*. Occasional Papers No. 5, Museum of Peoples and Cultures, Brigham Young University, Provo.

Trigger, B. G
1990 Maintaining Economic Equality in Opposition to Complexity: An Iroquoian Example. In *The Evolution of Political Systems: Sociopolitics in Small-Scale Sedentary Societies*, edited by S. Upham, pp. 119-145. Cambridge University Press, New York.

Upham, S.
1994 Nomads of the Desert West: A Shifting Continuum in Prehistory. *Journal of World Prehistory* 8:113-167.

Vierich, H. I. D.
1982 Adaptive Flexibility in a Multiethnic Setting: the Basawara of the Southern Kalahari. In *Politics and History in Band Societies*, edited by E. Leacock and R. Lee, pp. 213-222. Cambridge University Press.

Widlok, T.
1999 Mapping Spatial and Social Permeability. *Current Anthropology* 40:392-400.

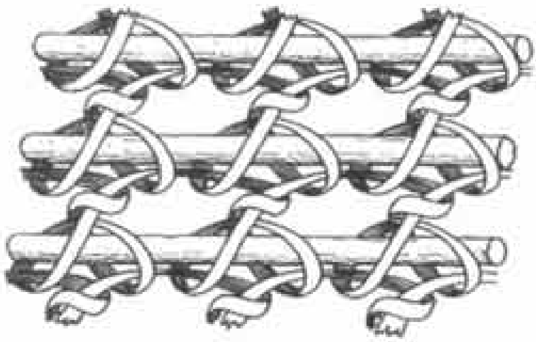
Wilde, J. D. and R. A. Soper
1994 *Baker Village: A Preliminary Report on the 1991, 1992 and 1993 Archaeological Field Seasons at 26WP63, White Pine County, Nevada*. Technical Series No. 84-11. Museum of Peoples and Cultures, Brigham Young University, Provo.

White, T. D.
1991 *Human Osteology*. Academic Press, San

Diego.

Wiessner, P.
1997 Leveling the Hunter: Constraints on the Status Quest in Foraging Societies. In *Food and the Status Quest: An Interdisciplinary Approach*, edited by P. Wiessner and W. Schiefenhövel, pp. 171-192. Berghahn Books, Providence, RI.

Zeanah, D. W.
1996 Predicting Settlement Patterns and Mobility Strategies: An Optimal Foraging Analysis of Hunter-Gatherer Use of Mountain, Desert and Wetland Habitats in the Carson Desert. 2 Vols. Unpublished Ph. D. dissertation. Department of Anthropology, University of Utah, Salt Lake City.



SETTLEMENT LOCATION AS A REFLECTION OF ECONOMIC STRATEGIES BY THE LATE PREHISTORIC FISHERMEN OF UTAH LAKE

Michelle K. Knoll, Department of Anthropology, Brigham Young University, Provo, UT 84602

While most central place foraging models focus on caloric return as a quantifiable currency, other viable currencies should be considered as well. One alternative proposed is storability, which was likely an important attribute for those who practiced collection strategies, and may have been a quality that was actively sought after in potential food. This paper examines the relationship between storability of fish, fish spawning habitats, and settlement location at five sites surrounding Utah Lake. Archaeological evidence shows that the Late Prehistoric occupants at these sites procured storable species in greater frequency than non-storable species, and that their residential camps were always located in close proximity to preferred spawning habitats of storable fish.

Utah Lake, located on the eastern edge of the Great Basin, was the main fishery for Utah Valley in both historic and prehistoric times, and supported several semi-settled villages along its edges (Janetski 1986:162; Janetski 1991:36). Steward (1938:226) notes that in 1849, the Provo area was "the spring gathering place for all Ute bands of the valleys for 200 miles, east and south. . . they raced, gambled, feasted, traded, and took fish which moved up the rivers in great numbers to spawn." The people who lived in this area at the time of historic contact came to be known as Timpanogos Utes (Steward 1938:225). Those who occupied the area from A.D. 1400-1650 also relied heavily on lacustral resources, as well as a variety of upland resources (Janetski 1986:162). But the focus of their subsistence activity, when living around Utah Lake, appears to have been fish.

Data from five sites around Utah Lake and their associated icthyofaunal remains are employed as one way to identify procurement strategies. The premise of this study is that fish have behavioral patterns that were well known to the Late Prehistoric people in this area. In addition, they knew which fish could be stored and which would quickly perish. As collectors who stored food, I suggest that they adapted their fishing strategies towards procuring mostly storable fish, with non-storable fish used as an immediate consumable. This was accomplished by settling in those areas with the most storable fish during the spawning season. Several questions about Late Prehistoric fishing activities at Utah Lake are explored here: (1) Which species of fish are most suitable for storage? (2) What are the spawning habitat preferences of the endemic fish in Utah Lake? (3) Do site locations correlate with spawning fish habitats? (4) Do the fish species found in the archaeological record match what would be expected for that site's location? In other words, is sucker bone predominant at sites located near rivers where suckers spawn?

STORABILITY AS A CURRENCY IN CENTRAL PLACE FORAGING MODELS

Evolutionary ecology uses optimality models, such as central place foraging, to analyze trade-offs between currencies and constraints as the mechanisms behind behavioral patterns. The approach assumes that if the currencies and constraints are correctly identified in a model, results can be explained by an evolutionary process that selects for the most optimal behavior (Simms 1987:19-21; Zeanah and Simms 1999:122). The beginning assumption of central place foraging models is that choices regarding prey types are based on the energy returned in relation to the travel and handling time in procuring that prey (Barlow and Metcalf 1996; Bettinger 1991:96). However, applications of central place foraging models show that time/energy maximization does not always explain behavior, suggesting other variables are also important including, for example, seed storage (Simms 1987), transport costs (Barlow and Metcalfe 1996; Jones and Madsen 1989), and social display (Hawkes 1993).

Simms (1987:82-83) shows that a simple diet breadth model cannot always account for variability in human behavior and that other constraints like storability can be just as important to someone practicing a collector strategy. Fishing imposes several constraints upon the hunter, such as seasonality and species-specific spawning preferences. Some fish also offer viable currencies, such as a high caloric return with minimal capture time, and storability. If considerations of storability shaped forager decision-making, then the occupants of Utah Lake would have chosen as their base camps those areas that offer the easiest access to a high ranked resource such as storable fish.

Janetski (1986, 1990:241) argues that residential sites for hunter-gatherers on Utah Lake were often located near the mouths of streams that drain into the lake. In fact, surveys around the Utah Lake shoreline by Brigham Young University in 1988 and 1991 show that of the 15 hunter-gatherer sites containing midden deposits or pits, 11 are located at the mouths of current or former streams (Baker and Janetski 1992:24).

Wheat's (1967) ethnography of the Northern Paiute also illustrates that fish spawning habitats can affect settlement patterns. The Trout-eaters of Walker Lake settled at the mouth of the Walker River near "their main source of food", while the Cui-ui eaters settled on the shores of Pyramid Lake near the mouth of the Truckee River to procure this member of the sucker family (Wheat 1967:5).

ETHNOGRAPHIC ACCOUNTS OF FISH STORAGE IN THE GREAT BASIN

Ethnographic accounts and archaeological excavations from the Great Basin document activities geared towards the preparation and storage of fish. At the Orbit Inn site on the Great Salt Lake, Simms and Heath (1990:800) conclude that the seventeen subsurface pits were primarily used for storage of a variety of items, for baking fish, and for refuse disposal. Many of the endemic fish in Pyramid Lake and Walker Lake are similar to those found in Utah Lake (trout, sucker, and chub) and thus are suitable for further discussion. The Northern Paiute of Pyramid Lake deboned, dried, and stored the Tahoe Sucker and Cui-ui flesh, heads, entrails and eggs on open-air devices in preparation for winter when they were ground up and boiled to make soup (Fowler and Bath 1981:185; Wheat 1967:61). Chub and speckled dace were probably sun-dried whole, a practice that has a long history in the western Great Basin (Raymond and Sobel 1990:8). Trout, on the other hand, perished more quickly and were usually eaten fresh (Fowler and Bath 1981: 185). While ethnographies of the Utes were not specific to species, the reports (Smith 1974; Harding 1930; Madsen and Madsen 1930) illustrate that some fish were eaten right away while others were dried and stored. Stewart (1942: 253) also notes that dried fish were eaten in the fall.

Fowler and Bath (1981:185) argue that the Northern Paiute stored Cui-ui and Tahoe suckers because of their higher oil content, an attribute suggested to be good for storability. Wheat states that the Cui-ui quickly became rancid because of its high oil content, but that the Paiutes had become accustomed to the flavor. Can a high oil content mean both rancidity and good quality storability? Conflicting accounts such as these raise some concern regarding the limited amount of quantified data on the fat content of fish and its effect on storability.

Few studies (but see Raymond and Sobel 1990) in the Great Basin have made any real attempt to actually measure the amount of fat in a local fish population, nor has there been any experimentation to see how well these fish store after air drying. While Fowler and Bath (1981), and Wheat (1967) recorded that the sucker and Cui-ui were stored, and made assumptions that its high fat content aided its storability, food science studies show that a high fat content also increases the chances of the fish becoming rancid quickly (Stansby 1990:120). Some even recommend that fish with a *low* fat content are more suitable for air drying (Ronsivalli and Learson 1973:270). In contrast, other scholars (Jarvis 1950; Stansby 1990) argue that fish oils and fats are drying oils that absorb oxygen, rapidly causing the flesh to harden. It is possible that hardening of the flesh is what allows the fattier fish to be stored for longer periods in subterranean pits, though this is not proven. Another characteristic to be considered is that each fish species will have a unique fat content, which also varies seasonally (Dennis Shiozawa, personal communication 2002). Because measuring the fat content of endemic fish species from Utah Lake and experimental air drying are beyond the scope of this paper, I make the assumption that ethnographic observations by Fowler and Bath (1981) and Wheat (1967) are valid, and that sucker and chub are storable (even if they do not taste very good).

The high storability of sucker and chub, however, does not discount trout as a viable food source. Some observers (Madsen and Madsen 1930:2) note that the Ute preferred trout to bony suckers and chub, and referred to it as *Ut-um-pa'-gu*, which translates to "good fish" (Fowler and Fowler 1971:173; also see Miller 1986:103 for Shoshone and Northern Paiute terms). In addition, Wheat (1967:60) notes that the Northern Paiute desired the black-spotted cutthroat trout above all, but it was the cui-ui that provided "tons of dried meat for the Indians."

If trout was the preferred, but least storable of the three fish mentioned here, one could argue that hunter-gatherer sites near trout spawning rivers should have the characteristics of a short-term occupation due to an immediate consumption strategy. In contrast, sites near sucker and chub spawning areas should exhibit traits of seasonal or longer-term occupation centered on a collecting strategy, such as storage pits and large middens.

UTAH LAKE AND ITS NATIVE FISH

The endemic fishes of Utah Lake, and hence those that we would expect to find in the archaeological record, are Bonneville cutthroat trout (*Oncorhyachus clarki utah*), Mountain whitefish (*Prosopium williamsoni*), Utah chub (*Gila atraria*), Leatherside chub (*Gila copei*), Least chub (*Lotichthys phlegethontis*), Longnose dace (*Rhinichthyes cataractae*), Utah sucker (*Catostomus ardens*), Webug sucker (*Catostomus fecundus*), June sucker (*Chasmistes liorus*), Mountain sucker (*Catostomus playtrhynchus*), Bonneville mottled sculpin (*Cottus bairdi semiscaber*), and Utah Lake sculpin (*Cottus echinatus*), Redside shiners (*Richardsonius balteatus*), and Speckled dace (*Rhinichtys osculus*). In addition, there were probably two races of Bonneville cutthroat trout: a large lake dweller and a river dweller (Heckmann et al. 1981:108). Only three species were identified in the icthyofaunal record at the five sites discussed in this paper: Utah sucker, Utah chub, and Bonneville cutthroat trout (Figure 1). Note, however, that June sucker bones are indistinguishable from Utah sucker bones, with the exception of the premaxilla element (Dennis Shiozawa, personal communication 2002). Therefore, it is not clear whether the sucker specimens recorded are actually Utah sucker or June sucker.

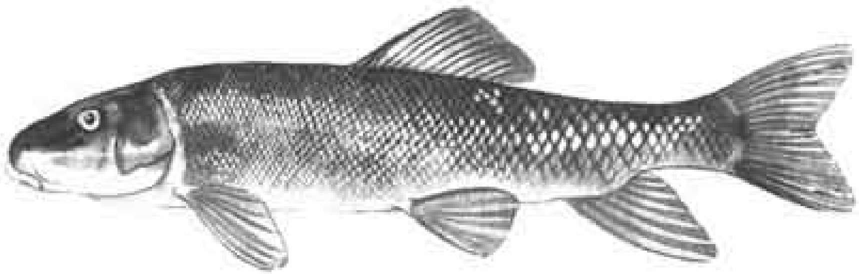
Spawning behavior is perhaps the most important factor to be considered, because the mass capture of large amounts of food in a short-term resource patch fosters storage. It was during the spawning runs that the historic period Utes were known to take most of their fish. For example, the explorer John C. Fremont noted that Utes camped on the Spanish Fork River were waiting for the fish run to start (Fremont 1845), and early pioneer George W. Bean (1945: 51) wrote that during the spring spawning season, the number of suckers that passed upstream were so great that the river, "would be full, bank to bank, as thick as they could swim for hours and sometimes days together." Wheat (1967:10) notes that in May, Northern Paiute from some distance away gathered around the mouths of the Truckee and Walker rivers for the spawning runs. Techniques used to take the spawning fish at Utah Lake, as documented in the mid-1800s, included wading in the river, and throwing fish out of the water by hand as fast as they could pick them up (Pratt 1849:112), and the use of willow weirs (Stansbury 1852:148). In the early to mid-1900s it was recorded that the Utes used fish arrows, bone or wood gorgets attached to lines, spears, brush or sapling weirs, woven dip nets, cordage nets, and basketry traps (Lowie 1924; Stewart 1942). Janetski (1991: 37) argues that the types of fishing technology used suggests both an individual and communal effort, but that the majority of tools found at sites surrounding Utah Lake seem to be stream oriented. Raymond and Sobel (1990: 15) argue that the lake-spawning Tui chub were not only attractive for their high caloric return and low processing time, but also for their year-round availability, predictability, and plentitude. Therefore, it is probable that the Utah chub was an equally easy prey to capture in mass quantities, even when it was not spawning.

The three species of fish identified in the archaeological record at Utah Lake each had distinct spawning habitat preferences that influenced where fishing camps were established. Trout generally spawn in the spring when water temperatures reach 50 degrees Fahrenheit in cold, shallow riffles of streams where there is gravel (Sigler and Miller 1963:38). They never spawn in lakes (Sigler and Sigler 1987:116). Suckers spawn by moving out of the deep areas of lakes or large rivers into streams with gravel and sand when water temperatures reach about 60 degrees Fahrenheit (March for Utah Lake) (Sigler and Miller 1963:94; 1987:217), though a lake-spawning form of this species has been identified in Bear Lake as well (Sigler and Sigler 1987:217). Ethnographic accounts from the 1800s suggest that the lower portion of the Provo River was a heavily used sucker spawning area (Billat 1985:19), and the plankton-rich southwestern shore (known today as "Sucker Point") was likely a June sucker (*Chasmistes liorus*) habitat area in the past as well (Dennis Shiozawa, personal communication 2002). Chub spawn during the late spring and summer, in water less than two feet deep (Sigler and Sigler 1987:165; also see Raymond and Sobel 1990), with vegetation (Shizawa, personal communication 2002), when water temperatures reach 52 to 68 degrees Fahrenheit (Sigler and Miller 1963:68).

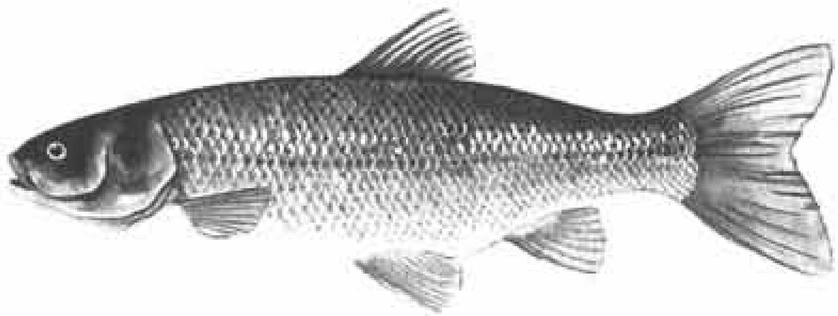
An important attribute of Utah Lake affecting the spawning behavior of fish is the flow rate of its tributaries. While much of the data are biased by urbanization and agriculture, some general inferences regarding flow rates can be made. The east side of Utah Lake has a gentle slope and is poorly drained, while the west side, adjacent to the Lake Mountains, rises rapidly (Jackson and Stevens 1981:5-6). The major perennial tributaries (those whose flow exceeds 2,000 acre-feet per year) that run into Utah Lake today (based on data gathered from 1930 to 1979) are the Provo River, Spanish Fork River, Benjamin Slough, Dry Creek, Hobble Creek, White Lake drainage, and American Fork River, in order from greatest flow to least flow (Fuhriman and Merritt 1981:appendix B-1; Jackson and Stevens 1981:3). Current Creek at the south end of Utah Lake may also have been an important tributary, though today it is insignificant. Only one tributary flows out of Utah Lake: the Jordan River, a warm, sandy-bottomed river that flows into the Great Salt Lake. Based on the information presented thus far, one would expect the archaeological record to have the following characteristics. Trout should be greatest in numbers at sites located near fast moving streams with gravel, such as the east side of Utah Lake. Chub should be greatest in number at sites located near shallow areas of the lake, such as Goshen Bay or Lincoln Bench. Sucker should be greatest in number at sites where stream flow is moderate to swift, which includes most of the tributaries on the lake.

A REVIEW OF FIVE LATE PREHISTORIC SITES AROUND UTAH LAKE

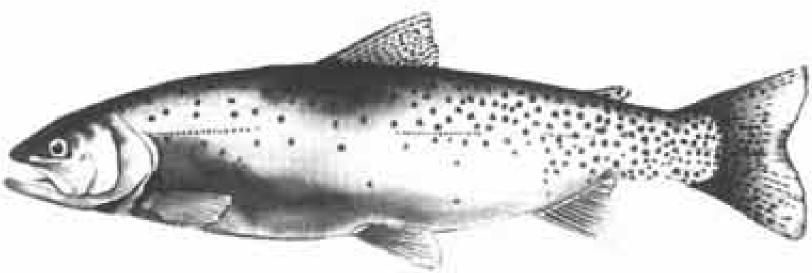
Icthyofaunal data from five sites around Utah Lake



Utah sucker
***Catostomus ardens* Jordan and Gilbert**



Utah chub
***Gila atraria* (Girard)**



Cutthroat trout
Oncorhyachus clarki utah

Figure 1. Predominant fish found in the archaeological record around Utah Lake (from Sigler and Sigler 1987).

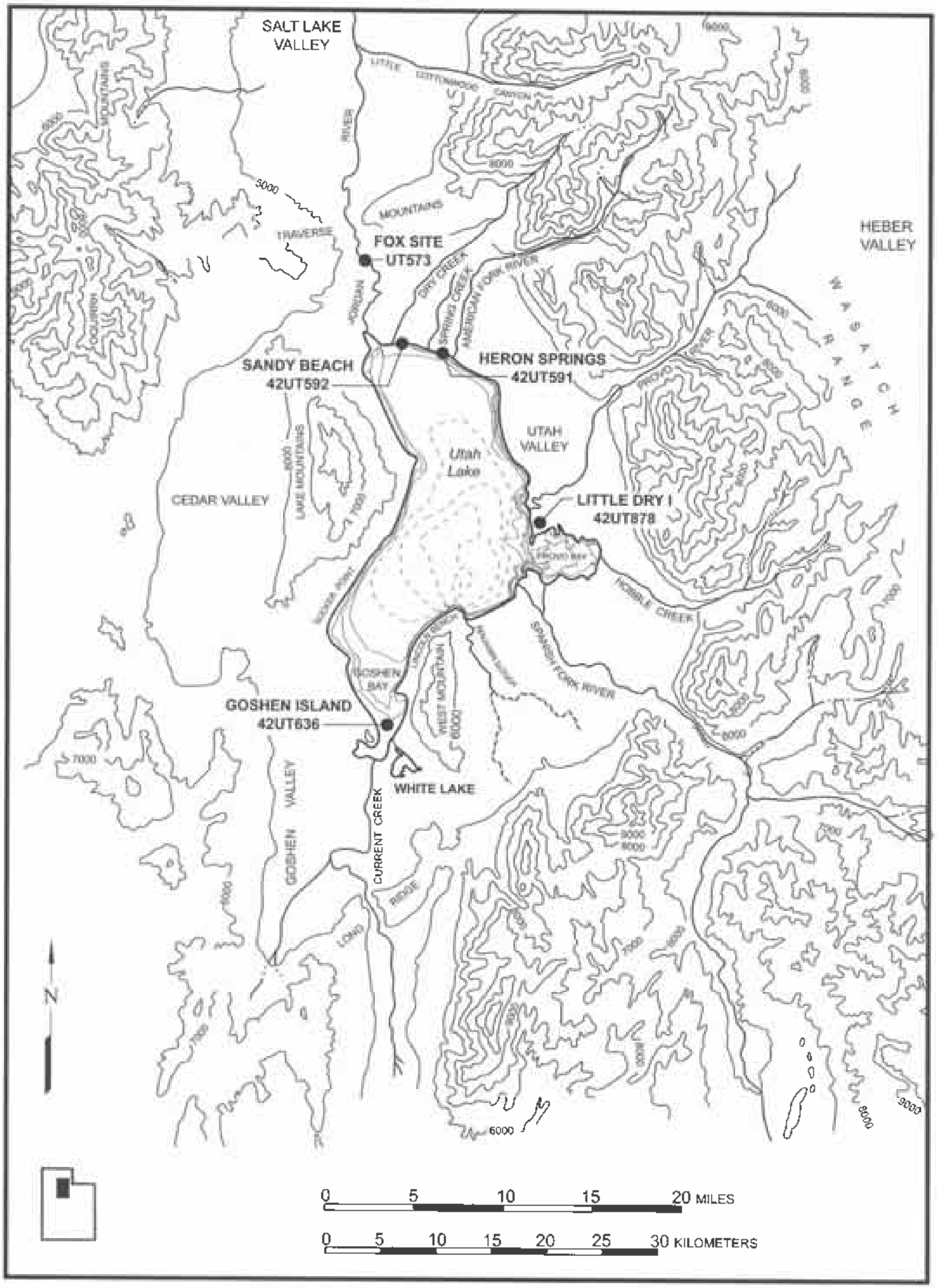


Figure 2. Map of Utah Lake showing excavated sites mentioned in text (from Janetski 1986, Figure 2).

(Figure 2) were analyzed to determine the species and quantities of fish procured by the Late Prehistoric occupants. They are the Fox site, Heron Springs, Sandy Beach, Little Dry I, and Goshen Island South. As stated earlier, if consideration of storability shaped a hunter-gatherer's decision making, then the occupants of Utah Lake would have chosen for their residential camps and storage facilities, those places that offered the easiest access to a high ranked resource: storable fish. This review of the evidence will evaluate the fit between site location and the archaeological record. In other words, do the icthyofaunal remains and site locations correlate with spawning habitats? Sites near trout spawning rivers should have the characteristics of a short-term occupation because of an immediate consumption strategy, while sites near sucker and chub spawning areas should exhibit traits of seasonal, or longer-term occupation centered on a collecting strategy. The data are consistent with these predictions and supports the scenario that people were mass capturing fish on site during the spawning season, as opposed to making logistical forays away from camp. By doing this they were maximizing their returns by settling in a location that minimized travel time between the area of capture and residential camps (see Thomas 1985). Considering the number of fish that can be caught during the height of a spawning run, this is not an unlikely proposition. Camp location, in response to seasonal spawning runs, may also indicate a seasonal occupation, though this should not be taken to mean that it is the only time of year a site was occupied.

The Fox site (42UT573) is about 7 km north of Utah Lake on the tip of a low, alluvial peninsula adjacent to and just above the Jordan River. The west bank of this section of the river is comprised mostly of silts, but has coarse gravely alluvium on the terraces to the east (Janetski 2002c). Because of the low diversity in the faunal assemblage (fish comprise 99.9 percent of the total faunal assemblage), the absence of storage pits, and the scarcity of features, Janetski (1990:252) argues that the Fox site was a specialized fishing camp. Radiocarbon dates from hearth samples indicate it was occupied sometime around A.D. 1650 (Janetski 1990:248). All faunal remains were water screened using 1/8" wire mesh, and analyzed by students at Brigham Young University. One-hundred percent of the total icthyofaunal assemblage was analyzed. Three species of fish (Table 1) could be positively identified: Utah sucker (*Catostomus ardens*), Utah chub (*Gila atraria*), and Bonneville cutthroat trout (*Oncorhyachus clarki utah*). Of the total number of fish bones (27,709) identified to species, sucker comprised 99 percent of the assemblage, chub .9 percent of the assemblage, and trout .1 percent. Minimum number of individuals (MNI) was calculated using the most abundant sided or singular element and resulted in 506 suckers, 24 chub, and one trout. Ichthyologist Dennis Shiozawa (personal communication 2002) suggests that the Jordan River may have been a consistent supplier of fish year-round because it is not a good spawning river as a result of warm temperatures and a sandy bottom.

Heron Springs (42UT591), on the north shore of Utah Lake, is a possible residential site, and is radiocarbon dated to A.D. 1400 (Janetski 1990:248, 252). The site is on a long beach ridge of sands and silts near Spring Creek, and is situated just south of an embayment (Janetski 2002a). A series of pits were discovered on the east side of the site, though none of them were culturally sealed, having been used and left open to accumulate refuse. All faunal remains were water screened using 1/8" wire mesh and analyzed by students at Brigham Young University. The fish assemblage comprised 89.5 percent of the total faunal assemblage (Janetski 1990:250). Students analyzed 65 percent of the icthyofaunal assemblage, and a total of 6,431 fish remains were identifiable to species. As in the Fox site, these were Utah sucker, Utah chub, and Bonneville cutthroat trout. Of the total fish remains identifiable to species, 94 percent are sucker, 5.6 percent are chub, and less than 1 percent is trout. MNIs were calculated using the most abundant sided or singular element and resulted in 59 suckers, 136 chub, and one trout. MNIs reversed the rank from chub to sucker, but given the overwhelming NISP of sucker, it is likely that this species was the most heavily taken at the site.

The Sandy Beach site (42UT592) is also located on

Table 1. Fish remains from five sites around Utah Lake mentioned in text.

	NISP				MNI				
Site	*C. Catostomus ardens* Utah Sucker	*C. Gila atraria* Utah Chub	*S. Salmo clarki* Bonneville Cutthroat Trout	Total	*C. Catostomus ardens* Utah Sucker	*C. Gila atraria* Utah Chub	*S. Salmo clarki* Bonneville Cutthroat Trout	Total	Notes
Fox Site (42Ut573)	27,432 99%	264 1%	13 <.1%	27,709 100%	506 ATL	24 ATL	1 VER	558	Total of PHR elements divided/2
Heron Springs (42Ut591)	6,048 94%	357 5.6%	26 0.4%	6,431 100%	59 PHR	136 PHR	1 VER	196	Total of PHR elements divided/2
Sandy Beach (42Ut592)	764 72%	195 18%	108 10%	1,067 100%	52 ATL	12 CER	2 VER	66	
Little Dry I (42Ut878)	2,274 95%	102 4%	22 0.9%	2,398 100%	154 ATL	28 PHR	1 VER		Total of PHR elements divided/2
Goshen Island So. (42(Ut636)	422 27%	988 62%	174 11%	1,584 100%	14 PHR	61 PHR	19 ATL	94	Total of PHR elements divided/2

the north shore of Utah Lake, two miles to the west of Heron Springs, and .5 miles east of the Jordan River outlet. Like Heron Springs, the site is argued to be a residential site with a pit radiocarbon dating to A.D. 1400 (Janetski 1990:248, 252). All faunal remains were recovered using 1/8" wire mesh and analyzed by students at Brigham Young University. The fish assemblage was 67 percent of the total faunal assemblage (Janetski 1990:250). Students analyzed 30 percent of the total icthyofaunal assemblage. A total of 1067 fish elements were identifiable to species, of which 72 percent were sucker, 18 percent chub, and 10 percent trout. MNIs were calculated using the most abundant sided or singular element, and resulted in 52 suckers, 12 chub, and one trout. While sucker numbers are what would be expected, it is notable that the trout NISP number is higher than what was recorded for the other two northern sites. This may be due to the site's proximity to Dry Creek, a major tributary of Utah Lake.

Little Dry I (42UT878) is on the east shore of Utah Lake about one mile south of the current mouth of the Provo River on the south and east channel of Little Dry Creek (Janetski 1993:10). The site was first observed as a surface scatter of Fremont and Late Prehistoric artifacts and midden deposits in the profiles of a moat adjacent to the Provo airport road. The midden deposits contained Promontory Grey sherds, bone, charcoal, ash, and fire-cracked rock. The deposit was tested in 1993 by BYU archaeologists, students, and ASAF volunteers, and a circular pit containing groundstone tools was discovered. All faunal remains were recovered from the midden using 1/8" wire mesh. Twenty-five percent of the faunal collection was analyzed by Dana Wood (1998) of Brigham Young University. The icthyofaunal assemblage was 98 pecent of the total faunal assemblage, and 18 percent of the total icthyofaunal assemblage was identifiable to species. Of the total fish identifiable to species (not including chub/sucker vertebrae)

95 percent are sucker, 4 percent are chub, .9 percent are trout, and less than .1 percent are catfish. MNIs were calculated using the most abundant sided or singular element, and resulted in 154 sucker, 28 chub, 1 trout, and 1 catfish (a historically introduced species and thus intrusive).

The Goshen Island site (42UT636) is located on the south end of Utah Lake in a narrow channel of Goshen Bay. The site is multicomponent, but clearly divided into north and south areas, with the southern end being the location of an intensive Late Prehistoric occupation radiocarbon dating to A.D. 1375 (Janetski 2002b). At this site were a dense and highly variable artifact scatter, and two alkali circles. Partial excavations at the site revealed a 2m wide x 1m deep pit with stratified deposits consisting of midden, bone, and charcoal. Included in the pit assemblage were fish, bird, and muskrat bone, grass and bulrush seeds, ceramics, and groundstone., Students from Brigham Young University analyzed 20 percent of the total icthyofaunal assemblage. Of this total, 1,584 elements were identifiable to species, including Utah sucker, Utah chub, and Bonneville cutthroat trout. In sharp contrast to sites on the northern end of the lake, chub comprises 62 percent of the icthyofaunal assemblage, sucker 27 percent, and trout 11 percent at Goshen Island. MNIs were calculated using the most abundant sided or singular element and resulted in 61 chubs, 19 trout, and 14 suckers. The presence of trout and sucker at this site may result from the proximity of Current Creek, a tributary which likely had a greater flow at one time, and may have harbored trout. Or, perhaps the trout numbers can be better explained by the attraction trout have for chub, its main food source.

DISCUSSION

A strict consideration of efficiency models suggests that the preparation, drying, and storage of large numbers of fish procured during spawning would require that residential camps be located near the areas of capture. Janetski (1986, 1991) argues that the Late Prehistoric occupants of Utah Lake were collectors who resided in small, long-term residential camps close to the lake edge in proximity to the mouths of tributaries, similar to what has been documented for the Northern Paiute. In all cases presented here there is a good fit between the icthyofaunal record and the spawning zones (Figure 3). However, the fit between site type and fish species (or storable vs. non-storable) was mixed.

Utah sucker seems to be the most ubiquitous species in the archaeological record at sites on the northern edge of Utah Lake. This was expected due to the spawning preferences of sucker, and the tributary characteristics in this area that would have attracted this fish. Occupants of the north shore lived near the mouths of rivers to procure the storable sucker. Sandy Beach and Heron Springs, located near the mouths of two moderately flowing tributaries, were small residential camps with clear evidence of storage pits and an abundance of sucker bone. The icthyofaunal remains and the site attributes fit the collecting strategy hypothesis. By contrast, the Fox site was clearly not a residential site, even though 99 percent of the fish remains were sucker. The warm and sandy Jordan River was likely a year-round resource patch for sucker (Dennis Shiozawa, personal communication 2002), and thus it is reasonable to assume it supported a logistical strategy where fishes could be taken in smaller numbers and transported back to the residential camps.

The icthyofaunal record from Goshen Island is predominantly chub (Nauta 2000), though trout and sucker are also well represented. Chub tend to spawn in shallow water with vegetation and can readily adapt to more saline environments, as is the case for the southern end of the lake. It is thus no surprise that chub comprise 62 percent of the icthyofaunal record. The Late Prehistoric occupation at Goshen Island has been described as a residential site with two large pits that do not appear to have been used for storage. Excavations at this site were limited, so it is not clear if there are storage pits similar to the sites on the north shore. But it is clear that the Goshen Island occupants were procuring mostly chub and sucker, although the percent of trout found was much higher than expected for this area. This may

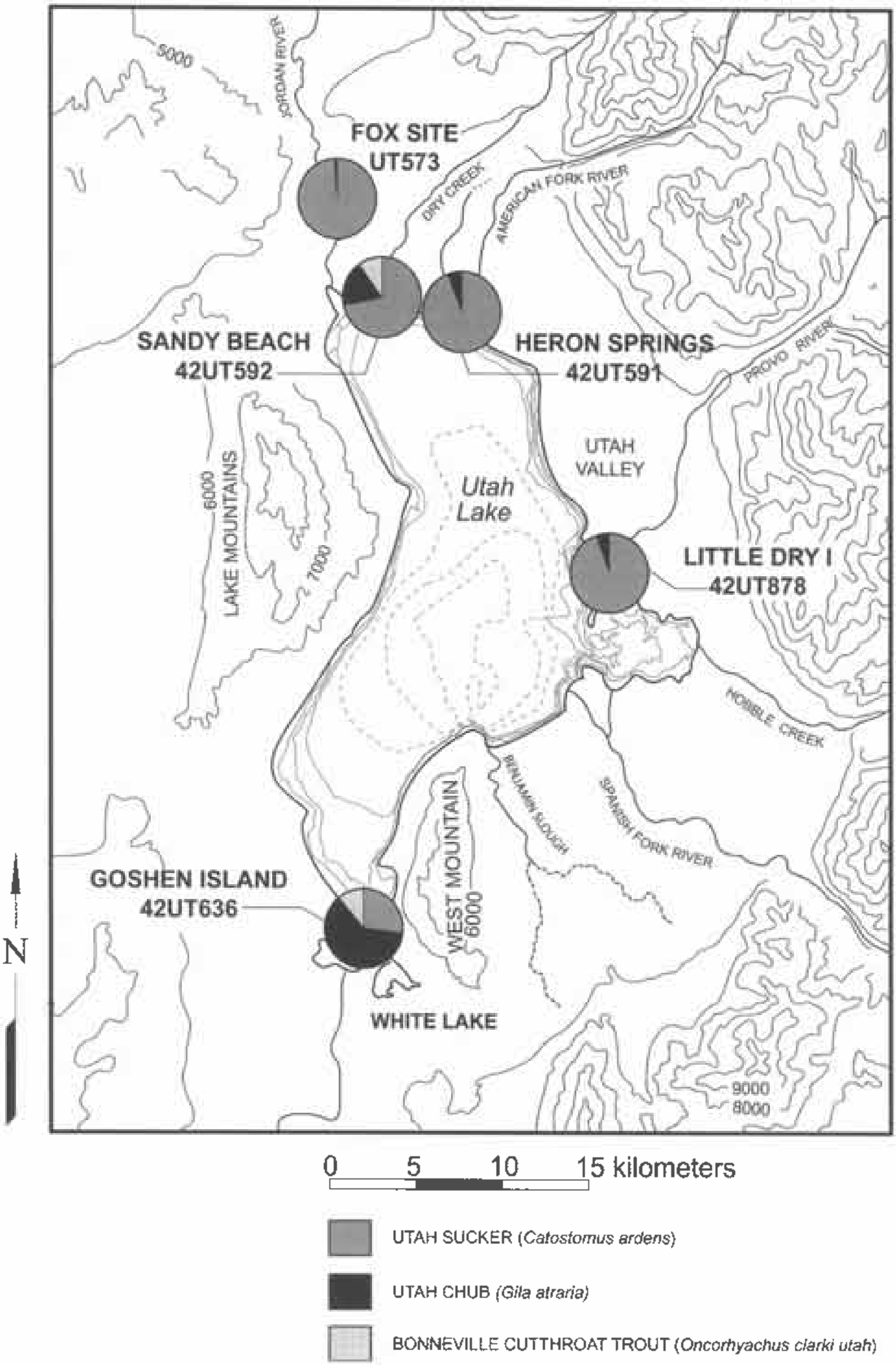


Figure 3. Icthyofaunal distribution patterns, based on NISP numbers, for sites mentioned in text.

be due to the abundance of chub in the area, the main food source for trout.

At the central region of the lake, the icthyofaunal record at the Little Dry I site was overwhelmingly sucker. The site is on Little Dry Creek, a minor tributary of Utah Lake, but if it were flowing moderately it would have provided sucker-spawning habitat. Evident at this site was a pit similar to those found at Goshen Island south, and a large midden area. Despite the limited excavations conducted, it is proposed that this was a residential site with an emphasis on storable sucker.

The small proportion of trout bone at the Little Dry I site was not expected because the site is near suitable trout-spawning habitat. Perhaps trout were not present, or were not taken (unlikely), or perhaps preparation techniques affected the preservation properties of the bone. Ethnographic accounts from the 1800s note that the lower portion of the Provo River was a heavily used sucker spawning area (see Billat 1985:19), and this seems to be evident in the icthyofaunal record at Little Dry I. Also, Little Dry Creek is a small, slow moving tributary, a condition much more favorable for sucker. To address the issue of preparation techniques, ethnographic accounts of the Northern Paiute reveal that while chubs and suckers were de-boned and dried on racks, most trout were baked on hot coals or steamed and baked in preheated grass-lined pits (Fowler and Bath 1981:185; Wheat 1967:10), and eaten right away. Few studies have focused on the effects culinary techniques have on post-depositional bone preservation (Speth 2000: 89), though suggestions have been made that boiling fish in soups may destroy the bone (Colley 1986:37; Raymond and Sobel 1990:6). This certainly would affect the presence of trout bone in the archaeological record, though perhaps not to the extent seen in this study.

Three additional Late Prehistoric sites (42Ut13, 42Ut167, and 42Ut820) exist on the eastern shore at former mouths of the Provo and Spanish Fork rivers (Baker and Janetski 1992:24), but were excavated and analyzed by others. Further investigation into the archaeological record of these sites may yield a higher percentage of trout bone and evidence enabling the sites to be classified as logistical, rather than residential camps.

The placement of the settlements in relation to spawning habitats and the high proportion of the storable Utah sucker and Utah chub in comparison to the non-storable Bonneville cutthroat trout suggests that the occupants at four of the five sites discussed here focused on procuring sucker and chub in mass quantities for drying and later consumption. In addition, settling at the mouths of sucker and chub spawning rivers would have minimized transport costs to storage facilities, a settlement/subsistence pattern that was also practiced by the Northern Paiute of Pyramid Lake and Walker Lake. The non-residential Fox site was an exception, though this may be because the Jordan River was not a good spawning habitat, and thus supplied small numbers of sucker year-round. If so, fishing for individual fish, rather than fish in mass quantities, would diminish the need for storage. Central place foraging models suggest that people make rational choices regarding settlement location that weigh caloric return of a ranked food resource against processing and travel time (Bettinger 1991:96; Barlow and Metcalfe 1996). However, storability is another currency that should be considered when one is studying people who are collectors with a central base and a logistic system. Thus, in addition to other benefits the local environment offered, lacustral settings were chosen to facilitate the procurement of a storable species of fish. People knew they needed to store fish, they knew which fish stored best, and they chose residential locations that minimized transport costs. They occupied these locations during spawning runs, a circumstance that provided the best opportunity for mass capturing fish with the least amount of effort.

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REFERENCES CITED

Baker, C. J., and J. C. Janetski
1992 *Archaeological Survey of the Utah Lake Shore 1988 and 1991.* Brigham Young University Museum of Peoples and Cultures Technical Series No. 92-1, Provo, UT.

Barlow, K. R. and D. Metcalfe
1996 Plant Utility Indices: Two Great Basin Examples. *Journal of Archaeological Science* 23:351-371.

Bean, G. W.
1945 *Autobiography of G.W. Bean, A Utah Pioneer of 1847.* Utah Printing Company, Salt Lake City.

Bettinger, R. L.
1991 *Hunter Gatherers: Archaeological and Evolutionary Theory.* Plenum Press, New York.

Billat, S. E.
1985 *A Study of Fremont Subsistence at the Smoking Pipe Site.* Unpublished Master's thesis, Department of Anthropology, Brigham Young University, Provo, UT.

Colley, S. M.
1986 Site Formation and Archaeological Fish Remains: An Ethnohistorical Example from the Northern Isles, Scotland. In *Fish and Archaeology: Studies in Osteometry, Taphonomy, Seasonality, and Fishing Methods*, edited by D.C. Brinkhuizen and A.T. Clason, pp. 34-41. BAR International Series 294, Oxford, United Kingdom.

Fowler, C. S. and J. Bath
1981 Pyramid Lake Northern Paiute Fishing: The Ethnographic Record. *Journal of California and Great Basin Anthropology* 3(2):176-186.

Fowler, D. D. and C. S. Fowler
1971 *Anthropology of the Numa: John Wesley Powell's Manuscripts on the Numic People's of Western North America, 1868-1880.* Smithsonian Contributions to Anthropology No. 14. Smithsonian Institution Press, Washington, D.C.

Fremont, John Charles
1845 *Report of the Exploring Expedition to the Rocky Mountains in the Year 1842 and to Oregon and North California in the Years 1843-44.* Gales and Seaton, Washington D.C.

Fuhriman, D. K. and L. B. Merritt.
1981 *Utah Lake Surface Inflows and Outflows: 1930-1981.* Utah Lake Phase 1, Report #12. Prepared for the U.S. Bureau of Reclamation. U.S. Department of Interior.

Harding, C. M.
1930 History of Peter Madsen, Sr. Ms. in possession of Alfred Madsen, Lakeview, UT.

Hawkes, K.
1993 Why Hunter-Gatherers Work: An Ancient Version of the Problem of Public Goods. *Current Anthropology* 34 (4):341-361.

Heckmann, R. A., C. W. Thompson, and D. A. White
1981 Fishes of Utah Lake. In *Utah Lake Monograph.* Great Basin Naturalist Memoirs, No.5, pp. 107-127. Brigham Young University, Provo, UT.

Jackson, R. H. and D. J. Stevens
1981 Physical and Cultural Environment of Utah Lake and Adjacent Areas. In *Utah Lake Monograph.* Great Basin Naturalist Memoirs, No. 5, pp. 3-23. Brigham Young University, Provo, UT.

Janetski, J. C.
1986 Great Basin Lacustrine Subsistence. In *Anthropology of the Desert West. Essays in Honor of Jesse D. Jennings*, edited by C. J. Condie and D. D. Fowler, pp. 147-167. Anthropological Papers No. 110. University of Utah Press, Salt Lake City.

1990 Wetlands in Utah Valley Prehistory. In *Wetland Adaptations in the Great Basin.* Papers from the Twenty-first Great Basin Anthropological Conference, edited by J. C. Janetski and D. B. Madsen, pp. 233-257. Museum of Peoples and Cultures, Occasional Papers No. 1, Brigham Young University, Provo, UT.

1991 *The Ute of Utah Lake.* Anthropological

Papers No. 116. University of Utah Press, Salt Lake City.

1993 *An Archaeological Survey of Selected Parcels of Land Related to the Expansion of the Provo Municipal Airport.* Brigham Young University Museum of Peoples and Cultures, Technical Series No. 93-21, Provo, UT.

2002a Excavations at Heron Springs: A Late Prehistoric Residential Site on the North Shore of Utah Lake. Ms. on file, Department of Anthropology, Brigham Young University, Provo, UT.

2002b Goshen Island: A Multicomponent Site in Goshen Bay. Ms. on file, Department of Anthropology Brigham Young University, Provo, UT.

2002c The Fox Site. Ms. on file, Department of Anthropology, Brigham Young University, Provo, UT.

Jarvis, N. D.
1950 *Curing of Fishery Products.* Research Report No. 18, U.S. Fish and Wildlife Service, Washington D.C.

Jones, K.T. and D.B. Madsen
1989 Calculating the Cost of Resource Transportation: A Great Basin Example. *Current Anthropology* 30(4): 529-534.

Lowie, R. H.
1924 Notes on Shoshone Ethnography. *American Museum of Natural History Anthropological Papers* 20:182-314. New York.

Madsen, D. H., and C. E. Madsen
1930 *Utah Lake, the Western Sea of Galilee.* Ms. in possession of Alfred Madsen, Lakeview, UT.

Madsen, D. B. and J. C. Janetski
1990 Introduction. In *Wetland Adaptations in the Great Basin.* Papers from the Twenty-first Great Basin Anthropological Conference, edited by J. C. Janetski and D. B. Madsen, pp. 1-4. Museum of Peoples and Cultures, Occasional Papers No. 1, Brigham Young University, Provo, UT.

Miller, Wick R.
1986 Numic Languages. In *Great Basin*, edited by W. L. d'Azevedo, pp. 98-106. Handbook of American Indians, vol. 11, W. C. Sturtevant, general editor. Smithsonian Institution, Washington D.C.

Nauta, L. T.
2000 Utah Chub Size Utilization at Goshen Island. In *Intermountain Archaeology*, edited by D. B. Madsen and M. D. Metcalf. Anthropological Papers No. 122. University of Utah Press, Salt Lake City.

Pratt, P. P.
1849 Correspondence from America. *Millennial Star XI* July 8.

Raymond, A. W. and E. Sobel
1990 The Use of Tui Chub as Food by Indians of the Western Great Basin. *Journal of California and Great Basin Anthropology* 12(1): 2-18.

Ronsivalli, L. and R. J. Learson
1973 Dehydration of Fishery Products. In *Food Dehydration*, vol. 2, second edition, edited by W. B. Van Arsdel, M. J. Copley, and A. I. Morgan, Jr., pp. 266-289. AVI Publishing Co., Westport.

Sigler, W. F. and R. Rush Miller
1963 *Fishes of Utah.* Utah State Department of Fish and Game, Salt Lake City.

Sigler, W. F. and J. W. Sigler
1987 *Fishes of the Great Basin.* University of Nevada Press, Reno.

Simms, S. R.
1987 *Behavioral Ecology and Hunter-Gatherer Foraging: An Example from the Great Basin.* BAR International Series 381. Oxford, United Kingdom.

Simms, S. R. and K. M. Heath
1990 Site Structure of the Orbit Inn: An Application of Ethnoarchaeology. *American Antiquity* 55(4):797-812.

Smith, A.
1974 Ethnography of the Northern Ute. *University of New Mexico Papers in Anthropology* 17. Albuquerque.

Speth, J. D.
2000 Boiling vs. Baking and Roasting: a Taphonomic Approach to the Recognition of Cooking Techniques in Small Mammals. In *Animal Bones, Human Societies*, edited by P. Rowley-Conwy, pp. 89-105. Oxbow Books, Oxford, United Kingdom.

Stansbury, H.
1852 *An Expedition to the Valley of the Great Salt Lake of Utah*. Sampson Low, Son, and Company, Philadelphia.

Stansby, M. E.
1990 Deterioration. In *Fish Oils in Nutrition*, edited by M. E. Stansby, pp. 120-140. Van Nostrand Reinhold, New York.

Steward, J. H.
1938 *Basin-Plateau Aboriginal Sociopolitical Groups*. Smithsonian Institution Bureau of American Ethnology, Bulletin 120. Reprinted by University of Utah Press, Salt Lake City.

Stewart, O. C.
1942 *Culture Element Distributions: XVIII, Ute-Southern Paiute*. University of California Anthropological Records 6(4): 231-355.

Thomas, D. H.
1985 *The Archaeology of Hidden Cave, Nevada*. Anthropological Papers of the American Museum of Natural History 61(1). New York.

Wheat, M. M.
1967 *Survival Arts of the Primitive Paiutes*. University of Nevada Press, Reno.

Wood, D.
1998 Preliminary Faunal Analysis Little Dry I. Ms. on file, Department of Anthropology, Brigham Young University, Provo, UT.

Zeanah, D. W., and S. R. Simms
1999 Modeling the Gastric: Great Basin Subsistence Studies since 1982 and the Evolution of General Theory. In *Models for the Millenium: Great Basin Anthropology Today*, edited by C. Beck, pp. 118-140. University of Utah Press, Salt Lake City.

ORANJEBOOM CAVE: A SINGLE COMPONENT EASTGATE SITE IN NORTHEASTERN NEVADA

Paul Buck, Desert Research Institute, Division of Earth and Ecosystem Science, 755 E. Flamingo Rd., Las Vegas, NV 89119

Bryan Hockett, Bureau of Land Management, Elko District Office, 3900 E. Idaho St., Elko, NV 89801

Kelly Graf, Ted Goebel, Gene Griego, Department of Anthropology, University of Nevada Reno, Reno, NV 89557

Laureen Perry, 2825 Swallow Point, Las Vegas, NV 89117

Eric Dillingham, United States Forest Service, 1101 New York Ave., Alamogordo, NM 88310

Excavations in Oranjeboom Cave (26EK1722) in northeastern Nevada near the Utah border reveal a single component site containing Eastgate points and Great Salt Lake grayware sherds. The central feature of this site is a prepared living surface covered with stripped juniper bark matting, and an associated single-use hearth. Calibrated two sigma radiocarbon dates place use of the site at about 1100 – 970 B.P., reflecting a single short-term event. Faunal remains indicate preparation and consumption of bison as well as other large-to-medium sized mammals. The lithic assemblage is dominated by broken bifaces, and abundant small pressure flakes, suggesting tool kit repair. Pine and juniper were used as fuel, and food remains include goosefoot, pine nuts, and juniper berries. The assemblage from Oranjeboom Cave shows that Fremont foragers using bows and arrows were exploiting areas west of the Bonneville Basin by at least 970 B.P.

Oranjeboom Cave (26EK1722) is located on the west slope of the Goshute Mountains in northeastern Nevada (Figure 1). Streams on the east slope of the Goshute Mountains drain into the Bonneville Basin. The cave is situated approximately 2,000 m (6,500 ft.) above sea level in pinyon-juniper habitat. The site is located 300 m (1,000 ft.) above the valley floor, and overlooks Goshute Valley to the southwest. Pleistocene Lake Waring filled this valley before approximately 10,000 B.P. (Currey et al. 1984; Mifflin and Wheat 1979; Snyder et al. 1964), and well-preserved lake terraces are visible along the foothill slopes below the cave. Nearby is Top of the Terrace Shelter. This large rockshelter contains the Top of the Terrace woodrat midden, with preserved macrobotanical remains dating back over 40,000 years (Rhode 1998, 2000; Rhode and Madsen 1995).

Oranjeboom Cave is approximately 80 m in depth and its entrance measures 10.5 m in width (Figure 2). The first recording of Oranjeboom Cave as an archaeological site was made by the Elko Field Office of the Bureau of Land Management (BLM) in July of 1993. At this time, a Rose Spring projectile point was found at the base of the steep slope leading up to the cave, and several small tertiary chert flakes were found just outside the dripline in front of the cave. It was apparent that rocks had been piled inside the dripline to level off

Figure 1. Oranjeboom Cave (26EK1722) is located on the west slope of the Goshute Mountains in northeastern Nevada. The cave is situated approximately 2,000 m (6,500 ft.) above sea level and located 300 m above the valley floor. The Scorpion Ridge site (not shown) is located on the outskirts of Elko, Nevada.

a portion of the steeply-sloped cave surface, but the age and nature of this feature were unknown then.

Oranjeboom Cave was test-excavated in 1998 as part of a joint project between the Desert Research Institute (DRI) and BLM. A grid was established using the letter-number system (Figure 3), and three units were excavated and screened with 1/8" mesh. One unit was placed on the steep slope near the dripline of the cave (Unit H10). It produced a few small tertiary chert flakes similar to those found on the surface in 1993. Another unit was placed deeper in the cave (Unit OO12). No artifacts were recovered, but a scant faunal assemblage was retrieved.

A third unit was placed near one edge of the leveled-off section inside the dripline of the cave (Unit AA10). This unit produced two Eastgate projectile points, hundreds of white chert flakes, arrow cane (or reed, *Phragmites* sp.) fragments that likely represents pieces of broken arrow shafts, grayware ceramic sherds, and burned and unburned large mammal bone fragments in association with a matting of stripped juniper bark, burned vegetation, and large chunks of charcoal measuring no more than 10 to 20 cm in thickness. During the Fall of 1998 charcoal recovered from this feature was sent for radiocarbon dating. This sample returned an uncalibrated, conventional ^{14}C date of 1660 ± 50 B.P. (Table 1).

The BLM and DRI returned in 1999 to fully excavate the living floor in collaboration with Ted Goebel, then of the University of Nevada, Las Vegas. The majority of artifacts recovered from the living floor came from a roughly 4 x 3 m area in the artificially-leveled zone just inside the dripline of the cave. Concentrations of bones, ceramic sherds from a single Great Salt Lake jar, and lithic debitage varied in density within this 12 m^2 zone. Barring clean-out of earlier occupations, Oranjeboom Cave appears to have served primarily as a short-term camp during Late Archaic times. The four conventional ^{14}C ages (Table 1) range from about 1100 B.P. to almost 1700 B.P., although the oldest dates may be unreliable (see discussion below).

The living floor consisted mainly of stripped juniper bark matting. An unprepared hearth was built somewhere near the center of the feature. Much of the juniper bark had burned, probably smoldering for some time after the occupants left the cave. The living floor lay exposed for a relatively brief period until sedimentation and the movement of animals in and out of the cave covered its contents. Approximately 10 to 15 cm of very loose silts, rockfall, and degraded owl pellets and their associated faunal remains covered the top of the feature. The contents of this upper, culturally sterile stratum were similar to paleoecological faunal assemblages recovered in other parts of the Great Basin (e.g., Hockett 2000), and are not discussed here. The following sections of the paper describe the stratigraphy and dating as well as the chipped stone tools, debitage, perishables, ceramics, and faunal remains recovered from the living floor. Following these analyses is a discussion of the significance of Oranjeboom Cave in a regional context.

STRATIGRAPHY AND DATING

The excavated stratigraphic profile at Oranjeboom Cave consists of about 35 cm of loose sediment (Figure 4). Layer 1, at the top of the profile, is a moderately compact stratum of woodrat dung pellets, reaching about 20 to 30 cm in thickness. Layers 2a and 2b are deposits of ash. Specifically, layer 2a is a lens of white ash with abundant charcoal; we interpret this as an unlined hearth feature. Layer 2b is a gray ash with little charcoal. This stratum, which becomes less ashy further from the hearth feature, contains a distinct bed of unburned juniper bark as well as the majority of the cave's cultural remains. The ashy matrix of layer 2b could be the result of at least one episode of hearth cleaning. Layers 3 and 4 are thin deposits of silt; layer 3, situated just beneath the hearth of layer 2, is fire-reddened. Layer 5, finally, is the limestone bedrock floor of the cave. Stratigraphically, the hearth (layer 2a) and juniper-bark mat (of layer 2b) appear to be contemporaneous. Together they represent a single human occupation of Oranjeboom Cave.

Four radiocarbon ages were obtained from materi-

Figure 2. Inside Oranjeboom Cave. View A is looking from the excavated area out toward Goshute Valley. The white "X" marks the southwest corner of unit AA9. View B is looking toward the back of the cave. Note the large tree toward the rear.

als collected from layer 2, the cave's cultural deposit. Charcoal and unburned organic material such as matting and twigs were abundant in the deposit. Two large pieces of clean wood charcoal (probably juniper) from the central part of the feature (units AA10 and BB10) were submitted for radiocarbon dating to Beta Analytic laboratories. A large handful of the intact cedar bark matting (from unit AA11) was also submitted. Finally, soot from the exterior of one of the GSL grayware sherds (artifact CRNV-11-8055-97) was scraped and submitted for an AMS date.

Results are shown in Table 1. The two oldest dates

Table 1. Radiocarbon dates from Oranjeboom Cave.

Sample	Material	Provenance	Method	Measured ^{14}C age	Fractionation 0/00	Conventional ^{14}C age	2-sigma range (method B)	Calendar age**
Beta-144436	Soot/charcoal smudging	BB09, level 2	AMS	1060 ± 40	-22.8	1100 ± 40	1078-930 B.P.	AD 882-1019
Beta-144731	Juniper bark matting	AA11, level 2	radiometric	1220 ± 60	-25.0*	1220 ± 60	1275-1049 B.P.	AD 664-977
Beta-144732	Wood charcoal	BB10, level 2 "inside hearth"	radiometric	1440 ± 60	-25.0*	1440 ± 60	1422-1262 B.P.	AD 532-686
Beta-121768	Wood charcoal	AA10, Feature 1, Stratum 2, level 1	radiometric	1660 ± 50	-23.2	1690 ± 50	1713-1509 B.P.	AD 240-435

are on wood charcoal and are considered too ancient. It is likely that old wood was used as fuel for the fire. Many pieces of dead wood are found today in the cave, including most of a large tree trunk that was dragged to the back of the cave (Figure 2b), as well as woody materials deposited by wood rats. We consider the two more recent conventional dates of 1100 ± 40 B.P. and 1220 ± 60 B.P. to be the best estimate of when the cave was occupied. At the 95 percent confidence interval, the two dates overlap slightly (Table 1), and when averaged and calibrated, result in a two sigma range of 1100 – 970 B.P. Cedar bark, being readily stripped from the exterior of nearby living trees (the bark found in the site was still fresh-looking and -smelling), would not exhibit the "old wood problem" (Schiffer 1982) of charcoal found in the hearth. The soot scraped from the exterior of the burned sherd and dated through AMS may have been charcoal adhering to the outside of the vessel from placement in a hearth or fire, possibly even from somewhere other than Oranjeboom Cave. The most likely calendar age of occupation for the site is therefore 1100 – 970 B.P.

LITHIC ASSEMBLAGE

The Oranjeboom lithic assemblage consists of 1,114 artifacts, including two cores, 1,054 pieces of debitage, and 58 tools. By far the most frequently occurring raw material type is cryptocrystalline silicate (CCS, 97.9 percent), while limestone, basalt, obsidian, and quartzite artifacts are rare (Table 2). Unit AA11 had 613 lithic artifacts, more than half the entire assemblage (Figure 3).

The core assemblage at Oranjeboom is small and characterized by one multidirectional flake core and one bipolar core. The multidirectional core is CCS and is less than 50 percent covered with cortex. The bipolar core is also CCS but does not possess cortex. Maximum linear dimensions (Andrefsky 1998) for both cores are 32.4 mm and 33.8 mm, respectively, and core weights are 7.77 g and 3.26 g, respectively. The relatively small size of the Oranjeboom cores, combined with their multiple platforms and fronts, suggest they were discarded at or near the ends of their use lives.

Debitage makes up the majority of artifacts in the lithic assemblage, with 1,054 pieces occurring (Table 2). Approximately 88 percent of debitage consists of retouch chips (i.e., pressure flakes and biface thinning flakes). Among retouch chips, there are 322 (34.8 per-

Table 2. Lithic assemblage from Oranjeboom Cave.

	Raw Material types					
	Obsidian	Basalt	CCS	Limestone	Quartzite	Total
Debitage	**3**	**2**	**1,035**	**11**	**3**	**1,054**
Angular Shatter			*13*	*3*		*16*
Cortical Spalls			*16*	*1*		*17*
Cortical Spall Fragments			8	1		9
Primary Cortical Spalls			1			1
Secondary Cortical Spalls			7			7
Flakes		*1*	*93*	*2*		*96*
Flake Fragments			45	2		47
Flakes		1	44			45
Blade-like Flakes			4			4
Retouch Chips	*3*	*1*	*913*	*5*	*3*	*925*
Retouch Chip Fragments		1	317	3	1	322
Retouch Chips			422	2	2	426
Biface Thinning Flakes	3		174			177
Cores			**2**			**2**
Multidirectional Cores			1			1
Bipolar Cores			1			1
Tools		**3**	**55**			**58**
Unhafted Bifaces			*43*			*43*
Biface Fragments			40			40
Knives			2			2
Preforms			1			1
Hafted Bifaces			*4*			*4*
Eastgate Projectile Points			4			4
Unifaces			*6*			*6*
Retouched Flake Fragments			2			2
Retouched Flakes			3			3
Burins			1			1
Groundstones		*3*	*2*			*5*
Groundstone Fragments		3	2			5
Total	3	5	1,092	11	3	1,114

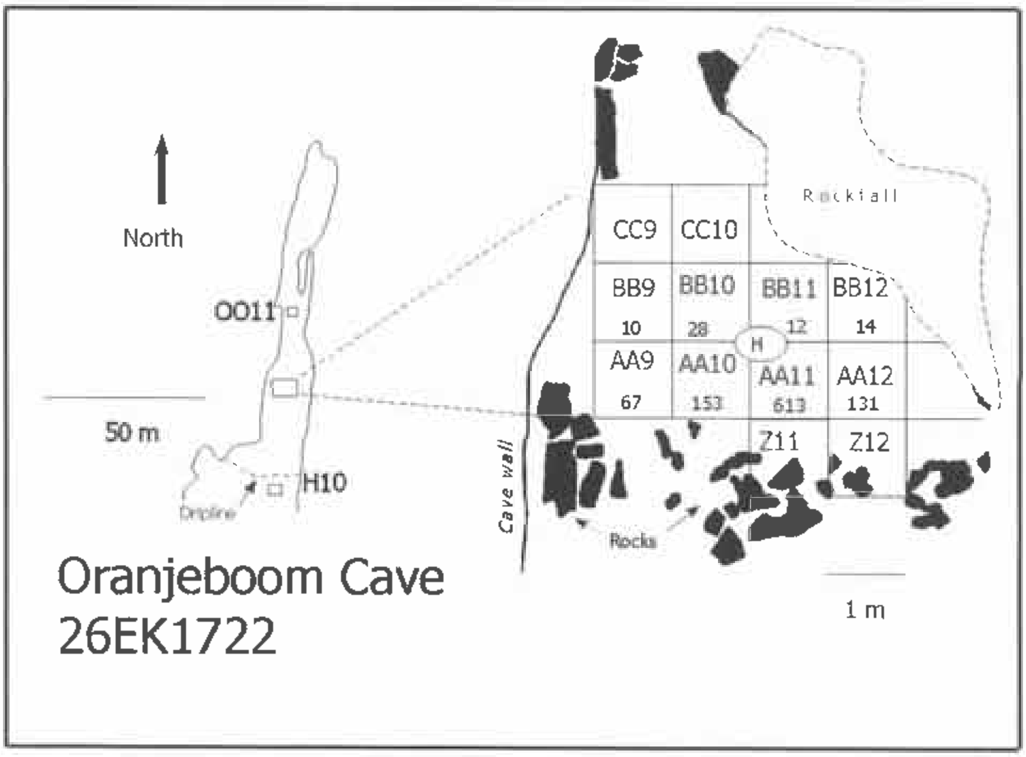


Figure 3. Plan map of cave floor. The oval with the "H" marks the location of the fire hearth. Unit names are shown in the upper part of each square (i.e., AA09).

cent) retouch chip fragments, 426 (46.1 percent) complete retouch chips, and 177 (19.1 percent) biface thinning flakes. When comparing debitage to raw material use (Table 2), it is interesting to note that for each debitage type CCS was utilized more than 80 percent of the time.

The number of dorsal flake scars was analyzed on 1,044 pieces of debitage. Only one piece of debitage exhibits no dorsal flake scars, 5.3 percent possess one dorsal flake scar, 30.1 percent exhibit two dorsal flake scars, 43.1 percent possess three dorsal flake scars, and 15.0 percent exhibit four or more dorsal flake scars.

Size value was scored for the debitage pieces possessing platforms. Among 916 pieces of debitage measured, the majority (92 percent) of pieces are smaller than 1 cm^2, while 7percent of the pieces are small (1-3 cm^2), and 1 percent are medium in size (3-5 cm^2). The abundance of very small flake debitage coupled with the high frequency of flakes with multiple dorsal scars suggest that the major reduction activity at Oranjeboom Cave was tool maintenance and resharpening.

The Oranjeboom lithic assemblage includes 58 tools, mostly fragmentary. Tools include 47 (81.1 percent) bifaces, six (10.3 percent) unifaces, and five (8.6 percent) groundstone pieces. Among bifaces, 40 (85.1 percent) are untypable fragments of late stage bifaces, four (8.5 percent) are Eastgate points (Figure 4a-c), two (4.3 percent) are unhafted bifaces, and one (2.1 percent) is a biface preform. The mean width of all bifaces and fragments is 15.1 mm (the length was seldom measured since the fragments are too small). The bifaces and fragments are all made of CCS, dominated by gray, white, and translucent colors.

The Eastgate points include two medial fragments and one lateral-proximal fragment, missing the tip and one lateral margin (Figure 4b). Among the unifaces, one (16.7 percent) is a burin on a flake, two (33.3 percent) are retouched flake fragments, and three (50.0 percent) are

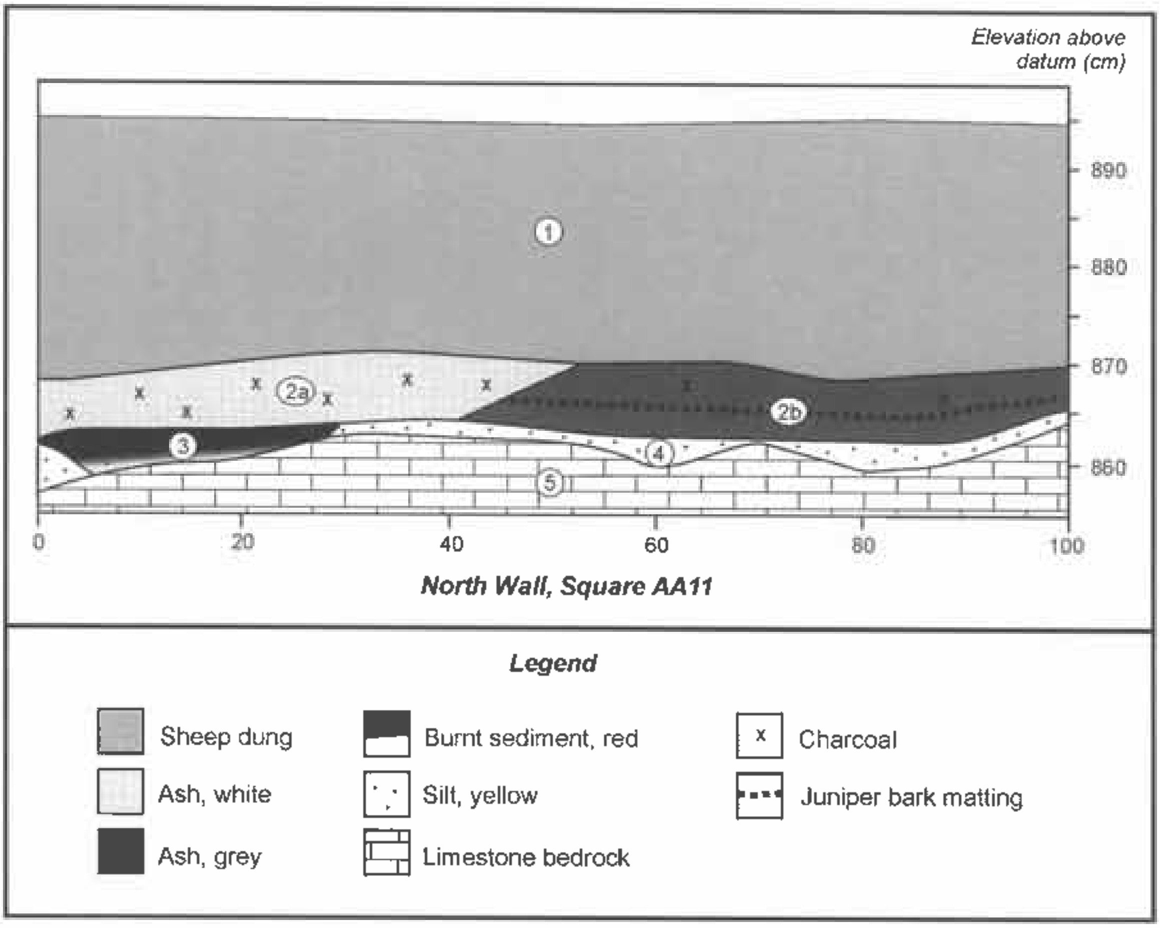


Figure 4. Stratigraphic profile of north wall of Unit AA11. Layers 2a and 2b contained most of the artifacts found at Oranjeboom Cave, including the juniper bark matting.

retouched flakes.

The groundstone artifacts are all untypable fragments; they may represent hammerstones or abraders. All of the chipped-stone tools and two of the groundstone fragments were manufactured on CCS, while the remaining three groundstone fragments were manufactured on basalt (Table 2).

DISCUSSION

The Oranjeboom lithic assemblage consists of 1,114 artifacts. CCS is the most common raw material type; however, basalt, obsidian, limestone, and quartzite are also present. The few cores recovered from the site were reduced intensively, apparently to the point of exhaustion. The debitage assemblage is characterized chiefly by retouch chippage. Very little cortex occurs on the debitage pieces, and the majority are small in size and bear multiple dorsal flake scars. The tool assemblage is dominated by small biface fragments and only four Eastgate points, all made of CCS. The biface fragments could have come from a small number of discarded projectile points. Thus, lithic technological activities appear to have been limited to the production of Eastgate points, biface maintenance, and the expedient manufacture of a few unifaces.

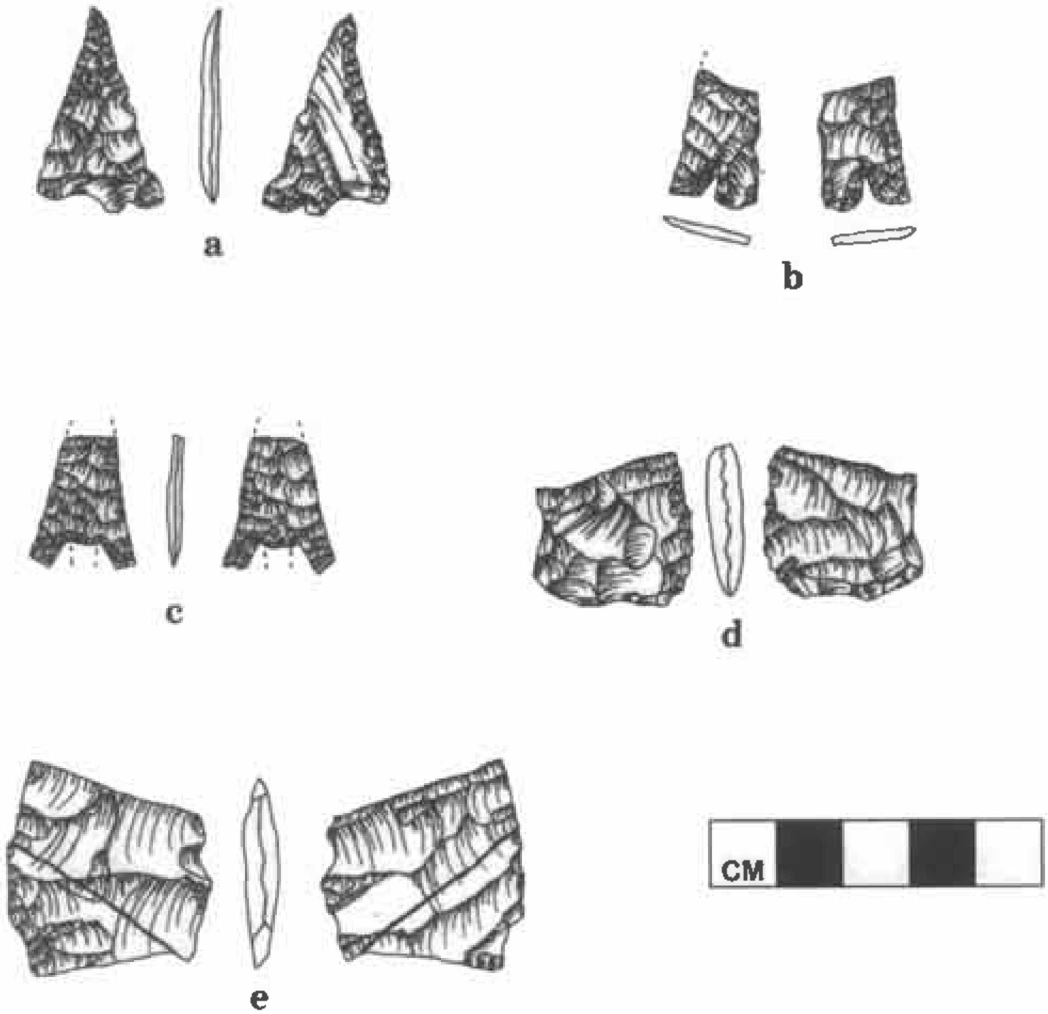


Figure 5. Selected stone tools from Oranjeboom Cave: (a) Eastgate point, ref. no. CRNV11-8055-130, unit BB11, level 2; (b) Eastgate point, ref. no. CRNV11-8055-33, unit AA10 (SW), stratum 2, level 1; (c) Eastgate point, ref. no. CRNV11-8-55-34, unit AA10, Fea. 1, stratum 2, level 1; (d) late stage biface, ref. no. CRNV11-8055-7-1, unit AA09, level 2; (e) late stage biface, ref. no. CRNV11-8055-7-2, unit AA09, level 2.

CERAMIC ARTIFACTS

The 24 ceramic sherds in the collection appear to be from a single Great Salt Lake Gray wide-mouthed jar (Madsen 1977). The surface is plain, and the construction method is coil and scrape with very uneven smoothing. Wall widths range from 3.2 to 6.4 mm. The non-plastic inclusions appear to be added as temper since biotite is present in large fragments. The temper consists of abundant frosted quartz with coppery mica. Also present in lesser amounts are black volcanic grains and other unidentified rock fragments.

One re-fired sherd contains a piece of another sherd, tempered with frosted quartz, besides the above constituents. Another has a streak of fugitive red pigment across the interior surface. Since none of the other sherds exhibit this pigmentation, it may have been applied after breakage. All of the sherds are burnt, most throughout the cross-section, suggesting the burning occurred after breakage. If this is true, then the vessel may not have been used for cooking and the wide-mouth might suggest storage of dry material, rather

Table 3. Organic artifacts from Oranjeboom Cave.

Description	Reference Number	Provenience	Dimensions	Comments
Twine fragments	CRNV-11-8055-35	AA10, Feature 1, Stratum 2, level 1	35 mm x 4mm dia.	2 strand S-twist; Z-spun (Emery 1966)
Conical wooden stick	CRNV-11-8055-13	AA10, Stratum 3, level 1	23 mm x 7 mm	Tapers to a blunt point; rasp-like abrasion on taper; unburned
Bone bead	CRNV-11-8055-82	BB10, level 2	3.5 mm x 2.5 xx dia.	Possible bird bone, undecorated

than liquid.

Four sherds were selected for more detailed laboratory analysis. Microscopic examination of these specimens in thin-section indicates a fine-grained granitic temper containing plagioclase feldspar, quartz, biotite mica, amphibole, and clino-pyroxene. After refiring, the sherd containing rounded quartz in its temper (CRNV-11-8055-43) was a recognizably different color from the other sherds, perhaps reflecting a mixture of clay sources.

The characteristics of these sherds fall within Madsen's (1977) description for Great Salt Lake Gray, dating from A.D. 400 – 1350, although the difficulties of classifying Fremont ceramics into distinct types is recognized (e.g., Madsen and Simms 1998). An uncalibrated AMS radiocarbon date of 1100 ± 40 B.P. (Table 1) was obtained from the outside of sherd CRNV-11-8055-97. The two sigma calendar age is A.D. 882 to 1019, clearly within the temporal range of this style. The core area is around Great Salt Lake and Utah Lake, although this pottery style has a wide distribution across Utah and into Nevada, southern Idaho, southwest Wyoming, and northwest Colorado (see Madsen and Simms 1998).

ORGANIC ARTIFACTS

By volume and absolute number, organic artifacts numerically dominate the Oranjeboom assemblage. The shredded juniper matting which formed the living floor is essentially a large organic artifact covering several square meters. Several samples of this surface were collected (the largest ~ 1 kg), including one from unit AA11 which was directly radiocarbon dated at 1275 – 1049 B.P. (Table 1). These samples were removed intact, and were not screened or sorted, and at least one contains visible lithic debitage and no doubt other artifacts as well. This surface was removed, screened, and discarded over much of the excavated area shown in Figure 3, with only samples retained in the collection.

A number of other interesting organic artifacts and objects were recovered from this screened matting, although none are diagnostic (Table 3). These include a single small bone bead, a short piece of twine, and a curious conical unburned wooden object. The conical wooden object is about the size and shape of the writing end of a standard no. 2 wooden pencil, which is unpainted and undecorated. Abrasion marks created apparently by a rasp-like stone are clearly visible on the entire surface. There is no evidence of impact damage to the blunt tip. Fragments of juniper wood and sticks were abundant, some partially burned. Fragments of arrow cane were also common, although none were longer than a few centimeters and none had traces of paint or other evidence of use or manufacture. No fragments of arrow or dart shafts were seen, although some pieces of the *Phragmites* spp. may reflect these artifacts.

MACROBOTANICAL REMAINS

Two soil samples (comprising 4.2 liters) from the hearth and burned area found in AA11 and BB10 were sent to the Paleoethnobotany Laboratory, Institute of Archaeology of the University of California Los Angeles for analyses. The samples contained primarily charcoal and there were a few seeds (Popper and Martin 2000). Identifiable carbonized seeds include *Chenopodium* sp. (goosefoot) and *Juniperus* sp. (juniper). Other plant parts recovered include small branchlets of *Juniperus* sp., a possible *Pinus* sp. nutshell fragment, and an unknown fruit. Most of the identified wood charcoal was *Juniperus* sp. and *Pinus* sp., with small amounts of *Artemesia* sp. cf. (sagebrush), *Rosaceae* cf. (rose family), and an unidentifiable conifer.

Most of the macrobotanical remains from Oranjeboom suggest that they were use as fuel, while the goosefoot seeds, juniper seed, and the possible pine nutshell possibly represent food items (Popper and Martin 2000). Each of the taxa recovered was locally available.

FAUNAL REMAINS

A total of 270 large mammal bone fragments was found in direct association with the living floor. Of these, 249 (92 percent) were unburned and 21 (8 percent) were burned. The vast majority of faunal remains (238, or 88 percent) were recovered from just six units: Z12, AA10, AA11, AA12, BB11, and BB12.

Of the 270 total bones recovered, 262 (97 percent) were unidentifiable large mammal bone fragments. Some of these were from a large ungulate (elk or bison-sized), and some were from a much smaller ungulate (pronghorn, mountain sheep, or deer). The extensive breakage of these bones suggests that marrow extraction was an activity that occurred within the cave.

The eight bones identified to element are listed in Table 4, and six of them were identified as bison (*Bison bison*). The bison distal first phalange fragment was thoroughly charred, while the remainder of bison bones were unburned. No cutmarks are visible on any of the identified or unidentified specimens. The rib fragment identified as large mammal is probably bison as well. The small ungulate second phalange compares most favorably with sheep, but could not be confidently assigned to either mountain sheep (*Ovis canadensis*) or domestic sheep (*Ovis aries*). This second phalange was found near the contact zone of the upper, disturbed stratum and the living floor, and because domestic sheep have been herded in the region for some time, the bone may belong to a domestic animal carried into the cave by a carnivore.

The identification of bison in Oranjeboom Cave is a bit surprising given its location above the valley floor. The time period between approximately 1600 and 600 B.P., however, was a period of increased summer precipitation, with subsequent expansion of grassland habitats across the northern and eastern Great Basin regions (Currey and James 1982). This period also witnessed the expansion of bison populations in northeastern Nevada (Murphy and Hockett 1994; van Vuren and Deitz 1993), and the appearance of bison in many eastern Great Basin archaeological sites containing Fremont ceramics (Lupo et al. 1994; Lupo and Schmitt 1997).

SUMMARY AND CONCLUSION

The assemblage from Oranjeboom Cave seems to represent a small short-term occupation (perhaps even a single or very limited number of visits) that took place around 1100 – 970 B.P. by Fremont Complex (Madsen and Simms 1998) foragers. The spatially limited, prepared area indicates a small group, perhaps even a single hunter. Repair of hunting equipment seems to have been the dominant activity, as indicated by the large number of small retouch chips and the prevalence of broken (irreparable) biface fragments. Fremont cultural affiliation is suggested by the presence of a single, broken vessel of Great Salt Lake Gray ware. Botanical remains are not very revealing, suggesting mainly that pine and juniper were used as fuel. Goosefoot, juniper, and pine nutshells were also found, possibly indicative of their

Table 4. Faunal remains identified to element at Oranjeboom Cave

Unit	Element	Identification
AA11	first phalange	*Bison bison*
AA12	rib fragment	*Bison bison*
AA12	rib fragment	*Bison bison*
BB9	sesamoid	*Bison bison*
BB9	rib fragment	large mammal
BB10	second phalange	*Bison bison*
BB11	second phalange	small ungulate
BB12	rib fragment	*Bison bison*

use as food.

The only large mammal bones identified to species were those of bison, and thus the partial remains of at least one bison were probably cooked and eaten in the cave. These and other large- and medium-sized mammal bones were very broken, suggesting marrow extraction. The faunal data suggest that the small hunting party consumed bulky and less calorie-rich parts of the bison carcass inside the cave (e.g., Binford 1981). Perhaps a bison was killed along the foothill slopes below the cave. The hunting party may have sought shelter inside the cave, carrying portions of the bison carcass such as ribs and lower legs to the cave to cook and consume meat and marrow. The highest meat-yielding portions of the carcass would have been consumed at the kill site or at another camp located some distance from the cave.

The data from James Creek Shelter (Elston and Budy 1990) and Scorpion Ridge (Hockett and Morgenstein 2002) suggest that the bow-and-arrow entered northeastern Nevada by at least 1200 B.P. The two sigma age range for acceptable dates from Oranjeboom Cave overlap with this date, suggesting that deposits in Oranjeboom Cave were left behind by some of the earliest bow-and-arrow wielding foragers in northeastern Nevada (Hockett and Morgenstein 2002). Additionally, Oranjeboom Cave documents that early Fremont foragers were exploiting environments west of the Bonneville Basin. These data add to the number of sites that document early occupation of the eastern and northern Great Basin regions by Fremont foragers (e.g., Henderson 2002), as the Fremont ceramics from Oranjeboom Cave pre-date the peak of Fremont sedentary villages in northern Utah and east-central Nevada (Madsen and Simms 1998).

REFERENCES CITED

Andrefsky, W.
1998 *Lithics : Macroscopic Approaches to Analysis.* Cambridge University Press, New York.

Binford, L. R.
1981 *Bones: Ancient Men and Modern Myths.* Academic Press, New York.

Currey, D. R. and S. R. James
1982 Paleoenvironments of the Northeastern Great Basin and Northeastern Basin Rim Region: A Review of Geological and Biological Evidence. In *Man and Environment in the Great Basin*, edited by D. B. Madsen and J. F. O'Connell, pp. 27-52. Society for American Archaeology Papers No. 2, Washington, D.C.

Currey, D. R., C. G. Oviatt, and J. F. Czarnomski
1984 Late Quaternary Geology of Lake Bonneville and Lake Waring. In *Geology of Northwest Utah, Southern Idaho and Northeast Nevada*, pp. 227-237. Utah Geological Association Publication 13, Salt Lake City.

Elston, R. and E.E. Budy (editors)
1990 *The Archaeology of James Creek Shelter.* Anthropological Papers No. 115. University of Utah Press, Salt Lake City.

Emery, I.
1966 *The Primary Structures of Fabrics: An Illustrated Classification.* The Textile Museum, Washington D.C.

Henderson, A.
2002 A Fremont Presence in Lincoln County, Nevada. Poster presented at 28th Great Basin Anthropological Conference, Elko, NV.

Hockett, B. S.
2000 Paleobiogeographic Changes at the Pleistocene-Holocene Boundary near Pintwater Cave, Southern Nevada. *Quaternary Research* 53:263-269.

Hockett, B. S. and M. Morgenstein
2002 The Implications of 1,200 Year-old Brown Ware Pottery in the Central Great Basin. Paper presented at 28th Great Basin Anthropological Conference, Elko, NV.

Lupo, K. D., J. Brenneke, and D. N. Schmitt
1994 Great Salt Lake Faunas Revisited: New Insights on Fremont and Late Prehistoric Mammalian Subsistence Strategies. Paper presented at the 24th Great Basin Anthropological Conference, Elko, NV.

Lupo, K. D. and D. N. Schmitt
1997 On Late Holocene Variability in Bison Populations in the Northeastern Great Basin. *Journal of California and Great Basin Anthropology* 19:50-69.

Madsen, D.B. and S.R. Simms
1998 The Fremont Complex: A Behavioral Perspective. *Journal of World Prehistory* 12:255-336.

Madsen, R. E.
1977 *Prehistoric Ceramics of the Fremont.* Museum of Northern Arizona Ceramic Series No. 6., Flagstaff.

Mifflin, M. D. and M. M. Wheat
1979 *Pluvial Lakes and Estimated Pluvial Climates of Nevada.* Nevada Bureau of Mines and Geology Bulletin 94, University of Nevada, Reno.

Murphy, T. and B. Hockett
1994 Bison Remains from Northeastern Nevada. Paper presented at the 24th Great Basin Anthropological Conference, Elko, NV.

Popper, V.S. and S.L. Martin
2000 Macrobotanical Analysis of Two Soil Samples from Oranjeboom Cave (CRNV), Goshute Mountains, Nevada. Paleoethnobotany Laboratory Institute of Archaeology, University of California, Los Angeles. Ms. on file at Desert Research Institute, Las Vegas, NV.

Rhode, D.
1998 *50,000 Years of Vegetation Change in the Northeastern Great Basin: An Analysis of Packrat Middens Located on Federal Lands Administered by the Bureau of Land Management, Elko District.* Report BLM1-1837(P), Ms. on file, Bureau of Land Management, Elko, NV.

Rhode, D.
2000 Middle and Late Wisconsin Vegetation in the Bonneville Basin. In *LateQuaternary Paleoecology in the Bonneville Basin*, edited by D. B. Madsen, pp. 137-147. Utah Geological Survey Bulletin 130, Salt Lake City.

Rhode, D., and D. B. Madsen
1995 Late Wisconsin/Early Holocene Vegetation in the Bonneville Basin. *Quaternary Research* 44:246-256.

Schiffer, M.B.
1982 Hohokam Chronology: An Essay on History and Method. In *Hohokam and Patayan Prehistory of Southwestern Arizona*, edited by R.H. McGuire and M.B. Schiffer, pp. 299-344. Academic Press, New York.

Snyder, C. T., G. Hardman, and F. F. Zdenek
1964 *Pleistocene Lakes in the Great Basin.* Miscellaneous Geologic Investigations, Map 1-416, U.S. Geological Survey, Washington, D.C.

Stuiver, M. and P.J. Reimer
1993 Extended ^{14}C Database and Revised CALIB 3.0 ^{14}C Age Calibration Program. *Radiocarbon* 35: 215-230.

Van Vuren, D. and F. C. Deitz
1993 Evidence of *Bison bison* in the Great Basin. *Great Basin Naturalist* 53:318-319.

BURNT STATION: WHAT REALLY HAPPENED IN OVERLAND CANYON

David M. Jabusch, Susan Jabusch, and Melvin Brewster. Salt Lake City Chapter, Utah Statewide Archaeological Society.

Serious scholarly work on the stations of the Pony Express and Overland Stage began in the late 1970s with the appearance of historian John Bluth's doctoral dissertation (Bluth 1978). In conjunction with the bicentennial, there followed a Bureau of Land Management (BLM) monograph on all of the stations in Utah by Fike and Headley (1979), and a report by Berge (1980) on excavations at some of the best preserved stations, including Simpson Springs, Boyd, and Round (Figure 1).

In the early 1990s, two of us (David and Susan Jabusch), under the auspices of the Utah Statewide Archaeological Society worked with the Bureau of Land Management (Melvin Brewster) to locate, survey and record all of the uninvestigated stations in Utah. That study produced new information on a number of stations, including the most enigmatic: Dugway, Blackrock and Willow Springs (Jabusch and Jabusch 1993). None of the above studies produced definitive information about Canyon (also known as Burnt or Cañon) Station in Overland Canyon. Indeed, Bluth admits, "A good deal of confusion exists over the structures and location associated with Cañon Station" (Bluth, 1976:24).

Here we report an integration of our field investigations with historical accounts about Overland Canyon during the period of the Pony Express and Overland Stage from approximately 1859 to 1869. Although these stations appear to have been relatively insignificant along the Pony Express and Overland Stage route, Overland Canyon was the focus of troubles with the Paiute and Goshute Indians during this period.

In this study we build upon our previous research, and in particular use archaeological survey to sort out the sometimes conflicting historical accounts regarding the location and construction of these stations, as well as the horrible events that happened at one of them.

THE MYSTERY OF BURNT STATION

Bluth (1976) and Fike and Headley (1979) posit a single station in Overland Canyon (Burnt Station) prior to its being burned on July 8, 1863, and the construction of a fortified station at the mouth of the Overland Canyon called Round Station.

Fike and Headley (1979) claim the location of Burnt Station to have been at the mouth of Blood Canyon, 21 km (13 miles) east of the Ibapah Post Office on the Pony Express road. They located a depression that could have been a station. Our 1991 survey recorded a circular depression 6 m in diameter, 30 m west of the main road at the mouth of Blood Canyon, but there were no pre-World War I artifacts (Figure 2). This would indicate brief usage of unknown date, nothing approximating a description of the station. The location of the depression at the mouth of Blood Canyon, and its location equidistant from the adjoining stations at Deep Creek and Willow Springs, argues in favor of it being a station. Furthermore, the best source of water in the area is located further up Blood Canyon, and that source supplied both Canyon Station and Round Station. The paucity of artifacts, however, makes it impossible to confirm this location as the station that burned in 1863. It may have been an early installation associated with

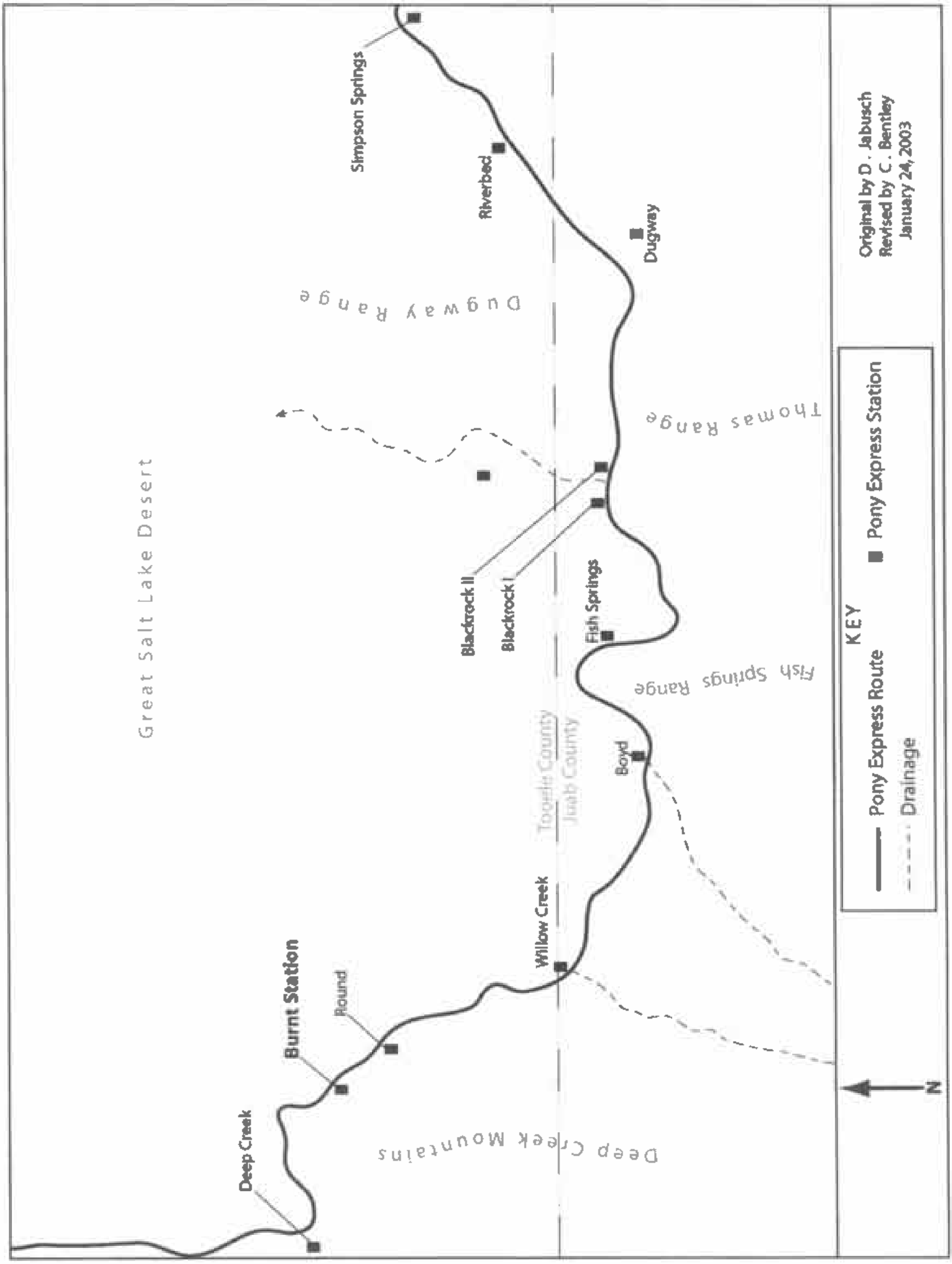


Figure 1. Map of Pony Express route and stations in western Utah.

Figure 2. Depression at the mouth of Blood Canyon, 1992.

the road, and we return to this possibility in the Conclusions.

The other possible location of Burnt (Canyon) Station is near the vandalized monument on Clifton Flat at the head of Overland Canyon (Figure 3). Our survey of the monument area in the spring of 1991 revealed a few scattered artifacts of the appropriate period, but nothing to match the historical accounts of the burning.

Following our research on the Willow Springs Station in 1993, we were contacted by Mr. and Mrs. David Bagley, who gave us copies of some personal papers of Mr. Bagley's father, Cyrene Bagley, some written in his own hand. In one of those documents, Cyrene Bagley discusses the choice of the monument site by the 1936 committee upon which he served, "The site of the station at the mouth of Blood Canyon that was burned earliest was by passed (sic) in favor of the site at the lower end of Clifton Flat with easy access to the highway" (Bagley n.d.).

In our interview, David Bagley (personal communications 1991, 1993) reported his father saying that the station was located not at the monument, but to the west. About the same time, Joseph Nardone delivered to the BLM office the vandalized plaque from the Civilian Conservation Corps monument that he had discovered in a nearby wash. Nardone also reported a concentration of artifacts west of the monument. The inscription on the plaque read, "Established April 1859 as an overland stage station used later by the Pony Express. It was burned and pillaged twice by Indians who killed five keepers and riders, and two soldiers. Rebuilt on this site May, 1861 and on the ridge south of overland canyon in 1864" (Monument plaque in possession of the BLM). The following weekend we located, surveyed and recorded the site described in this report.

James Sharp (1966:131), an avocational historian who visited Round Station but not Canyon Station, describes Burnt (Canyon) Station,

> I'd better describe Canyon Station, for it had been burned, as I had it described to me, and as it was before

Figure 3. Monument and site on Clifton Flat thought to be Burnt Station, 1993.

> the fire. Canyon Station was said to have been a dry station and consisted of a log house and behind and adjoining this, was the stable with a door going from the house into the stable and another door going to the outside. Opposite this door was another leading into a sort of dugout where the meals were cooked and served.

Egan (1917) mentions the barn (stable) with a canvas roof and the dugout, but not the log house. In a later manuscript, Sharp (1966:131) mentions, " the dugout had a canvas roof and the stable was made of cedar posts with a dirt roof." Although these descriptions represent a secondhand account by Sharp and recollections several decades later by Egan, we think it is reasonable to conclude that the station consisted of the log house, an adjoining barn (stable) with a canvas roof, and a dugout made of cedar posts with a dirt roof.

At the time of the re-discovery of the site on Clifton Flat, the artifact scatter corresponded remarkably well with the historical descriptions. The site consisted of two adjacent artifact scatters, lying on a shelf between a shallow wash and a hillock to the north that could have been the house and barn. Numerous artifacts found at the site correspond well with historical accounts and the dates (Figures 4 and 5). Twenty artifacts were collected, and are presently on loan to the Utah State Historical Society Museum from the Utah Museum of Natural History.

Although the dugout, the outhouse, and graves were not located during the survey, following Sharp, we suspect that a survey with a magnetometer between the smaller artifact scatter and the hillock to the north may locate the dugout.

Simpson and Greely did not travel through Overland Canyon, but Burton (1861:560-62) describes his passage thusly,

> To Deep Creek and halt, lst and 2nd October, 1860 . . . After six miles we reached 'Mountain Springs,' a cottonwood, willow, rose, cane, and grass. On our right, or eastward, lay Granite Rock, which we had well nigh rounded, and through a gap we saw Lost Springs Station, distant apparently but a few hours' canter. Be-

> tween us, however, lay the horrible salt plain —a continuation of the low lands bounding the western edge of the Gt. S. Lake —which the drainage of the hills over which we were traveling inundates till June ... After twelve miles over the bench we passed a dark rock, which protects a water called Reading's Springs, and we halted to form up at the mouth of Deep Creek Canyon (Overland Canyon?). This is a dangerous gorge, some nine miles long, formed by a water-course which sheds into the valley of the Gt. S. Lake. Here I rode forwards with 'Jim,' a young express rider from the last station, who volunteered much information upon the subject of Indians. He carried two Colt's revolvers, of the dragoon or largest size, considering all others too small. I asked him what he would do if Gosh-Yuta appeared. He replied, that if the fellow were civil he might shake hands with him, if surly he would shoot him; and at all events, when riding away, that he would keep a 'stirrup eye' upon him: that he was in the habit of looking round corners to see if any one was taking aim, in which case he would throw himself from the saddle, or rush on, so as to spoil the shooting—the Indians, when charged, becoming excited, fire without effect. He mentioned four red men who could 'draw a bead' against any white, usually, however, they take a minute to load, they require a long aim, and they stint their powder. He pointed out a place where Miller, one of the express riders, had lately been badly wounded, and lost his horse. Nothing, certainly, could be better fitted for an ambuscade than this gorge, with its caves and holes in know (sic) cuts, earth-drops, and lines of strata, like walls of rudely piled stone; in one place we saw the ashes of an Indian encampment; in another a whirlwind, curling, as smoke would rise, from behind a projecting spur, made us advance with greatest caution ... As we progressed the valley opened out (Clifton Flat), and became too broad to be dangerous. Near the summit of the pass the land is well lined with white sage, which may be used as fodder, and a dwarf cedar adorns the hills. The ground gives out a hollow sound, and the existence of a spring in the vicinity is suspected.

Since Burton describes this area where Canyon Station was to be located without mentioning a station, it is likely the station on Clifton Flat had not yet been built. Indeed as a non-contract station, we believe the first Canyon Station was constructed in the summer of 1861, as part of the improvements (including Riverbed and Blackrock stations) effected by the stage company that acquired the line near the end of the Pony Express.

THE BURNING

The most compelling reason for studying Canyon Station is that events occurred there that shed light on the conflict between white settlers and the Native Americans that inhabited the land, and gave the station its nickname: "Burnt Station."

Burton (1861:560-562)anticipated difficulties with Indians in Overland Canyon,

> A 'little war' had been waging near Willow Springs. In June the station was attacked by a small band of Gosh-Yuta, of whom three were shot and summarily scalped; an energetic proceeding, which had prevented a repetition of the affair. The savages, who are gathering their pine nut harvest, and are driven by destitution to beg at the stations, to which one meal a week will attach them, are now comparatively peaceful: when the emigration season re-commences they are expected to be troublesome, and their numbers—the Pa-Yutas can bring 1000 warriors into the field—render them formidable. . . with regard to ourselves, Lieut. Weed had declared that there was no danger; the station people thought, on the contrary, that the snake, which had been scotched not killed, would recover after the departure of the soldiers, and that the work of destruction had not been carried on with sufficient vigor.

The best documentated destruction of a station in Overland Canyon occurred on July 8, 1863. The event was reported a week later in *The Deseret News* (1863),

> An attack was made by Indians on what is known as Kanyon station, near Deep Creek, on Wednesday last, which resulted in the killing of four soldiers and the station keeper, William Riley, whose father, we understand, is living in Provo; and also in the burning of the station-house and barn with their contents, including five horses. The particulars of the affair, as stated in a letter from a telegraph operator at Deep Creek to Major Egan, dated on the 10th, was in substance as follows, 'The Indians (how many was not stated) on making the attack first shot Riley, who ran about fifty yards and fell dead. The fiends dragged his body back to the station, placed it on a pile of wood and burned it. There were four soldiers there in the stable at the time, but it is not known whether or not they fired upon the Indians.' It is represented that three of the four men were wounded in the barn before they made an attempt to escape. They then took out some horses, mounted them and fled; two of them ran about two hundred yards and one about three hundred yards before they were shot dead. The fourth man had his horse killed and himself mortally wounded, but escaped to Willow Station by the

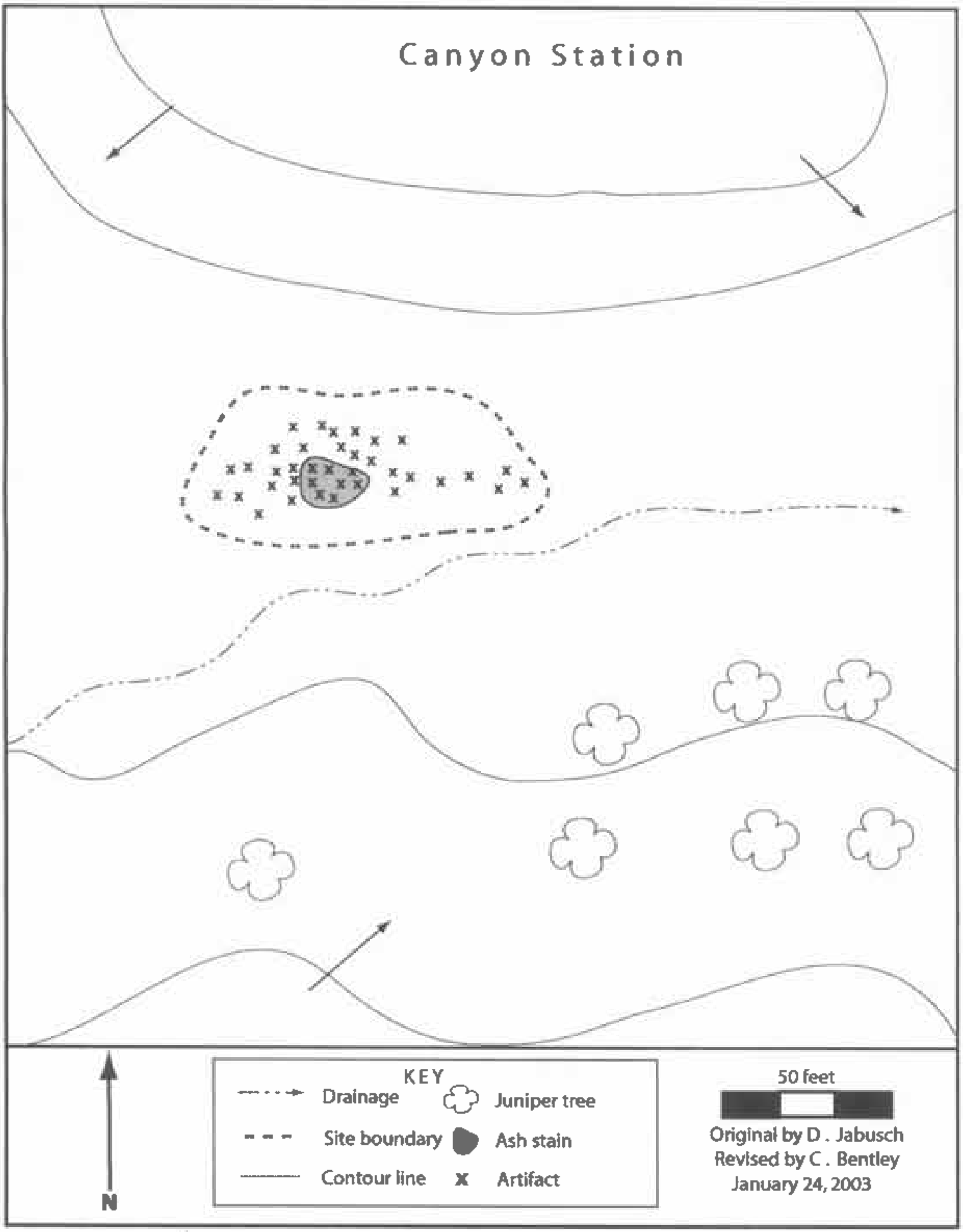


Figure 4. Map of archaeological site on Clifton Flat thought to be Burnt (Canyon) Station.

Figure 5. Artifacts from archaeological site on Clifton Flat, including stove part (upper left), horseshoe folded over from heat (upper right), and glass/bottle fragments.

aid of some emigrants who came along, where he soon after died. The station was completely destroyed by fire. Five horses were burned in the barn, one was killed and two were supposed to have been driven off by the Indians. The station water-hauler and three soldiers escaped death, as stated, by the breaking down of a wagon. It appears they were off somewhere for water and by some accident were detained a short time, and while at some considerable distance from the station they saw it in flames and retreated to Deep Creek for safety.

Artifacts found at the site provide tangible support for these accounts of the intensity and extent of the fire. The artifacts included two horseshoes in the barn area, one of which was folded over, presumably by the heat of the fire (Figure 5). Other evidence included smoked stoneware sherds, melted glass (presumably window glass) in the area of the house, and scattered concentrations of charcoal. Significant numbers of nails, bottle sherds, and stove and utensil fragments were found throughout the barn and house areas (Figure 5).

The accounts of the number and nature of the killing of the soldiers vary. Both Egan (1917) and Sharp (1966) claim the men were at breakfast, and were killed without returning fire. *The Deseret News* places four of them in the barn where three were wounded before attempting to flee on horseback. Reagan (1934:46) claims, "It is alleged that the Indians killed three soldiers and two stock-tenders here and that one soldier got away wounded. The bodies of the soldiers were afterwards taken to Camp Douglas to be buried; the civilians were buried near the ruins of the station and their graves still mark the spot."

To test Reagan's claim as to the burial of the soldiers, we visited the Fort Douglas graveyard in Salt Lake City. With the help of "Chuck" Hibbard, a Fort Douglas Museum docent, we discovered at grave C-28 the sandstone gravestone of Private John McClusky

Figure 6. Fortress at Round Station.

next to two "unknown" gravestones that had been replaced due to the disintegration of the original stone. Written records reveal that John McClusky was born in Antrim County, Ireland, and died on July 8, 1863 at the age of 35. He was a member of Company G of the 3rd Californian Infantry. We suspect that McClusky and the soldiers in the two "unknown" graves next to his were the three soldiers killed at Burnt Station.

Cyrene Bagley also claims that one soldier escaped to Willow Springs Station and was buried south of the station. Egan and Sharp's stories do not account for the cook. Accordingly, we think it is probable that two civilians, Riley and the cook, both of whom are mentioned in the account by Sharp (1966) and by *The Deseret News*, died and were buried at Canyon Station. A fourth soldier also mentioned in the accounts as wounded, escaped to Willow Springs only to die. We suspect he was buried there.

CONCLUSIONS

In our view there were three stations in or near Overland Canyon. The first, at the mouth of Blood Canyon was probably never more than a Sibley tent or a crude dugout, and was in use a short period before being destroyed. The second was at the head of the canyon near Clifton Flat, and is the station described in the accounts of the burning on July 8, 1863. It served the Overland Stage, but probably not the Pony Express. The third station (currently named Round Station, see Figure 6), was constructed as a fortress at the mouth of Overland Canyon, and served the stage until its demise in 1869 (Berge 1980). The site at Sixmile Spring described by Fike and Headley (1979) was never a Pony Express station, and probably served the Overland Stage as a watering stop without a station. It became a Post Office and a homestead that has been occupied until the present day.

Because of its remoteness and vulnerability to attack, Overland Canyon was a focal point of conflict with the Indians on the Pony Express and Overland Stage route in Utah. At least six people died as a result of the attack on Burnt Station on July 8, 1863. William Riley and the cook were buried near the ruins of the station. Three soldiers were buried at Fort Douglas and another at Willow Springs.

The artifact scatter near the monument on Clifton Flat is well preserved, and accurately dates a thirty-three month period bracketing the demise of the Pony Express: between Burton's passage in October, 1860 and the attack in July 8, 1863. Along with the depression at the mouth of Blood Canyon, these provide a physical connection through archaeology to these transportation and communication stations, as well as to an Anglo-Indian conflict of the time.

REFERENCES CITED

Bagley, C.
n.d. Personal papers. Utah State Historical Society library. Utah Division of State History, Salt Lake City.

Berge, D.
1980 *Simpson Springs Station: Historical Archaeology in Western Utah.* Bureau of Land Management Cultural Resources Series No. 6. Salt Lake City, Utah.

Bluth, J. F.
1978 Confrontation With an Arid Land: The Incursion of Goshute and Whites into Utah's Central West Desert 1800-1878. Unpublished Ph.D. dissertation, Department of History, Brigham Young University, Provo, Utah.

Burton, R. F.
1861 *The City of the Saints: Across the Rocky Mountains to California.* Longman, London.

The Deseret News
1863 Article describing the burning of the Pony Express station in Overland Canyon. July 15, pg. 20. Salt Lake City.

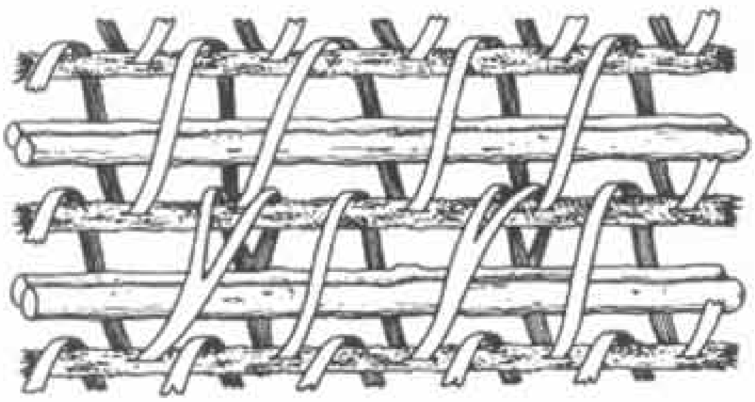
Egan, H. R.
1917 *Pioneering the West, 1846 to 1878.* Howard R. Egan Estate, Richmond, Utah.

Fike, R. E. and J. W. Headley
1979 *Pony Express Stations of Utah in Historical Perspective.* Bureau of Land Management Cultural Resources Series No. 2. Salt Lake City.

Jabusch, D. and S. Jabusch
1991 *Pathway to Glory: the Pony Express and State Stations in Utah.* Treasure Press, Salt Lake City.

Reagan, A.
1934 The Goshiute (Goshute), or Shoshoni-Goship Indians of the Deep Creek Region, in Western Utah. *Proceedings of the Utah Academy of Sciences, Arts, and Letters* 11:43-54.

Sharp, J. P.
1966 The Pony Express Stations. *The Improvement Era*, Volume 48.



Book Reviews

***Canyoneering 3*,** by Steve Allen. University of Utah Press, Salt Lake City. 1997. 328 pages, 40 plates, 49 maps and illustrations. $21.95 *paper*

***Singing Stone: A Natural History of the Escalante Canyons*,** by Thomas Lowe Fleischner. University of Utah Press, Salt Lake City. 1999. 212 pages, 12 color plates, 11 black and white plates, 4 illustrations, 1 table. $17.95 *paper*

Reviewed by: **Lisa Westwood,** Anasazi State Park Museum, P. O. Box 1429, Boulder, UT 84716-1429

With the establishment of the Grand Staircase – Escalante National Monument (GSENM) in 1996, guidebooks highlighting the natural and scenic qualities of this area are increasingly popular. While some guides focus on the outdoor activities available in the monument, others present a personal, historical, or natural account of the area. Regardless of the books objectives, the natural beauty of the GSENM has inspired authors to put pen to paper.

In recent years, many of these guides have broadened to provide a more comprehensive summary of the area. Rather than being restricted to providing directions to favorite hiking trails and scenic views, the guides often offer a basic overview of the cultural and natural history of the area. Some also view this as an opportunity to present their political views or to editorialize public policy.

As a prelude, many authors summarize the cultural context of the area. When aptly done, such a synthesis is an excellent mechanism by which the public can become informed about archaeology without laboring through volumes of technical reports. When less effort is expended, the result is often the communication of outdated or incorrect information. Unfortunately, many failed attempts to provide accurate cultural summaries have resulted in the reinforcement of misinformation and old-school terminology.

Authors of future guides who understand this problem have an excellent opportunity to thoroughly research archaeology and provide more accurate accounts. A number of publications are available to the general public that would be appropriate sources of information on current archaeological thought. These include syntheses written by professional archaeologists that are intended for the general public, or articles published in professional journals. By contrast, popular magazines and the media are rarely suitable sources for accurate information about archaeology.

Also important is the proper citation of *primary* sources of information, either within the text or through the use of footnotes. Not only does this allow readers to pursue additional information about a topic of their choosing, but it also acknowledges those responsible for generating the data or theory, and provides professional support for the information contained within.

Finally, in providing archaeological information about prominent sites in an area, authors should be aware of the need to preserve confidentiality of site locations. A number of state and federal laws control access to archaeological sites. Authors who discuss sites in their publications should be aware of applicable laws and repercussions of publishing confidential site data. Regardless, it is strongly recommended that authors include site visitation protocol in their guides, as hikers undoubtedly stumble across archaeological sites that have no posted signs. As a result, a guide book may be the hiker's only contact with archaeology and the laws and ethics that protect it.

With the foregoing in mind, two GSENM guides are reviewed here: *Canyoneering 3* by Steve Allen (1997) and *Singing Stone: A Natural History of the Escalante Canyons* by Thomas Lowe Fleischner (1999).

CANYONEERING 3

In this guide to hiking in the Escalante region, Steve Allen provides detailed information on some of the most remote, pristine, and advanced hiking trails in the area. The book begins with a politically-charged discussion of proposed and realized developments in the region, followed by a chapter on protecting the environment and its resources. These include prehistoric archaeological sites and artifacts, although the equally important issue of historical sites was not discussed. Allen provides the general public with a good summary of the basic protocol for visiting prehistoric archaeological sites, and briefly discusses the penalties for illegal artifact collection and excavation.

The bulk of the text regarding the culture history of the Escalante is in two chapters: "Man in the Escalante – The Prehistoric Period" and "Man in the Escalante – The Historic Period." Allen narrates the prehistory of the region from the Paleoindian period through Euroamerican contact. This is followed by a brief discussion of the historical occupation of the Escalante, commencing with the Mormon arrival in the 1860s. These passages are noticeably devoid of in-text citations for references, something that professional archaeologists are accustomed to. Equally frustrating for the professional is the outdated terminology and information presented in the guide. It does, however, provide a good introduction of prehistory to a public that might otherwise find in-text references and complex archaeological theories and data cumbersome. As Bert Fingerhut states in the Forward, one of the purposes of this chapter is to "weave a tapestry that provides the foundation needed for a more full understanding of this complex canyon area." In this respect, Allen has succeeded.

Allen's guide features 37 major hikes of various lengths and skill levels in Glen Canyon National Recreation Area, Box-Death Hollow Wilderness Area, and GSENM. Arranged by geographical location, each description is accompanied by a detailed map, customized instructions, caveats, and pertinent historical information. The book also provides extensive information about canyoneering, its associated dangers, necessary precautions, and required equipment. Although these discussions are likely intended for the novice or non-local hiker, whose unfamiliarity with the hazards of canyoneering could be disastrous, this guide is more appropriate for the advanced canyoneer who is familiar with the Escalante. Some of the 40 photographs throughout the book depicting narrow passages, steep rock climbing segments, and "spooky" gulches, attest to this.

Overall, this guide is a good source of information on canyoneering in the Escalante region. Allen's passion for protecting the environment and exploring the land is evident in his writing. Although professional archaeologists might quibble with some of the cultural information, Allen should be commended for reaching out to the general public in a way that is easily understandable.

SINGING STONE: A NATURAL HISTORY OF THE ESCALANTE CANYONS

Singing Stone can be described as part novel, part personal narrative, and part documentary that celebrates the natural beauty and wonders of the region now called the GSENM. Fleischner intermixes personal experiences, both real and spiritual, with narrative interpretations and descriptions of the natural and cultural history of the area. The prehistoric human history of the Escalante region is recounted in a fluid and informative manner, speaking in general interpretive tones rather than raw archaeological data. Although some of the fictional passages may appeal more to post-processualists than mainstream archaeologists, the story-like narrative on the cultural history of the area will likely be appealing to the non-professional and provides a good basic introductory setting.

The book segues into chapters on the

Euroamerican occupation of the Escalante region, from the earliest Mormon settlers through the present day tourist industry. The impact of humans on the landscape, in terms of land use and increasing government agency management, are fully detailed. As a result, this book is a good source of the history of the GSENM and the changes it has seen over the centuries. It is structured not as a reference book, but as a guide to be read in a leisurely fashion, cover-to-cover. Fleischner does a wonderful job illustrating the delicate balance between nature and culture, particularly when he states, "physical landscape, life-forms and the patterns they form, and human cultures and their foibles. Each affects the other. Nothing is irrelevant."

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INSTRUCTIONS TO AUTHORS

UTAH ARCHAEOLOGY is published annually in the first quarter of the year following the issue date of the journal (e.g., *Utah Archaeology 1999* appears in March 2000). The journal focuses on prehistoric or historic archaeological research relevant to Utah. Articles must be factual with some archaeological application. We seek submissions from authors affiliated with government agencies, cultural resource management firms, museums, academic institutions, and avocational archaeologists equally.

Utah Archaeology uses a modified version of *American Antiquity* style, the journal of the Society for American Archaeology. Authors submitting manuscripts are requested to follow *American Antiquity* style, especially for reporting dates, measurements, headings, in-text citation, and references. Either consult a previous issue of *Utah Archaeology* or see the October 1992 issue of *American Antiquity*, which contains a complete style guide and is available in many libraries. If you do not have access to a copy please contact one of the editors.

Categories of papers:

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Important points for authors:

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Please submit manuscripts and direct questions about possible topics, style, and submission instructions to:

Steven R. Simms
Anthropology
Utah State University
Logan, UT 84322-0730
(435) 797-1277
ssimms@hass.usu.edu

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CONTENTS