SPECIAL ISSUE: MOUNTAIN AND HIGH-ALTITUDE ARCHAEOLOGY

the SAA archaeological record

March 2014 • Volume 14 • Number 2

SOCIETY FOR AMERICAN ARCHAEOLOGY

Conferencia Intercontinental

SAA

Society for American Archaeology

¡La SAA regresa a América Latina!

Lima, Perú
8-10 de agosto de 2014

¡La SAA regresa a América Latina! La Sociedad para la Arqueología Americana (Society for American Archaeology) se complace en anunciar la segunda Conferencia Intercontinental para reunir a los especialistas de la arqueología de América y el Caribe en América Latina a realizarse del 8 al 10 de agosto del 2014 la cual será coordinada por Bárbara Arroyo y Luis Jaime Castillo como el coordinador local.

La Conferencia empezará la tarde del 8 de agosto, 2014 con la primera sesión plenaria de charlas. Esa noche, un invitado especial presentará la ponencia distinguida. Las ponencias generales seguirán en sesiones plenarias consecutivas el sábado 9 y la mañana del domingo 10 del 2014.

Temas de la Conferencia

- Orígenes del Estado
- Historiografía en Arqueología
- Arqueología y Turismo

Fechas Importantes

15 febrero 2014—Fecha límite para proponer una ponencia
Fin de marzo de 2014—Notificación de decisiones
1 abril 2014—Apertura del inscripciones
30 mayo 2014—Fecha límite para la inscripción de ponentes
6 mayo 2014—Fecha límite para la solicitud/renovación de afiliación para 2014
1 julio 2014—Fecha límite para la inscripción de asistentes (no presentadores)

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¡Nos vemos en Lima!

No se olvide de anotar en su calendario la 79ª Reunión Anual de la SAA, 23-27 abril, 2014, Austin, Texas, USA

the SAA archaeological record

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Correction: On p. 16 of the article "Student-Initiated Projects, The Flipped Classroom, and Crowdfunding," in the January 2014 issue, Ms. Simerly's name was spelled incorrectly on first occurrence. The correct spelling is Kate Simerly.

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EDITOR'S CORNER

Anna Marie Prentiss

Anna Marie Prentiss is Professor of Anthropology at The University of Montana.

The practice of field archaeology presents challenges no matter the environment. Whether we work on arctic tundra, remote islands, swamps, or just a farmer's field, there will always be logistical hurdles to overcome. This issue of the *SAA Archaeological Record* highlights the problems and prospects of working in mountain and high-altitude environments. The guest editor, Matt Stirn, and several contributors outline a range of barriers to be crossed to successfully complete an archaeological research project in these environments. Some would seem to be routine: making it to the field site, managing a camp, keeping all team members safe and fed, and completing required research activities. But changeable high-elevation weather, difficult terrain, and, in some contexts, restrictive government regulations can make even the most routine operations non-routine.

Advances in technology have made work in alpine and high-altitude environments more productive than ever before. Articles by Adams et al., Lee et al., and Morgan illustrate the application of exciting new and some not-so-new approaches to alpine archaeology. Most notably, compared to just a couple of decades ago, archaeologists today have a far wider range of technological options for all-weather clothing and gear. It is interesting, however, how frequently we prefer to use old-fashioned data collection techniques (e.g., compass and chain mapping) over more electronically advanced options when working in risky environments. As outlined by Schroeder and Lee et al., new methodological strategies are permitting us to sort out the complexities of defining and dating occupations in sedimentary environments characterized by compressed stratigraphy, old wood, and acidic soils. Articles by Frachetti, Schroeder, and Saul move us beyond logistical and methodological issues. Frachetti makes critical points regarding the shifting role of mountain archaeology in reconstructing regional systems, noting in particular that these places were not always fringes to the bigger developments elsewhere. Saul makes a similar point while also framing the importance of archaeological research to indigenous groups with unique heritage concerns.

This special issue on mountain and high-altitude archaeology will extend into the May issue of the *SAA Archaeological Record*. Space restrictions made it impossible to include two of the originally submitted articles. Thus, the May 2014 issue will include articles by David Hurst Thomas and Nikos Efstratiou (and colleagues) examining, respectively, the archaeology of the Alta Toquima site, high in the Toquima Range of central Nevada, and the Middle Paleolithic of high-altitude northwestern Greece.

Last but not least, I want to acknowledge the efforts of Eleanor Umali, SAA manager, Publications, over the past year. I was sorry to see her go. However, I welcome Cindy DeLano into the same position. We are greatly looking forward to working with her as we develop future issues of the *Record*! Meanwhile, I remain open to ideas for new submissions, whether independent articles or special issues. The upcoming meetings in Austin are a great place to meet and have those initial discussions. Please don't hesitate to drop me a line or catch me in the hallway. See you in Austin!

Texas & Archaeology: A Response to Matthew Taylor

In its January issue, the *SAA Archaeological Record* published a letter to the editor from Matthew Taylor about Texas's efforts to legislatively protect unmarked burials. His letter not only outlined his concerns about the changes made to Texas law in 2009 (through passage of House Bill 2927), but also made a number of personal attacks on specific staff at the Texas Historical Commission (THC) who were involved with passage of the bill.

In this letter, we rebut Dr. Taylor's unfounded and inaccurate portrayal of events leading up to the passage of the bill and provide a broader and more complete context for understanding the changes to Texas law. We also address the specific personal attacks made by Dr. Taylor.

The passage of House Bill 2927 made it clearly illegal to disturb unmarked human remains in Texas for the first time ever. Prior to passage of this legislation, looters were able to dig up human remains, mostly Native American, on private land with legal impunity. Hundreds of prehistoric graves, many in the Caddo area of eastern Texas, had been systematically looted. THC staff was outraged by this activity and extremely frustrated about how little could be done to stop it. On the legislative front, nine separate attempts were made over 18 years to enact unmarked burial legislation in Texas, often modeled after other states and focused on Native American interments. They all failed. We clearly would have preferred to achieve protection for unmarked burials in this manner, but this was not going to happen. In fact, the more recent bill attempts did not even make it out of legislative committee.

The THC staff worked closely with State Representative Donna Howard to develop the bill to address these issues. H.B. 2927 made several changes to the Health and Safety Code to better protect human graves and historic cemeteries in Texas. The staff lead on this effort was with the THC Cemetery Coordinator in the History Programs Division—not Archeology Division staff, as Dr. Taylor seems to think. During development of the bill, the definition of what constitutes a grave was modified to include "a space of ground that *contains interred human remains* [emphasis added to reference new wording]." The wording, while minimal, was important to clarify exactly what constituted a grave.

When H.B. 2927 was passed and signed into law in 2009, the THC developed rules to implement the changes to state law. Draft rules were widely circulated, the subject of a public hearing, and twice published in the *Texas Register* (http://www.sos.state.tx.us/texreg/index.shtml). Much input from a very wide variety of groups was received over months and considered in the final adoption of the rules. Native American input was received. The Council of Texas Archeologists also provided detailed comments on how best to implement the statutory changes.

Since passage of H.B. 2927, the revised Health and Safety Code has proven to be successful in protecting unmarked cemeteries, both prehistoric and later. As an example, a housing development in Corpus Christi, Texas, was stopped before houses could be built over a Native America cemetery. Professional archaeologists were employed to define the extent of the cemetery, and important input in this process was obtained from Native American descendant community members. The cemetery was permanently protected through an easement and made part of a green belt. Descendant community members are today able to visit the area and preform religious ceremonies.

Specific allegations made by Dr. Taylor are addressed below.

Staff intentionally misrepresented the intention of H.B. 2927. Among the several proposed modifications to the Texas Health and Safety Code in H.B. 2927 was clarification of what constituted a grave. The bill's text speaks for itself and there was no intentional misrepresentation made.

It takes months of waiting to get a court order to move human remains. In fact, staff of the THC received a court order in less than 48 hours allowing excavation of an1830s Texas soldier's remains. Other professional archaeologists in the state have also successfully received approval for burial exhumation in short periods of time.

Salvage excavation of a human burial is a felony. Looting of a human grave is a felony, as it should be. Professional archaeologists can do salvage work. They just need to go through a legal process to enable the salvage work to occur.

The THC's former Archeology Division Director said that human "remains could simply melt away." We have no recollection of making this statement in our conversation with Dr. Taylor. We do remember talking to Dr. Taylor about his concerns and trying to seek a workable solution to his issues. His main concern was that he could no longer freely dig Native American burials for his research purposes. We assured Dr. Taylor that even with the changes to the Health and Safety Code he could still excavate human burials. He would simply need to follow the legal process to do so and his need to disturb the remains would have to be justified.

His open records request was blocked by a claim of attorney-client privilege. The Texas Public Information Act, which governs open records requests, is a strong statute that ensures public access to government

☞*LETTER, continued on page 43*

FROM THE PRESIDENT

Jeffrey H. Altschul, RPA

Jeffrey H. Altschul, RPA, is President of the Society for American Archaeology.

Austin promises to be the largest meeting in SAA history. There will be more sessions, more posters, more forums, more everything than ever before.

To keep up with the meeting, SAA is initiating a new mobile app. This app will provide an interactive approach to the final program, allowing you to create your own schedule, tour the interactive exhibit hall map, explore Austin resources through a city guide, and much, much more. The free annual meeting app will be available for iPhones, iPads, Android phones, and Blackberry devices.

To promote the use of the mobile app onsite in Austin, there will be volunteers holding signs at registration and an opportunity at the SAA Booth in the Exhibit Hall to demonstrate that you have downloaded the app onto your device, which will make you eligible to drop your business card in a basket for a chance to win an iPad mini. The drawing will be held at the Annual Business Meeting on Friday, April 25, 2014, and you must be present to win.

The meeting kicks off with the Presidential Forum on Wednesday night. This year we focus on the evolving nature of publishing in archaeology. Since its founding in 1934, the dissemination of knowledge has been central to the mission of SAA. From humble beginnings, SAA now publishes three journals and a magazine, publishes books through SAA's own press, and supports postings on ongoing research of its members through Current Research Online. Receiving an SAA journal is a benefit of membership, one that is highly regarded by our members. In the 2010 needs assessment, more than half those responding indicated that they joined and renewed their membership in SAA to receive one or more of the Society's journals. Recently, there has been a drive to open our journals to members and nonmembers alike. Such a move requires us to consider a number of questions: Who should have access to information? Who should pay for publishing—the reader, the author, the sponsor? How will the changing nature of publishing change the SAA? These questions will play out over the next decade and, as they do, American archaeology will be transformed. The debate is just starting. I suggest you get a front-row seat.

Ensuring that all archaeologists are treated fairly and have equal professional opportunities is a cornerstone of SAA's ethical principles. Nowhere is this more important than in obtaining funds to support archaeological research. Women have made great strides in archaeology, but they appear to be flagging in one critical area: grant submission. The National Science Foundation (NSF) has noted that women have about the same success rate as men in the archaeology program, but that women submit only half the number of grants as their male counterparts. Why is this so, and what can we do about it? To address this issue, the SAA board of directors created a task force on the subject, co-chaired by Lynne Goldstein and Barbara Mills. The task force is holding a sponsored forum, Friday between 1:00–3:00 p.m. Please plan on attending and giving voice to this critical issue.

This year's annual meeting is the largest and most vibrant ever. SAA is moving forward on many new initiatives, driven largely by the energy and passion of our membership. As we welcome new members, we want to acknowledge those who have laid the foundation for our success. And what better way than throwing a party. SAA members who have been with the Society for 20 years or more are invited to have a drink on us Thursday night from 5:00 p.m.–6:30 p.m. in Salons F/G/H at the Hilton Austin. Please come and bring a friend. It's time to celebrate our accomplishments and look to the future.

Of course, these are just a few highlights out of more than 200 symposia, poster sessions, forums, receptions, workshops, excursions, and much more. It's not too late to plan to come. Onsite registrations are welcome. I look forward to seeing you in Austin.

IN BRIEF

Tobi A. Brimsek

Tobi A. Brimsek is Executive Director of the Society for American Archaeology.

Launching for Austin—SAA's Mobile App!

In early April, attendees will be able to download for free SAA's Annual Meeting mobile app, compatible with iPhones, iPads, Blackberries, and Android phones. The mobile app will include most of the content of the final program, in addition to a myriad of new functions, all presented in a dynamic environment. There are search functions, the ability to create your own schedule, a city guide, an interactive exhibit hall map, and an attendee list, to name a few of the exciting features.

To promote the use of the mobile app onsite in Austin, there will be volunteers holding signs at registration and an opportunity at the SAA Booth in the Exhibit Hall to demonstrate that you have downloaded the app onto your device, which will make you eligible to drop your business card in a basket for a chance to win an iPad mini. The drawing will be held at the Annual Business Meeting on Friday, April 25, 2014, and you must be present to win.

The Society for American Archaeology (SAA) offers the mobile app through its designated vendor, QuickMobile. While SAA uses its best efforts to ensure that the app will function properly, it assumes no responsibility for any functionality issues with the app. Individuals shall be responsible for any data charges or damages relating to the downloading and use of the app on their mobile device.

Staff Transitions

In January, Cindy DeLano joined the staff team as manager, Publications. Cindy is a senior publishing professional with experience in the not-for-profit publishing arena. She replaces Eleanor Umali, who had held the position for the past year.

Also in January, the staff team grew a bit by taking on an intern in Communications, Brianna Kelley. Brianna is a graduating senior at American University and will be working at SAA through her spring semester.

Online Seminar Series a Success

Due to the unqualified success of the Online Seminar Series, with virtually every course full, the number of seats in each course has been expanded to accommodate the demand, beginning with the February seminars. Currently, a two-hour fee-based seminar and a one-hour free online seminar are offered monthly. The free seminars are available only to SAA members. Check out the upcoming offerings on www.saa.org. Seminars are in session every month except April (due to the annual meeting), June, July, and August.

And Austin!

Austin is shaping up to be one of the most exciting and enriching annual meetings ever. We hope that you will join us there. Check out the final program and abstracts, which will be posted by early April!

VOLUNTEER PROFILE

Pei-Lin Yu

Some might say that volunteers are people with too much time on their hands and not enough skills to get paid. But in the Society for American Archaeology, this view couldn't be further from the truth. At the annual SAA meetings, archaeologists volunteer time, expertise, energy, and skills—from session volunteers to registration desk staff to committee members, SAA volunteers do some heavy lifting. SAA volunteers also include the annual program committee, members of the Board of Directors, and the editors of *American Antiquity, Latin American Antiquity, Advances in Archaeological Practice*—and the publication you are now holding or viewing on the screen.

Committees and Volunteerism

My own volunteer experience began in the early 2000s. My first service was on the Committee on Curriculum (2003–2009) as a graduate student member, federal archaeologist, and later junior professor. This was an essential view into the job world that awaited me after graduate school, and I developed long-lasting connections with academic, private, and public sector colleagues. I even got a publication out of it (Yu et al. 2006). In my second term, I learned curriculum development at all levels, exchanged ideas and innovative approaches, and scoped out ways for the SAA to contribute and support archaeologists teaching in the classroom and the field. This culminated in co-chairship of a curriculum symposium (Yu 2009a) about parity between applied archaeology and theory and method.

In 2009, I was invited to serve on the Annual Meeting Program Committee. Our duties were to review and evaluate hundreds of submissions, make recommendations for acceptance (or not), and group them into sessions. This was an absolutely fascinating overview of our discipline, and I recommend it for any archaeologist, particularly for those (like myself) who think there is room for improvement in meeting offerings and organization.

Archaeology has always had a dynamic relationship with the media, from the *National Enquirer* to *Science* to the blogosphere. I have a background in journalism, so service on the Media Relations Committee (2007–2013) has been a natural fit. In addition to rubbing shoulders with some of the finest science journalists, Media Relations Committee members serve on the Gene Stuart Award Committee and provide data about archaeology to the press. The Media Relations Committee was recently asked to help the SAA cope with a spate of unethical cable television shows (e.g., Diggers, American Diggers, Treasure Hunters, etc.). In media-related symposia I have been able to address issues I really care about in a public forum (Yu 2009b).

Benefits of Volunteering

Our discipline, always a mobile profession, is growing even more so as the market evolves toward lower job security and shorter job tenure. In the past 13 years I have held four jobs. The SAA is the premier venue for engaging with our evolving discipline and honing competitive skills—and volunteering is the quintessential way to connect. Volunteering is not just for early career archaeologists; anyone seeking to improve their current situation or find a new career path can establish professional relationships, learn new skills, assemble symposia and edited volumes, offer subject matter expertise to others, take the pulse of our discipline, propose innovative or daring concepts in a friendly setting, and evaluate the jobs landscape.

Future Volunteer Horizons

I traveled to my first SAA meeting in 1995 (Minneapolis) with four graduate student friends in an old van from Maya country. We drove all night and made an 80-mile side pilgrimage to the Marshalltown trowel factory (I still have those trowels, worn to

☞*VOLUNTEER PROFILE, continued on page 44*

WHY ALL THE WAY UP THERE?

MOUNTAIN AND HIGH-ALTITUDE ARCHAEOLOGY

Matthew A. Stirn

Matthew A. Stirn is Research Associate at the Jackson Hole Museum, Jackson, Wyoming.

Mountains and high-altitude landscapes have often been interpreted as marginal and generally inhospitable environments. When explaining my research in the mountains of Wyoming to both professionals and the public, I am often met with the question, "Why would people *live* all the way up there?" Because of this mindset, in addition to the fact that research at high altitudes is logistically demanding, the archaeological potential of mountains has long been overlooked. During the last 20 to 30 years, particularly in the European Alps and western United States, occasional research projects (e.g., Benedict 1992; Husted 1965; Walsh et al. 2006) ventured into the alpine zone and discovered that, in contrast to past beliefs, mountains can offer a rich and chronologically deep archaeological record that is often equally dense and better preserved than that of the surrounding lowland areas. While these projects were not the first of their kind (e.g., research in the Peruvian Andes and Swiss Alps), they did catalyze an interest in alpine paleoecology, human adaptations, and technological innovations developed to survive in high-altitude landscapes.

In addition to a heightened interest in the prehistory of alpine landscapes, the accessibility and ease of research in mountainous areas has greatly increased with advances in lightweight equipment and remote-sensing technologies. In recent years, the popularity of mountain archaeology has skyrocketed and is now the focus of symposia, conferences, and field projects across the globe. By exploring the practice of archaeology in the mountains, investigating current debates within the field, and introducing a variety of new and exciting projects, this special issue of *The SAA Archaeological Record* sheds light on the fascinating and ever-changing world of mountain and high-altitude archaeology.

What is Mountain and High-Altitude Archaeology?

In 1984, F.G. Fedele proposed a distinct human ecology of the mountains. Fedele suggested that, because mountains represent a unique landscape, they should be approached with an equally unique theoretical and methodological framework, preferably specific to individual ranges. However, Fedele also warned that mountains should not be studied in isolation from surrounding landscapes simply because they are topographically and environmentally "different" (c.f. Schroeder, this issue). While the alpine ecotone presents a unique research context for archaeological research, it is often easy to trick ourselves into thinking that occupants of mountains and high altitudes were prehistorically independent from those in lower elevation landscapes. So how, then, should we approach mountains in archaeology?

Exploring the dichotomous nature of mountain and high-altitude archaeology first requires some definitions. Fedele (1984) pointed out that high elevations and rugged terrain are not ubiquitous across all mountain ranges. As such, the terms "mountain" and "high-altitude" archaeology are used independently because they often focus on different topographical environments. "Mountain archaeology," in this case, refers to the study of mountainous landscapes that have considerable topographical relief and rugged terrain in comparison to surrounding lowlands, but may or may not break into the alpine ecotone (generally > 10,000 ft or 3,000 m). "High-altitude archaeology," on the other hand, focuses exclusively on past groups that resided above 3,000 m. Unlike mountain archaeology, high-altitude studies do not necessitate rigorous terrain and in some instances (e.g., the Tibetan Plateau or Central Asian Steppe) can occur on grassy plains or relatively flat valleys that happen to be located at high elevations. Because of the high environment in which it occurs, high-altitude archaeology often focuses on past alpine-specific human adaptations to physiological (Aldenderfer 2006) or resource (Bettinger 1991) stresses.

Conducting Archaeological Research in the Mountains

Conducting research in mountainous areas is expensive and

often logistically and physically demanding. Throughout our fieldwork in Wyoming's Wind River Range, we were preoccupied with planning personnel, food, and equipment transportation to a backcountry base-camp that was located two days hike from the nearest road. Once all of those tasks were completed, less than half of the field schedule (generally 8-day sessions) was available for conducting research. In addition to logistical struggles, we faced several unmanageable risks (e.g., unpredictable weather, animal encounters, dangerous terrain, etc.) that had an amplified impact because of the little time we had available in the field. Given these obstacles, it seems that successful projects are often guided equally by luck (e.g., good weather, no grizzly bears, low forest fire danger, etc.) as they are careful planning. To compensate for these unique requirements, many projects have developed custom strategies to maximize gain.

The articles in this issue introduce mountain archaeology through an exploration of research methods, obstacles, and rewards that make conducting research in the alpine zone a unique experience. Adams et al. recap several years of remote, high-elevation research in the Wind River Range of Wyoming. Adams and his team have developed a mountain-specific research strategy focused on simplicity and efficiency. Lee et al. highlight the unique aspects and dilemmas of conducting ice-patch archaeological research in North America. The article explores the costs and rewards associated with searching for thawing organic artifacts and looks at field techniques, including remote sensing, that have increased rates of success in recovering archaeological materials. A consistent theme between Adams et al. and Lee et al. is a preference for simplicity in mountain research. In both cases, consumer grade technologies (e.g., GPS and Google Earth) have proven to be less costly and more time- and energy-efficient than professional-grade options such as total stations, GPR, or LIDAR. The potential cost of lower resolution data obtained from these technologies is outweighed by the ability both to transport the equipment into the mountains by foot and to cover more ground with highly reliable equipment performance.

In addition to technology, the collective knowledge of modern-day mountain communities marks a crucial resource for many alpine archaeological projects. Frachetti's article looks back on several seasons of research on the Central Asian Steppe and explores parallels between Bronze Age and modern-day nomads. In addition to identifying a several-thousand-year-old nomadic mountain tradition, Frachetti explores the implications and biases behind modern political borders and mindsets regarding mountainous regions and how these affect archaeological research. Much like Adams et al's observations in the Rocky Mountains, Frachetti's research shows that new sites "discovered" by archaeologists are often already known to locals who are willing to share their knowledge.

Nurturing a positive relationship with modern-day mountain communities can play a significant role in promoting and preserving cultural heritage. Saul's article highlights a growing relationship between archaeologists and indigenous communities in the Nepalese Himalaya. In addition to exploring the high mountains for new archaeological sites, Saul's team works with local groups and organizations to preserve culturally historic sites that might otherwise be endangered by a lack of resources. This work shows that by maintaining a positive, constructive, and transparent relationship with mountain communities it is possible both to utilize their knowledge and to promote a relationship founded upon protecting cultural heritage.

Beyond locating and accessing alpine archaeological sites, a final dilemma that mountain researchers face is the excavation process. The alpine ecotone presents an incredibly fragile environment that recovers poorly and slowly from human disturbances. Additionally, in North America, many mountain ranges are located in federally protected wilderness areas that limit subsurface testing and prohibit the use of any mechanized equipment. Thus, it is often required that archaeologists hike into the study area on foot and carry their excavation/camp equipment in backpacks or via pack animals. Given these constraints, it is often very difficult or impossible to excavate large blocks or trenches that would be standard in more durable environments at lower elevations.

Morgan's article retraces a decade of high-altitude archaeology and illustrates that digging any site above treeline is no simple process. Recounting challenges such as blizzards and health problems, such as pulmonary edema, unique to high altitude environments, Morgan weighs the costs and benefits of conducting archaeology in remote and high-altitude regions. The other papers in this special issue present a variety of other mountain-specific research projects that further illustrate the intricacies of planning and executing archaeological research above the treeline.

Approaching the Mountains

In his book *Mountains of the Mind*, Robert Macfarlane (2004) traces the modern history of European perceptions towards mountainous regions. Macfarlane argues that the way in which people perceive mountainous environments is almost entirely cultural and little guided by economics or subsistence (see Walsh et al. 2006 for a similar discussion of

ancient Roman perceptions towards the Italian Alps). Placing causality and the related debates aside, an interesting point that Macfarlane highlights is that our interpretation of mountains routinely shifts between seeing them as marginal environments and seeing them as hospitable. These shifts come and go at different intervals and are not ubiquitous across regions, cultures, or populations. Archaeologists are not exempt from this cycle, and as we enter the twenty-first century, the perception within the field appears to be transitioning from "alpine-ophobic" to "alpine-ophilic" (see also Morgan et al. 2012:38–40).

Generally, modern perceptions do not incorporate mountains into the realm of "home." Instead, these high and rugged landscapes offer places to hide, barriers to circumvent, and isolated havens to "get away from it all." Even in my hometown of Jackson, Wyoming, bordering Grand Teton National Park, the mountains are where we go to play (or work in the case of archaeology), not where we go to live. Given this bias, it becomes understandable why archaeology in the mountains was widely ignored until the past few decades. However, now that the archaeological potential of high altitudes is more widely recognized, research projects above the treeline are becoming common in most large mountain ranges around the world. Considering that our understanding of prehistoric alpine adaptations is in its infancy, it remains uncertain what drove early mountain settlements and how difficult (or easy) it was to colonize high altitudes. Archaeological thought is currently divided over whether alpine environments should be viewed as marginal or as hospitable to human groups.

The marginal-mountains perspective can be summed up with a quote from Aldenderfer (2006:358), which, alluding to factors such as physiological stress (e.g., hypoxia) and an assumed low productivity of alpine resources, states that, "With its litany of woes, it is a wonder that high-elevation environments were ever inhabited at all." This viewpoint highlights resource opportunities of high- and low-elevation landscapes and considers mountains and high altitudes to be ranked lower in terms of potential net foraging returns than lower-elevation environments. Furthermore, the marginal-mountains standpoint suggests that early use of alpine regions commenced after less hostile environments were occupied and were likely induced by a push of external forces, such as population pressure and resource imbalance (Bettinger and Baumhoff 1982).

In contrast, the hospitable-mountains stance focuses on landscape familiarity and adaptability by suggesting that, once they settled in the mountains, prehistoric humans would have had little difficulty moving and living at high altitudes. This perspective further suggests that mountains and high-altitude environments were no less hospitable than others and that past alpine populations were likely not inhibited by problems such as physiological stress or resource uncertainty (see Adams 2010; Stirn 2014a). While this debate generally revolves around quantifiable variables (e.g., resource return rates, least-cost modeling, cost/benefit ratios, etc.) its foundation lies in how mountains should be approached in comparison with other environments.

Successfully incorporating alpine studies into wider archaeological research can be tricky. In many cases, especially in the mountains of western North America, several alpine archaeological sites that are strikingly similar in appearance and in material culture have been interpreted as culturally linked (see Stirn 2014b). Schroeder's article in this issue explores the relationship between low- and high-elevation sites in Wyoming and argues that, while it is tempting to connect similar and contemporaneous sites at altitude, such an association cannot be made without considering low-elevation corollaries. Schroeder further emphasizes that, even if mountain and lowland sites can be linked within a local network, expanding the geographic range of interpretation much further should be carried out with caution and precision (see also Thomas 2014).

Whereas Schroeder warns of interpreting prehistoric mountain cultures beyond their local regions, Frachetti (this issue) suggests that mountains (particularly those inhabited by mobile societies) can provide excellent evidence of multicultural interaction and the spread of ideas, technology, and material items. On this perspective, mountains that either overlap or are within close proximity to several cultural regions can be treated as a thoroughfare, rather than as a boundary. Schroeder and Frachetti highlight the importance of interpreting the alpine archaeological record within regional cultural frameworks.

Why [Work] All the Way Up There?

Conducting archaeological research in the mountains is logistically difficult, expensive, and tiring. Thus, after hiking 20 miles uphill carrying excavation equipment in a backpack, one might be tempted to ask—is it still worth it? Without a doubt. Mountains offer aesthetically stunning surroundings. Where else can one work beneath alpenglow, travel across a glacier, and camp next to a lake with enough trout to feed an entire field school? In addition to aesthetics and pleasing scenery, mountainous regions offer several other distinctive perks.

Thomas (2014) explores a highly preserved prehistoric alpine village perched at 3,600 m in Central Nevada and depicts his

astonishment at the exciting nature and unanticipated level of preservation of archaeological sites at the higher elevations. The Alta Toquima site, having never been looted and barely impacted by post-depositional processes, permits detailed interpretations to be made regarding ancient alpine adaptations. Originally considered to be anomalous, the astonishingly well-preserved architecture and material culture found at Alta Toquima has been complemented by the discovery of similar alpine villages across the Great Basin (Bettinger 1991). As it turns out, the preservation of these villages is not unique to archaeological sites at high altitudes. Lee et al. recognize that few other environments allow for the high state of preservation that has been observed in alpine regions. Efstratiou et al.'s (2014) article on Paleolithic exploitation of the Pindus Range in Greece demonstrates that archaeologically untapped alpine environments have the potential to exhibit rare material in excellent states of preservation. The fieldwork conducted in the Pindus identified a surprising record of Neanderthal occupations that the authors believe would have been destroyed at lower elevations by environmental conditions, agricultural activities, and looting.

Only a small proportion of the world's mountain ranges have been intensively surveyed for archaeological sites. As such, the dataset of worldwide alpine archaeology is far from complete. However, this gap in the alpine archaeological record presents exciting opportunities for future research. Because many mountain ranges have not been archaeologically explored, the probability of new and potentially significant results is high. Many of the authors within this issue describe their surprise at the often-unexpected results of conducting research at high elevations. Whether it be frozen organic artifacts, preserved villages, or Neanderthal material culture, mountainous regions never fail to alter longstanding impressions or to help formulate new ones.

In Conclusion—Bridging the Crevasse

Up until the past 10 to 15 years, alpine archaeological research remained somewhat stunted due to the general lack of projects around the world. However, now that research is increasingly being conducted in mountainous regions, it is becoming easier to share methodological innovations and research results regionally and internationally. Current research in alpine archaeology spans a wide range of questions, methods, and contributions. Despite the variety of approaches, alpine projects seek to unravel a common range of problems, including chronology, settlement and subsistence patterns, travel and exchange relations, and ethnic identities. Now, with expanded interest and enhanced technologies, mountain and high-altitude archaeology can expect an exciting future with significant potential to impact the general field.

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UNTRAMMELED BY MAN

WILDERNESS ARCHAEOLOGY IN WYOMING

Richard Adams, Tory N. Taylor, Meredith E. Taylor, John B. Lund, Bryon A. Schroeder, Orrin Koenig, and Matthew A. Stirn

Richard Adams is Professor of Archaeology at Colorado State University-Ft. Collins. Tory N. Taylor, Meredith E. Taylor, and John B. Lund are independent researchers. Bryon A. Schroeder is a doctoral student in the Department of Anthropology at the University of Montana. Matthew A. Stirn is a Research Associate at the Jackson Hole Museum.

Four decades ago, when one of us— Richard Adams—was a wannabe archaeology student enrolled in a Wyoming archaeological field school, an instructor somewhat facetiously defined a site as something George Frison could drive his backhoe to. This instructor's definition ruled out all 15 of Wyoming's officially designated Wilderness Areas, where the use of motorized equipment is prohibited. In northwest Wyoming—sometimes called the greater Yellowstone ecosystem—there are about 5.3 million acres (including Yellowstone and Grand Teton National Parks) of non-motorized wilderness. According to State Historic Preservation Office data, the state of Wyoming averages about 4.2 prehistoric archaeological sites per square mile. This means that there are potentially 34,000 sites in those 5.3 million acres of wilderness that archaeologists can't drive backhoes to.

The definition of wilderness as places "untrammeled by man, where man himself is a visitor who does not remain" (Zahniser 1964) was used in the Wilderness Act of 1964. This official definition of wilderness has led to the notion that prehistoric humans neither lived in, nor extensively exploited, wilderness resources and is similar to a sentiment expressed by anthropologist Julian Steward (1938:14), who called the alpine tundra (of the Great Basin mountain ranges) "unimportant to man, except as it supports animal species." Steward's claim was echoed by Alfred Kroeber, one of North America's first Ph.D. anthropologists, who wrote in 1939 that:

> like other elevated divisions, the Rocky Mountains constituted chiefly fringes, hinterlands, or barriers under native settlement. There was no . . . pressure . . . to draw the population into the mountains (Kroeber 1939:187).

This misconception promulgated by two of North America's greatest anthropologists inadvertently turned a generation of archaeologists away from the mountains and toward the lowlands.

The misconception that mountainous areas in western North America were inhabited by the "other" or avoided by prehistoric people is common in anthropological literature (Hughes 2000). This notion that prehistoric humans were mere visitors to the alpine zone (and by extension modern wilderness areas) pervades American public perception and has colored the attitude of federal land managers toward archaeology in wilderness areas. As a result, sometimes proposed archaeological investigations in federally designated Wilderness Areas are challenged by a lack of institutional interest in the "trash" left by prehistoric people who not just visited, but lived in, what are now believed to be "pristine" wildernesses.

Combine the bias against mountains expressed by previous generations of archaeologists with bias against wilderness archaeology among land managers and you have a challenging work environment. Regardless of one's feelings about wilderness, there are still tens of thousands of prehistoric sites above treeline in wilderness areas that still need to be recorded. These sites testify to the importance, utility, and attraction of high altitude terrain.

The Value of Longitudinal Studies

The example set by the late polymath James Benedict for longitudinal studies of alpine environments and prehistory (e.g., Benedict 1992) is our inspiration. It was only after years of alpine surveys that Wyoming's prehistoric alpine villages were recognized. Not too long ago, alpine villages were known only in the White Mountains in California and the

Toquima Range in Nevada. Now, at least 19 villages (sensu Bettinger 1991) have been identified in northwest Wyoming (Stirn 2014).

Over the years, our team, consisting of several students (now professionals), retired professionals, citizen scientists, and treasured collaborators, has found ancient alpine villages (Stirn 2013), recorded soapstone workshops, and increased the number of prehistoric sites in the alpine zone of Wyoming's Wind River Range several hundred-fold.

The keystone of our longitudinal studies is an ongoing (15 years and counting) collaboration with Tory and Meredith Taylor from Dubois, Wyoming. The Taylors, now retired, are backcountry outfitters, archaeologists, authors, hunters, gatherers, beekeepers, horse-packers, health care professionals, conservationists, and epicures. For part of their 35-year-long career, they led heritage tourism expeditions into Wind River and Absaroka Mountain wilderness areas, where their clients learned about the Sheepeater Shoshones.

Heritage tourists are people who travel to an area to find out more about its history and prehistory. Heritage tourism in this country, even narrowly defined, is big business. According to one study, heritage tourism was a $4 billion industry in Colorado in 2008 (Clarion Associates 2011:34).

Heritage tourists who joined our team for week-long trips generally expressed two main interests: who were the prehistoric people that made a living in the mountains, and how did they make a living in the mountains? We combined hands-on archaeology with evening discussions. During a typical day in the backcountry, heritage tourists helped reconnoiter challenging alpine terrain and record archaeological sites. Often these interested and interesting guests had hidden talents, such as sketching, note-taking, bird identification, plant identification, and, on one memorable trip, mycology. Volunteers, thrilled to be part of a team present at the moment of discovery, asked nonstop questions.

Evenings were spent around a campfire at treeline, and there was a palpable sense of excitement as architects, investment bankers, surgeons, writers, and clergy moonlighting as archaeological volunteers asked challenging questions about wilderness ethics, horsepacking, culture history, prehistoric technology, and what kind of foods prehistoric mountain people ate. Piqued by the prehistoric food questions, we started adding more and more aboriginal foods and prehistoric technology to our repertoire until we were able to create what we imagined were prehistorically correct meals. Our PC meals featured elk, big horn sheep, and bison, paired with soapstone bowls, sheep horn spoons, stone knives, manos and metates. Enthusiastic responses to our PC meals suggest that prehistoric cuisine did not have to be nasty, short, and tasteless.

Think Globally, Dig Locally

If you spend money in local communities purchasing food, beverages, other supplies, and services, then those communities are more willing to support your project. For instance, the location of the famously stratified Gatecliff Shelter was revealed to David Hurst Thomas as he conducted ethnographic research (and supported the local economy) at a bar in Nevada.

In our case, the key to our success is a mutually beneficial collaboration with the townspeople of Dubois, Wyoming, through the efforts of the Dubois Museum. We hire local outfitters and cooks, stay in local bed and breakfasts, patronize local groceries, baristas, and restaurants, and enthusiastically support local watering holes; however, our main relationship is with the local museum. For decades, the museum has been a focal point for local participation and an outstanding venue for sharing results. The museum creates displays, produces videos, mobilizes volunteers, and provides speaking venues for team members. The museum is a place to meet locals who share their knowledge of artifacts and sites. The local townspeople are proud of their archaeological resources and appreciate that spending by archaeologists contributes to the economic well-being of their town of 2,500 people. In Dubois, there is a critical mass of local volunteers, local museum support, and an interested public that creates synergy. This synergistic relationship epitomizes citizen science and has attracted archaeologists from all over North America.

Our Outfitters, Our Selves

Most modern human groups lost the ability to move fast and light across mountainous landscapes hundreds, if not thousands, of years ago. Let's face it—most archaeologists have too much stuff to carry comfortably in a backpack the size of Otzi's. Although there are young, tough graduate students who can carry all the recording gear and food they need to record sites in the wilderness, we older Anthro-Americans suspect that these energetic grads probably eat poorly, sleep uncomfortably, and wish they had brought extra batteries.

The success of our program is totally dependent on the outfitters whose pack animals carry an embarrassing large quantity of our stuff. If the thought of carrying a 70-pound pack and thousands of pin flags uphill thrills you less than it

did 20 years ago, then, by all means, hire an outfitter and mount an expedition using horses, llamas, or pack goats to haul your gear to a remote base camp if you still want to do wilderness archaeology for 10 days at a time.

While notable archeologists (e.g., Larry Todd and Chris Morgan) still conduct backpack-supported archaeology, the rest of us who want to work in the backcountry hire an outfitter. Pack animals will uncomplainingly carry a large canvas wall tent that can make the difference between a miserable week and a productive week of fieldwork when the weather fails to cooperate.

Pack animal-supported backcountry archaeology is not cheap. People assume that, because we do backcountry archaeology, we sport cowboy hats and sit tall in the saddle, but saddle horses are usually twice the price of a pack horse. Budget considerations force us to walk while our gear goes on horses. Frequently, we employ what are called drop trips—that's where outfitters with horses take our gear into a wilderness area and drop it off, then come back and pick it up in a specified amount of time.

Outfitters have specialized knowledge of weather, ground conditions, and wildlife that academic archaeologists might appreciate in a pinch—say, when a grizzly bear sow and cub wander into camp before dawn. Our outfitters, armed with only pots and pans, scared off the grizzlies before the crew awoke. This is what is known in the outfitting business as a full-service trip—a trip where the outfitter takes care of the food, the horses, moving camp, and perimeter defense.

Can Optimal Foragers Feed a Crew that Travels on Its Stomach?

There is no doubt that highly ranked optimal foragers can live for weeks in the backcountry on a limited diet of Power Bars, ramen noodles, and peanut butter carried in backpacks. Because we have horses, we eat fresh items kept cold by pounds of homemade frozen entrees that provide thermal mass. By carefully protecting the food in our bear-resistant panniers from the sun, we can have fresh food for a week. The expectation of a real meal at the end of the day is what we think motivates crews to march across alpine landscapes.

While horses carry 99 percent of our food, we use backcountry excursions as opportunities to explore local foods. We supplement our modern diet with fresh trout, wild mushrooms, currants, roots, insects, and the occasional marmot. We strive to envision a paleo-diet component that is as titillating as it is authentic.

Backcountry Methodology

We do it old school, partly because backcountry analog recording techniques worked for George Frison (Frison et al. 1990), Wil Husted (1964), James Benedict (1992), and Bob Bettinger (1991). Consider the following question. Which technology is costlier to carry: paper and pencil or a waterlogged GPS? Experience has trained us to use paper, pencils, pens, compasses, and tapes. These analog methods provide valuable backup for digital and video data acquired by devices that seem to have a lemming-like desire to leap to their demise.

By keeping the technology simple, most of our gear is powered by off-the-shelf batteries. We prefer consumer-grade GPS receivers, walkie-talkies, and digital cameras that use replaceable, standard sized batteries to top-of-the-line digital gear using proprietary batteries that require charging during the day. We have wasted too many hours of sunlight waiting for the solar charger to charge the proprietary battery packs of top-shelf technological marvels.

If a picture is worth a thousand words, then 10 minutes of video is priceless. Collaborator Tory Taylor started videotaping the highlights of every trip a decade ago. Even though almost all video cameras use proprietary batteries, the utility of hand-held video cameras is incomparable, and they should be standard equipment on alpine archaeological projects. In the past decade, we have acquired footage of one-of-a-kind discoveries interspersed with moments of sublime weather, animal encounters, and infectious humor. The only downside to video is the amount of time it takes to catalog and edit all the video when you get out of the backcountry.

Alpine Archaeology in a Global Context?

Was it not the hilly flanks of the Taurus and Zagros Mountains along the Fertile Crescent where animal husbandry first began? Mountains, including not so well-watered ones like the Rocky Mountains, have always attracted a small percentage of humans. If prehistoric game animals in the Rocky Mountains moved uphill in the late spring to feed on plants maturing at increasingly higher altitudes as the growing season progressed, then the prehistoric hunters who targeted those animals followed them uphill. This seems to have led to a vertical annual round where Late Prehistoric people in the GYE practiced big horn sheep herd management (as evidenced by two dozen wooden sheep traps) that may qualify as incipient transhumance. Prehistoric sheep hunters following big horn sheep in the mountains were doing the same thing that their kin were doing with bison on the Plains: monitoring and manipulating herd composition.

Gatherers may have insisted on harvesting the dense roots, nutritious greens, and tasty pine nuts that are found by following the seasons all the way to the alpine zone. The prevalence of groundstone in Wind River alpine villages suggests a heavy reliance on plant foods, especially whitebark pine nuts.

Push vs. Pull: Where Would You Rather Be?

According to the National Oceanic and Atmospheric Administration, 39 percent of the U.S. population lives in a county that abuts the coast. It has probably always been thus.

A much smaller percentage of people have occupied high altitude areas in South America and North America for 11,000 years and in Africa, Asia, and Europe for hundreds of thousands of years. Compared to coastal regions, the mountains have been a less popular, but persistent, part of human settlement.

So it comes down to pull vs. push, doesn't it? Was there a prehistoric demographic high pressure ridge in the Great Basin or on the Plains that pushed people up into the mountains? Given the long-term global popularity of the coasts, it seems to us that any mid-continental demographic pressure would have pushed prehistoric people toward the coasts rather than the mountains.

In North America's GYE, the orographic effect ensures that the mountains receive more annual precipitation than the basins. More moisture means more plant and animal life and probably a better overall return rate than the more xeric basins. On any given prehistoric summer day in the Rocky Mountains, the alpine zone was likely to have been wetter and greener than the lowland basins. Most modern people faced with the choice between spending a summer in the Tetons and a summer in the hot, dusty sage steppe epitomized by the Interstate 80 corridor in southwestern Wyoming wouldn't even think twice about choosing to spend the summer in the mesic rather than the xeric environment.

In the Middle Rocky Mountains, there is an additional attraction. The foothills of the Middle Rockies are frequently uplifted hogbacks of Paleozoic and Mesozoic rocks that contain beds of high quality chert and quartzite. Farther west, obsidian occurs in volcanic extrusions in the center and western periphery of the GYE. Mountains flanked by high quality rocks have prehistoric site densities greater than ranges that lack cherty foothills.

Combine the exhilarating clarity of alpine landscapes with exuberant alpine streams, carpets of edible flowers, and abundant wildlife, and you can see why mountainous terrain appeals to more than eight million people who choose to visit Yellowstone, Rocky Mountain, and Glacier National Parks every summer. Today's hordes were preceded by small numbers of prehistoric people who also spent summers high up in the mountains. In the summertime, the Rocky Mountains are, and have been since deglaciation, popular destinations because they are generally cooler and wetter than the lowlands. Prehistoric people and modern visitors had a better chance of encountering charismatic (and tasty) wildlife. Best of all, all of us—prehistoric and moderns alike—could make campfires that smelled like juniper and pine rather than sage and greasewood.

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ICE PATCH ARCHAEOLOGY IN WESTERN NORTH AMERICA

Craig M. Lee, Robert L. Kelly, Rachel Reckin, Ira L. Matt, and Pei-Lin Yu

Craig M. Lee is a Research Scientist at the Institute of Arctic and Alpine Archaeology (INSTAAR) at the University of Colorado, Boulder, and at Metcalf Archaeological Consultants, Inc. Robert L. Kelly is Professor of Anthropology at the University of Wyoming. Rachel Reckin is USFS Archaeologist, Kootenai National Forest. Ira L. Matt is Tribal Historic Preservation Officer of the Confederated Salish & Kootenai Tribes. Pei-Lin Yu is a Cultural Specialist for the National Park Service, Rocky Mountain Cooperative Ecosystems Studies Unit.

In North America, the field of "ice patch archaeology" refers to the study of anthropogenic materials recovered in association with retreating snow and ice patches (e.g., Dixon et al. 2005; Hare et al. 2004). Colleagues in Europe frequently refer to this field as "glacial archaeology," in part because of archaeological finds in glaciated passes (e.g., Equinox 2013; Hafner 2012). Global warming is melting perennial ice patches at high latitudes and high elevations, resulting in the release of ancient paleobiological and archaeological materials that, until recently, were in cryogenic-like stasis. Ice patches can attract animals and their human predators and thus maintain a record of human hunting and other activities. The stable ice in these features exhibits little internal deformation or movement and can preserve otherwise perishable materials for millennia.

In northwestern North America, researchers have conducted systematic investigations of ice patches in the Yukon (Hare et al. 2012), the Northwest Territories (Andrews et al. 2012), and Alaska, including Denali, Gates of the Arctic, Katmai, Lake Clark and Wrangell-St. Elias National Parks, the Chugach National Forest, and the Tangle Lakes area south of the Alaska Range (VanderHoek et al. 2012). In the coterminous United States, investigations have occurred in the Colorado Front Range, including Rocky Mountain National Park (Lee and Benedict 2012), within the Greater Yellowstone Ecosystem of Montana and Wyoming (Lee 2012), in Olympic National Park in Oregon (Kim Karswick, personal communication to Craig Lee, 2012), and in Glacier National Park (GNP), Montana, where the authors of this paper recently (August 2013) completed the last of three planned field seasons. Perhaps nowhere else in the United States is the evidence for global warming more visibly apparent than in GNP. At its inception in 1910, the Park included over 150 glaciers. It now contains only 26—a 67 percent reduction. In addition to the glaciers, kinetically stable ice patches are also melting. While ongoing studies have been measuring changes in GNP's glaciers for over a decade, the effect of this drastic environmental change on cultural resources was relatively unknown prior to our study.

The widespread trend toward atypical melting in alpine snow and ice patches has hastened the development of the field of ice patch archaeology since the late 1990s. Although a seemingly new phenomenon, archaeological discoveries on glaciers and perennial frozen snow and ice patches sparked public imagination—if not archaeological science—once before, during the 1920s and 1930s. Under the dual storylines "Ice Gives up Indian Arrow" and "Remarkably Fine Specimen of Ancient Weapon Found in North is Centuries Old," the March 15, 1925, issue of the *Vancouver Province* newspaper narrates the first discovery of a complete arrow with fletching, sinew lashing, and a chipped stone projectile point made on a glacier in North America (British Columbia) (Keddie and Nelson 2005). Around the same time, complete arrows with fletching, sinew lashing, and projectile points were found in the Oppdal Mountains of central Norway (Farbregd 1972). These early discoveries were regarded as curiosities and not the harbingers of a soon-to-be globally relevant research frontier. The advent of ice patch archaeology in the modern era coincides with public recognition of global warming and public lands policy, including support for research and protection of the items found in ice patches. The National Park Service and U.S. Forest Service in particular have made funds available and are partnering with universities and Native American experts. Despite the loss of many other types of archaeological sites, in some small way the field of ice patch archaeology is a silver lining to climate change. Although melting at ice patch sites occurred historically as a result of interannual and even decadal variability, the volume and age of the materials now being identified suggest that the current melt is unprecedented over the past

7,000 to 10,000 years (e.g., Andrews and MacKay 2012; Reckin 2013).

Organic artifacts recovered at melting ice patches provide context for the inorganic artifacts that comprise most of the archaeological record. Organic artifacts are amenable to a variety of technical analyses, including the direct assessment of their age via AMS ^{14}C assays that can be made on tiny, discretely taken samples due to their excellent preservation and rich carbon content. Archaeological remains from alpine ice in western North America include ancient wooden dart shafts and fragments, fletched wooden arrows, antler foreshafts, baskets, numerous wooden artifacts of uncertain function, butchered animal remains, and chipped stone artifacts. Fragments of weapons ranging in age between 10,400 cal B.P. and 200 cal B.P. suggest long-term continuity in ice patch hunting traditions and that these locations were an important element of the sociocultural and geographic landscape for Native Americans (Lee 2012). Paleobiological specimens recovered in North American ice patches range in age from several hundred years to nearly 8000 cal B.P. (Lee 2012). In northern latitudes, caribou (*Rangifer tarandus*) are the dominant big-game prey species (Hare et al. 2012), whereas Bighorn sheep (*Ovis canadensis*) are the presumed prey species in the coterminous United States (Lee 2012). The remains of bison (*Bison bison*) and other large ungulates also occur in association with mid-latitude ice patches (Lee and Benedict 2012). The GNP ice patch project recovered cranial and post-cranial elements from a male bison at an ice patch in 2012.

We use the remainder of this essay to review some of the issues associated with conducting ice patch research in western North America with an emphasis on our work in GNP, including (1) methods of ice patch identification; (2) expense of the surveys in terms of time, effort and money relative to the rate of return; (3) the wildcard role of interannual variability introduced by weather events; and (4) the inherent beauty of these seasonally restricted alpine landscapes and their connection to living indigenous communities.

Methods

Google Earth has aided efforts to determine which ice patches are worth reconnaissance. In GNP, we used the time slider feature on Google Earth to determine which patches survived high melt years (such as 2003 and 2009). We've also found that aerial photographs can be very useful in determining which patches are most likely candidates. We do not survey ice patches that did not survive recent high melt years since in all likelihood they have repeatedly melted out in the past, disgorging any artifacts they may have contained; such artifacts would have either decayed or drifted away in the patch's outflowing stream. Using Google Earth, we are also able to determine whether an ice patch has a flat forefield—an area immediately downslope from the ice patch—where artifacts and paleobiological material might be expected to be stranded, at least temporarily, before decaying or being swept away downslope. And on busy public lands there is also the risk of illegal collecting. As with other ice patch projects, the team always surveyed the streams emanating from a given ice patch for several hundred meters—or until the stream went over a cliff!

During survey, while examining the forefield, we also use GPS to map the ice patches' lateral and lower margins. Recording the ice patch margins in this way allows for comparison of ice patch extent based on remotely sensed images and for direct comparison of melt from year to year. Any artifacts or paleobiological specimens (feces, unmodified wood, bone) found are photographed and their GPS coordinates recorded. Fragile specimens are mounted on ridged, hydrophobic, and archivally stable plastic board (e.g., Coroplast) and held in place with plain cotton gauze bandaging or strips of unbleached muslin. A representative sample of paleobiological specimens is collected for paleoenvironmental context. Sometimes the volume of paleobiological material can be staggering. To date, in Glacier National Park, we have found wood as old as 5000 B.P., and of species that are no longer found around or above the ice patches. We had originally speculated that some of the wood may have been transported to these locations by raptors for use in nest building, but that explanation now seems unrealistic based on GNP's maps of known raptor nesting locations. A more parsimonious explanation holds the presence of this wood as indicative of a higher treeline during a more favorable climate.

Expense and Return

Ice patches tend to exist at high elevations and in remote areas. This makes them quite expensive to investigate—even more so in light of their low potential return. In our project in GNP we have not found a single artifact (other than a few bits of historical signage and the odd modern hat) associated with ice patches. Perhaps the ice patches in GNP were not conducive for use by ancient humans as hunting locales; at least no obvious evidence of their use in this way has been preserved. The GNP Ice Patch Project went to great effort to identify this seeming absence of evidence. Some of our target ice patches were so deep in the backcountry that surveying them required three days of strenuous hiking. Were they allowed to land in the park (they are not), helicopters could

reduce travel time, but they would vastly increase the cost. In Alaska, the Yukon, and Northwest Territories, helicopters are the accepted, essential tool needed to visit most of these locations. Far from a perfect solution, the use of these expensive and complex machines can be compromised by their inherent limitations and by inclement weather. In the last 30 years, many spectacular finds have been discovered by accident from melting ice across the globe—notably, Ötzi, the Neolithic man who was murdered some 5,000 years ago in the Italian Alps, and the nearly 500-year-old Kwäday Dän Ts'ìnchi (southern Tutchone for *Long Ago Person Found*) in British Columbia (Dickson 2012). The archaeological information gleaned from such finds, let alone the significance for descendant cultures, is unrivaled. Take the resurgence in popularity of the woven spruce root hat style found with Kwäday Dän Ts'ìnchi, for example. Directed surveys of ice patches have certainly produced successes, such as the late-Paleoindian age atlatl foreshaft recovered near Yellowstone (Figure 1), but it seems that, in general, fewer than 10 percent of ice patches surveyed reveal any artifacts. This could be because many ice patches were simply not used.

From a global perspective, ice patches reveal two major categories of associated activities: hunting and travel. Ice patches can be excellent places to hunt in the summer, as large game often hang out on the patches, using them as a source of water and forage (Figure 2). Animals may also use them as respite from biting insects such as mosquitoes and nose botflies because insects avoid the chilled air above the ice patches. And some animals seem simply to enjoy sliding around in the summer snow. In any case, they form large brown targets against a white background, perfect for hunters.

In other places, such as in the mountain passes of the Alps, the artifacts left behind are more of a hodgepodge, things that one might lose while traveling through a cold, windy, possibly stormy pass. One surprising finding is the number of shoes. One might think that shoes are the last thing a person would want to lose in a snow-covered pass at 11,000 feet, but people who routinely traverse such passes find that leather-soled footwear is slippery on the slopes. Therefore, a person might remove them in order to cut trail (as portrayed in the 1925 silent film, *Grass,* about Bakhtiari herders in Iran).

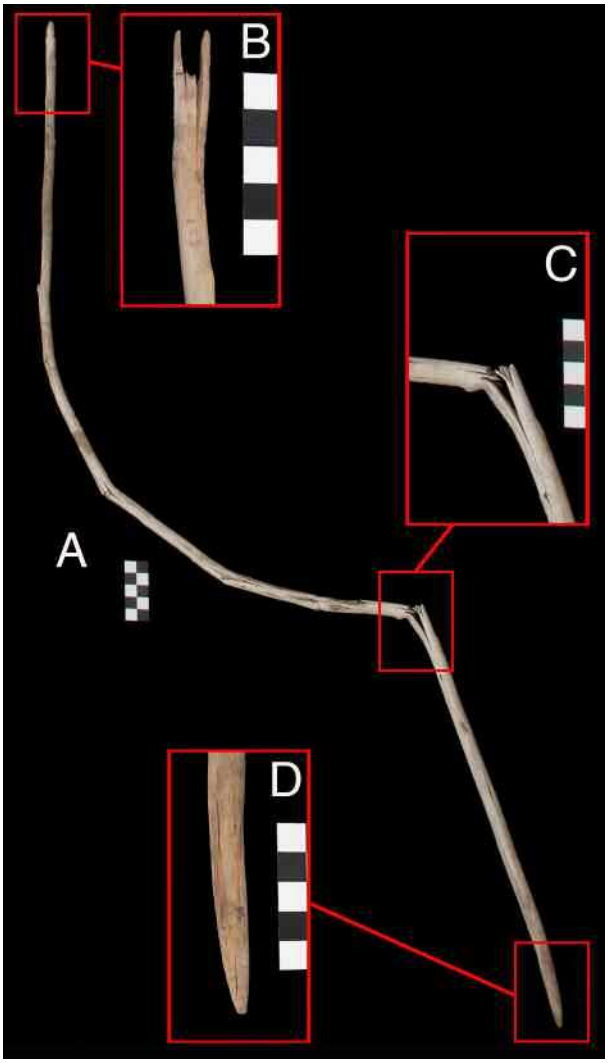

Figure 1. Dart foreshaft. Clockwise from the larger image: (a) the complete foreshaft; (b) detail of the hafting element at the tip (probable ownership marks are visible near the bottom of the image); (c) detail of a trampling fracture that likely occurred when the artifact was saturated and partially buried in slush; (d) detail of the base portion of the foreshaft, which would have been fitted into a socket. Scale in centimeters (photographs by Tara L. Hornung; image first published in Lee 2010; used with permission).

Weather

Complicating matters, ice patch research is at the mercy of the weather. It is not worth surveying until as late in the warm season as possible before the first snows of the fall. This means that the fieldwork window is tight (ideally, we would survey during the first part of the academic semester). Fresh snowfall obviously hinders survey, and while in GNP we had to seek cover more than once from late summer snow squalls. In addition, we planned our fieldwork during 2009, a high melt year. But by the summer of 2010, when we actually got into the field for the first time, the ice patches had accu-

Figure 2. Overview of a Yellowstone area ice patch showing late-season forage outside of the vegetation-free area adjacent to the ice patch (photograph by C. Lee).

mulated more snow. The winter of 2010–11, in fact, saw snowfall that was 250 percent of normal, and in August 2013 the patches were larger than in August 2010. It is possible that we failed to recover any artifacts in GNP because any material exposed in the patches' forefields during the high melt year of 2009 was covered from 2010 onwards. Decay of organic artifacts may begin not only when artifacts are exposed to sunlight and alternately wet and dry conditions, but also when they come into contact with "warm snow."

Finally, ice patches exist in emotionally moving environments, many of which are protected today as national parks or as "wilderness." The clear and obvious evidence of long and repeated use of alpine environments, including ice patches, vividly illustrates that these locations were in no way foreign elements of the regular—albeit likely seasonal—ranges of many Native peoples. Many ice patch projects, including those occurring in Alaska, the Yukon, and Northwest Territories have been blessed by the involvement of Native Americans with a deep connection to the high country. Glacier National Park's alpine regions continue to be important spiritual locations to the Salish, Pend d'Oreille, Kootenai, and Blackfeet people. For our project, the intersection of climate science, archaeology, and culture in the field of ice patch archaeology is resulting in innumerable positive outcomes for project participants, as well as for the communities affected by the research. This is a recurrent pattern. For example, Andrews et al's (2012) work in the Northwest Territories with the Shuhtagot'ine (Mountain Dene) culminated with the installation of heritage exhibits linking the archaeological record with the living culture, a sample of which can be seen online here: http://www.pwnhc.ca/exhibits/icepatch/. Our project in GNP will also culminate with the development of a culturally informed, interactive webpage describing the project for Salish, Kootenai, Pend d'Oreille, and Blackfeet audiences, the general public, archaeologists, other scientists, and resource managers. A nine-minute video describing the project can be found online here: http://youtu.be/w1Vgs9IMixY.

In the coming decades, the field of ice patch archaeology will expand to other parts of the globe where permanent snow and ice exist, including South America and Asia. As the field develops, comparative synthesis, such as the review of global radiocarbon ages compiled by Reckin (2013), will provide important testable assertions regarding broad scale behavioral trends.

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ARCHAEOLOGY AND PARTICIPATION ACROSS INNER ASIA'S HIGH FRONTIERS

Michael D. Frachetti

Michael D. Frachetti is Associate Professor of Archaeology in the Department of Anthropology at Washington University in St. Louis.

Looking at a modern political map of Asia, one might conclude that Asian mountains are perceived as barriers. This environmental view was pervasive in the geographies of nineteenth-century works like the *Pulse of Asia,* by Ellsworth Huntington. The impact of this environmental determinism, long abandoned as an explanatory paradigm, is still evident in the way mountain societies are considered relevant to world civilizations. In this short paper I argue that, while the topography and environmental extremity of mountains may appear imposing to lowland agricultural societies and coastal populations, mountains have served a longstanding and fundamental role in shaping the form of regional civilizations and how they interact. After more than a decade of research in the mountains of Inner Asia, archaeological data are painting a picture of mountains as bridges that bring neighboring communities into discrete arenas of participation; culture (social and material), language, ideology, and a host of other institutions are mediated and transformed along the corridors they define. In Inner Asia, the natural and social geography of mountains fundamentally fostered some of the earliest and most important "participations" among mobile societies. They are also sources of innovation and unique formulations of complex social organization. Here I briefly discuss how participation is conditioned by mountain landscapes and how mountain communities in turn shaped institutional channels, redirected the flows of commodities, and linked the material symbol systems of societies across Eurasia thousands of years before the historical "Silk Routes."

Given that modern borders often coincide with mountains, I also briefly consider the modern political realities of working in areas that have been relegated as peripheral in the contemporary view. I conclude that, while making a career in the mountains can result in fruitful discoveries, our misconceptions of mountain societies may be limiting our historical view of regional interaction and, more broadly, civilization itself.

Inner Asian Mountain Pastoralists: Connected or Isolated?

From an ethnographic perspective, societies living in the mountains can appear isolated, remote, and limited in their engagement with the modern world. While working in a remote mountainous part of Uzbekistan this summer, my only neighbor—"Abdulali"—appeared nearly completely disconnected from the conventional trappings of "modernity." An excerpt from my journal illustrates some of the complexity of this superficial view:

> Our neighbor Abdulali lives in a small tent about a half click from our camp. He has no electricity, so he borrows it periodically from our generator, giving us time to talk. Abdulali spends his days pasturing a large flock of sheep with a few neighboring herdsmen, making a daily circuit of about 5–10 km. He told us that he maintains a "modern" house in a regional center roughly 150 km away, but prefers making the trek through the mountains with over 2000 sheep each summer, mainly to take advantage of the rich pastures at high elevation. He officially rents pasture access from the authorities, since we are located in a border zone and a forest reserve. Although some of the animals in his herd are owned by other individuals, the gross market value is an impressive $350,000 (roughly $175 per sheep). He told me the small plateau where we're working supports about 20,000 sheep annually—making the collective value among the 15 or more camps on the plateau an astonishing $3,500,000.00.
>
> In September, Abdulali treks over 500 km with his flocks to the shores of Aydarkul, where he passes most of the winter. Back at his house the regional center, which he visits roughly every two weeks (leaving his colleagues to watch the herds), Abdulali's son attends

university—something to do with technology he said. He will likely not become a herder like his father. Abdulali asked me to bring him a pair of American hiking boots, which at first I thought he wanted himself. Later he later told me he simply thought his son would think it was cool to have American boots. Since I didn't have an extra pair of boots handy, I arranged to trade him a Swiss Army knife for his handmade *kinjal*.

This pastoralist vignette has been playing out over and over again, from the mountains of Iran to the Altai of Russia. While the flocks represent great net value, herders are far from the richest Central Asians in the modern global economy; neither are they the poorest. Across much of the region, a decent monthly salary hovers around $200 per month and many live on much less—which casts the potential wealth tied up in livestock breeding and mountain herding into stark contrast with other occupations. Of course, the economy of herding is such that full liquidation of the herd is neither a sustainable nor wise financial option. Indeed, most herders subsist on the profit margins (selling a number of animals at market as needed), keeping their salary within high average ranges and responding to the demands of the regional economy. From their outward appearance, however, you might be fooled to think pastoralists were barely making a living.

Seasonal mobility affords mountain pastoralists the opportunity to participate in multiple communities, and their wealth in animal stock means that they foster important social institutions. For example, they provide lambs to slaughter for weddings, sometimes 200 or more for larger festivals. They commonly act as couriers between distant regions, and create extensive social and family networks through marriage, business dealings, and other engagements along their routes. In fact, by simply migrating to and from the valued high mountain pastures, they open channels for extensive webs of trade, communication, resource transport, and community formation between China (to the east) and areas south and west. Fredrik Barth, Lois Beck, Thomas Barfield, Nasif Shahrani, and countless other ethnographers have documented the centrality of mobile pastoralists in shaping wide-scale institutional landscapes across Asia throughout the past century. Today, archaeologists working from Mongolia to Turkmenistan are filling in the ancient details of this remarkable arena of participation, and from this work, mountains emerge as the spine of Inner Asian social conductivity (Law 2006; Parzinger and Boroffka 2003; Potts 2012).

Ecology and Mobility along the Inner Asian Mountain Corridor

My own work in the mountains of Inner Asia began nearly 15 years ago in Kazakhstan, whose eastern border with China is defined by the Dzhungar Mountains (Figure 1), situated between the larger Tien Shan range to the south and the Altai Mountains to the north. The Dhzungar range is formidable, with the highest elevations upwards of 4,000 m. Furthermore, the Dhzungars rise abruptly from a desert plain east of Lake Balkhash. In roughly 150 km west to east, one can go from sand dune deserts to 4,000-m-plus glaciers. Every couple of hundred meters of rise in elevation reveals a shift in vegetation and climate within environmental ecotones—transitions from desert to steppes, steppes to piedmont meadows, and meadows to high alpine pastures. Similar orographically distributed ecotones can be found along a long swath of mountains extending from the northeastern borders of Iran and Afghanistan to the Altai mountains of SW Siberia—a territory I have recently referred to as the IAMC, or Inner Asian Mountain Corridor (Figure 2; Frachetti 2012).

Our research initiative along the northern slopes of the IAMC has consisted of a number of regional surveys spanning from the deserts and foothills to high mountaintops of the Dzhungar Mountains. The archaeological data collected over the past decade illustrate not only that these mountains have been considerably populated for at least the last 5,000 years, but also that seemingly small-scale pastoralist campsites often exhibit incredible long-term reuse and reoccupation. The nomadic communities who lived in these mountains were not transient. Rather, they developed mountain-specific adaptations that have endured at least since the Early Bronze Age (ca. 3000 B.C.E.). The archaeological palimpsest includes a vast array of rock art, which shows prehistoric, historic, and even modern engagement with common locales on the landscape. Early Bronze Age petroglyphs, superimposed by Iron Age motifs, superimposed in turn by medieval motifs and, ultimately, modern day graffiti, define and imbue sites across the mountainous landscape with meaning and present a semiotic record of places of significance and sociality (Frachetti 2008). Likewise, the burial record illustrates a long-term sense of history and place, wherein the same cemeteries, the same territories, and the same spaces and locales in the landscape exhibit a remarkable burial palimpsest spanning thousands of years. The earliest burials date to roughly 2,500 B.C.E., and many cemeteries illustrate continuous reuse until the medieval era (thirteenth–fourteenth centuries C.E.).

Figure 1. Archaeological surveying in the Dzhungar Mountains (2012).

The Dzhungar Mountains are also host to a long-term record of nomadic settlements. Categorically, settlements of mobile pastoralists were once thought to be nonexistent. Indeed, someone once told me that the use of the term nomadic settlement was an oxymoron! In Central Asia, pastoralist encampments once proved difficult to find, mainly because archaeologists overlooked the continuities between contemporary or ethnographic settlements and those of the more distant past. There was no expectation that an apparently ephemeral campsite dating to the last few centuries C.E. could reveal more ancient occupation. Starting in the early 2000s, our collaborative survey teams started to record and excavate these ethnographic settlements and found that they have substantial and deep archaeological stratigraphy (Figure 3). In fact, our excavations at a number of settlement complexes in the last decade demonstrate that all the campsites were used repeatedly with reconstruction phases spanning at least 2,000 years, and some upwards of four millennia (Frachetti and Mar'yashev 2007).

Applying this fact toward predictive modeling in GIS, we utilize the spatial patterning of mobile campsites recorded on the surface to model prehistoric landscape use patterns. Such ecological and spatial modeling has led to the discovery of more pastoralist settlements in other regions of the IAMC, such as in the mountains of Uzbekistan, where none were previously known. Of course the ancient pastoralist communities we are discussing were diverse in their identities and practices over the past millennia, but their recurrent patterns of mobility and niche construction help define a social economy with diverse modes of exploitation throughout the mountains.

There are two dominant environmental pressures that influence mobility patterns of pastoralists throughout the IAMC. The first is altitude and the second is seasonality. Elevation dictates a number of environmental conditions, not least of all rainfall, temperature, and solar radiation. These factors are most pronounced in their effect on vegetative resources and growing season, and shape the quality and density of pasturelands in the steppe and piedmont areas of Inner Asia.

If we investigate the summer productivity of semi-arid steppe pastures in the Dhungar mountains (roughly 800 m or below), for example, we see that while they account for a large territory across the region, their reduced foraging quality means that as much as 10 times more pasture area is needed to maintain the same number of animals in higher-elevation, mountain meadows (for discussion, see Frachetti 2008). If we compare upland pasture zones (1,000 m up to 2,500 m), we see that rich pasture grasses comprise upwards of 75 percent of the available vegetation. Thus, there is a clear and obvious advantage to traveling during the summer to higher pastures, where rich grasses are more abundant and where increased biodiversity aids in fostering diverse pastoralist strategies. Of course, seasonality plays an important role in the mobility strategies of pastoralists. While the highland pastures are extremely lush during the summer

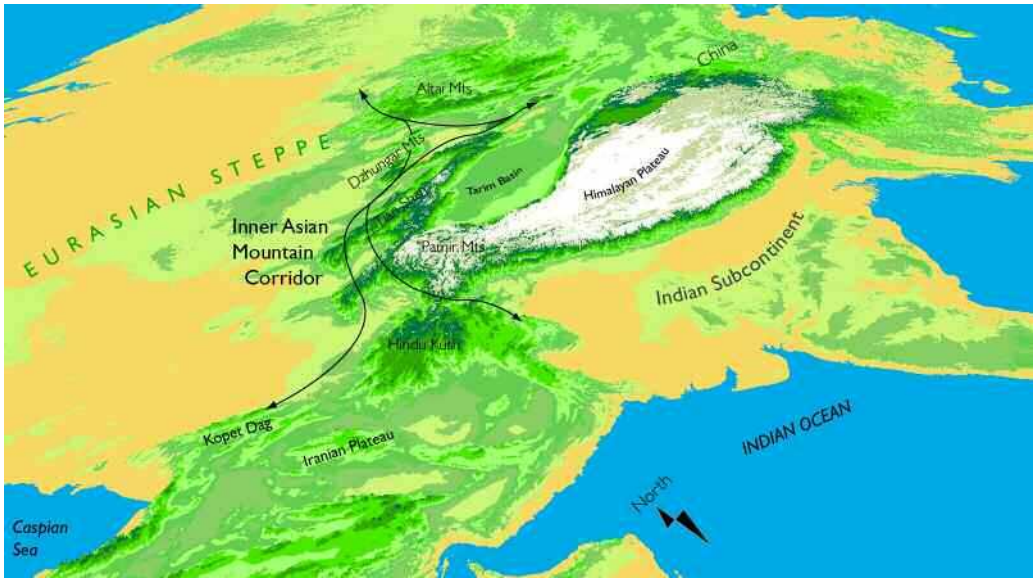

Figure 2. Geography of the Inner Asian Mountain Corridor.

months, high altitude zones become less accessible in the winter, when grasses are buried under deep snow. Most pasture animals have difficulty grazing in high pastures, so pastoralists typically move downhill to lowland areas where the snow is lighter or nonexistent.

Vertical transhumance is a well-known mobility pattern that is evident in many mountainous environments, from Africa to Western Europe, Central Asia, and the Andes. In general, anywhere there are highland ecotones, there are pastoralist populations keen on exploiting the seasonal and orographic differences in pasture quality and biodiversity. Comparing productive parameters of the environment with the location of archaeological sites in the Dzhungar Mountains, we have produced models of pastoralist occupation and land use patterns through prehistory. Our models illustrate broadly that resource availability and the mobility necessary to exploit resources have fluctuated very little throughout the last 4,000–5,000 years. Certainly there are stochastic deviations, expansions, and contractions in the overall territories used by mobile populations, but generally we have modeled mobility ranges between summer and winter camps from roughly 10–35 km per year (max 50–60 km). While this provides interesting ecological information about pastoralists in this region, it more importantly illustrates the mechanics underlying social participation and the formulation of social arenas throughout the highlands of Inner Asia.

Social Participation and the Mountain Ecumene

The geographic layout of pasture resources in the Dzhungar Mountains, for example, shaped the mobility and interactive courses of regional pastoralists for millennia. Seasonal and vertical patterns of migration produced discrete locales for engagement between neighboring communities and their respective social networks. This shifting circuitry took shape as societies constructed meaningful landscapes of settlement, burial, and rock art sanctuaries across a latticework of lowland and highland areas within their mountain homelands. In this sense, we can envision an expansive arena of participation—or institutional engagement and disengagement—forming and reforming among mountain communities. Participation was not rooted in the formality and institutional rigidity of large settlement centers, but instead was negotiated across diverse and non-uniform assemblages of social, political, economic, and ideological ways of doing things. It is these dynamic confluences and engagements—practical channels of participation—that underpin the scale and complexity of mobile pastoralist hegemonies from ancient times to more recent history.

Our excavations at pastoralist encampments located throughout the piedmont zone (1,000–2,000 m) of eastern Kazakhstan provide tantalizing details about the nature and impact of participation among mountain communities on a diversity of emerging institutions of ideology, economy, and production. The early Bronze Age settlement site of Begash,

Figure 3. Early and middle Bronze Age levels of the multiphase settlement Dali, Dhzungar. Mountains, Kazakhstan (2012).

located in the foothill zone of the Dzhungar Mountains (ca. 900 m asl) is one of the earliest dated settlements in Semirech'ye (Frachetti and Mar'yashev 2007) and illustrates how apparently small-scale participants can transform broader arenas of institutional practice, drawing distinct communities into an enormous, shared ecumene.

The zooarchaeology of Begash provides a window into the territorial range of regional mobile pastoralism. The fauna consists primarily of sheep and goat, followed by cattle. Later in the site's chronology, we see the addition of horses in the pastoralists' repertoire of herd animals. From an economic perspective, this herd structure defines a widely shared economic tradition throughout the IAMC. It is also important to note that there is a consistent exploitation of wild animals throughout the occupation phases at Begash. Importantly, the wild animals illustrate a sustained use of a wide range of environmental zones. Djeiran (antelope) and gazelle inhabit desert territories, while red deer and elk occupy highland zones. In most cases, these species make up less than five percent of the total faunal record, yet they illustrate how mobile pastoralists moved within and beyond their herding areas, making excursions far beyond their home territories for the purpose of hunting. This diversity of mobility likely provided exposure and opportunities to participate with outside groups, bilaterally reshaping cultural institutions among regional communities.

Recent paleoethnobotanical studies at Begash and other mountains settlements in the Dzhungar range by Dr. Robert Spengler illustrate some of the earliest evidence for the use of domestic grains—specifically wheat and millet—in the context of cremation burial rituals during the early/middle third millennium B.C.E. (Frachetti et al. 2010; Spengler et. al 2013). These data not only provide some of the earliest botanical evidence for the penetration of domestic grains into the herding economies of Inner Asia during the Bronze Age, but they also expose a larger ritual employment of exotic grains in burial rites. Wheat offerings are also known from early second millennium B.C.E. burials in Western China (Xinjiang) (Flad et al. 2010). Based on the chronology and morphology of these seeds, wheat appears to have been introduced to China from the west, where communities used it in comparable ritual fashion. In the opposite direction, the earliest broomcorn millet in northern central Asia, also at Begash, appears to have passed through the same mountain corridor. In fact, corollary evidence from other second millennium B.C.E. pastoralist sites in the Dzhungar mountains, excavated by Paula Doumani, illustrates a late Bronze Age transformation in mountain domestic economies from devoted herding to multi-resource pastoralism (herding supplemented by seasonal cultivation), sparked by the decision of select mountain communities to incorporate grains in their ritual practices, some 500 years before planting them for food.

Begash is just one site among a handful that have been systematically excavated; the wide abundance of (yet unexcavated) settlements in our study region may expose other channels of participation among a larger population of pastoralists interspersed throughout highland valleys and ravines of the IAMC. Trade, political alliance, competition, production, and diverse negotiations represent only a sample of modes of participation that allowed technologies, ideas, ideologies, commodities, and languages to be exchanged and innovated among mobile mountain societies. Sometimes these innovations were essential for survival; others were as random as a pair of American hiking boots, or the Swiss-Army knife I traded for a Turkic *kinjal*. As archaeologists working among mountain communities, the challenge is to disentangle the various cultural and institutional channels that inserted small-scale, mobile communities into wider arenas of participation and to comprehend how their diverse institutional practices shaped what we might consider a distinctly different modality of civilization.

Closing Thoughts

Our research in the mountains of Inner Asia is prompting new questions about mountain societies in the past and about the role of mountains in the contemporary social landscape of Inner Asia. As was briefly introduced earlier, the population density of mountain regions in Inner Asia is today extremely low, drastically reduced as a result of global resettlement policies by the Soviets and the border politics of the post-Soviet era. Today all of the "-stans" are ethnically pluralistic, with Uzbeks, Kazakhs, Kyrgyz, Tajiks, Uighurs, and other groups defining a cultural bricolage along the (mountainous) border regions of each republic. These ethnically diverse margins reflect the inherent ancient social geography of the region and index a past reality when mountain communities bridged lowland urban centers by monitoring long-distance exchanges and participating in the revaluation of commodities and material symbol systems through remote corridors of interaction.

While archaeologists are commonly invested in studying premodern societies, contemporary political borders (frequently in mountainous regions) emerge as central to the formulation and execution of successful research. For example, my current field projects in Kazakhstan and Uzbekistan are situated in sensitive border areas, each with its own diversity of bureaucratic, practical, and logistical considerations. As is the case in the United States, sovereign national borders have become liminal areas, often where few are encouraged to live. Globally, scientific access to highland landscapes is becoming increasingly limited, both logistically and bureaucratically. In this short exposé, I have argued that perceived peripheries today were not necessarily so in the past, and mountain regions, which have been canonically cast as "beyond civilization," might more accurately represent important nerve centers for the resonance of local and regional social institutions. Archaeological research in the mountains of the world is essential in producing a rectified conceptual approach to the human past.

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THE HIMALAYAN EXPLORATION AND ARCHAEOLOGICAL RESEARCH TEAM

SCIENTIFIC-HUMANITARIAN FIELDWORK IN COLLABORATION WITH THE MOUNTAIN COMMUNITIES OF NEPAL

Hayley Saul

Hayley Saul is Lecturer in Archaeology and Lecturer and Course Director of the MA in Mesolithic Studies program at the University of York.

The Himalayan Exploration and Archaeological Research Team (HEART) is a joint scientific-humanitarian venture run out of the Department of Archaeology at the University of York. The project operates in collaboration with the NGO Community Action Nepal and seeks to push the frontiers of archaeological knowledge in the Himalayas while integrating the research with initiatives that stimulate local economies. Community Action Nepal (CAN) provides a proven infrastructure to identify known but at-risk heritage for responsive research, while HEART's objectives to explore, survey, and excavate new archaeology using the latest scientific and technological methods will further extend Nepal's potential to offer exciting heritage tourism opportunities. While being a landscape survey, and thus collecting multi-period datasets, the HEART project focuses on prehistoric research questions, about which relatively little is understood. The region is particularly important in a prehistoric context because the Himalayas occupy a key nexus in Asia, where multiple processes of animal and plant domestication articulate.

Research Directions: Domestication and Exchange

It is increasingly being recognized that the regions of northwest India, Pakistan, Afghanistan, and the Himalayas are essential in developing archaeological understanding of the processes of animal and plant domestication that occurred at the beginning of, and in some cases in advance of, the Early Holocene (ca. 11,000 B.P.). It is in these areas that many cultivated species indigenous to eastern and western hemispheres meet and, by inference, so too do the anthropogenic processes that motivated these domestication episodes. Cultural exchange of both foods and food management knowledge in this articulation zone seems likely, given that there is a broad and compelling contemporaneity to the domestications of plants such as rice (*Oryza sativa*) (Fuller et al. 2007; Jones and Liu 2009;), the millets (*Panicum miliaceum, Setaria italica*) (Hunt and Jones 2006; Hunt et al. 2008), wheat (*Triticum* sp.), and barley (*Hordeum vulgare*) (Li et al. 2011), as well as minor cultivars like peach (*Prunus persica*) and apricot (*Prunus armeniaca*) fruit (Hunt and Jones 2006).

Genomic evidence from *japonica* and *indica* rice strains (*Oryza sativa*), with indigenous distributions centered on China and India respectively, either side of the Himalayas, shows that there was an exchange of genetic material between these varieties. This exchange takes the form of critical domestication alleles, coding for plant management features such as grain shattering (Sh4 allele) and panicle color (Rc allele) (Kovach et al. 2007). These selected characteristics are common to both modern strains, but are not found in wild counterparts. Phylogeographic investigations of rice point to possible domestication centers in both China and India (Sang and Ge 2007), but this overlap of domestication alleles happened because of interbreeding and thus points to trans-Himalayan exchange networks. The earliest macroscopic evidence of cultivated rice grains comes from grains embedded in Lower Yangtze pottery in China, dated to ca.10,000 B.P. (Jiang and Liu 2006), but microscopic phytolith evidence from Diaotonghuan Cave may suggest an even greater 13,000-year-old antiquity (Zhao 1998) (Figure 1). Similarly, in the Gangetic Plain, emerging discoveries of rice from the site of Lahuradewa (ca. 11,000- 10,000 B.P.) suggest that management/cultivation of rice was being practiced in the early Holocene, though full domestication was not convincingly evidenced on morphological grounds (Fuller 2011). A plausible, but unproven, model for the process of rice domestication, therefore, describes two possible domestication centers in northern India and central China, with a subsequent and undated influx of viable domesticated seed-grain from China into Indian crops. How the

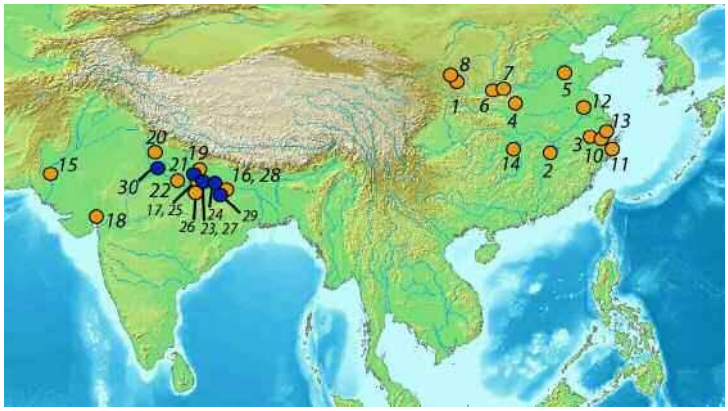

Figure 1. Map showing the early occurrence of rice between 5000–2000 cal B.C. (orange dot), and > 2000 cal B.C. (blue dot) (based on Hu et al. 2006; Jones and Liu 2009; Jiang and Liu 2006; Fuller et al. 2007; Fuller 2011): (1) Xishanping (2) Diatonghuan Cave; (3) Shangshan; (4) Jiahu; (5) Yuchanyan; (6) Yuezhuang; (7) Nanjiaokou; (8) Huizul; (9) Qingyuang; (10) Hemudu; (11) Kuahuqiao; (12) Longqiuzhang; (13) Chuodun; (14) Bashidang; (15) Mohenjodaro; (16) Mahagara; (17) Koldihava; (18) Lothal; (19) Lahuradeva; (20) Damdama; (21) Imlidih-Khurd; (22) Jhusi; (23) Koldihwa; (24) Khairadih; (25) Kunjhun II; (26) Lekhania; (27) Malhar I; (28) Senuwar 1A; (29) Waina I; (30) Ahirua Rajarampur.

Himalayas were involved in this remains to be established. The earliest finding of domesticated food in the mountains comes from Mebrak, where first millennium B.C. naked barley was recovered (d'Alpoim et al. 2013; Simons et al. 1994), and Changguogou in southern Tibet, where naked barley is dated to ca. 3,500 B.P. (Lister and Jones 2013). However, the antiquity of Himalayan settlement, the degree of mobility, the role of these high-altitudes in domestication processes, and the extent of trans-Himlayan exchange are key research aims for HEART.

HEART developed in response to the need to push the boundaries of prehistoric knowledge in these high-altitude environments. Evidence for occupation of the mountainous ranges, either (semi-) permanently or as route ways for exchange, is scant before the first millennium cal B.C. Developing these datasets not only is a physically challenging undertaking, but also requires experience of knowing "where to look," since the accelerated erosional processes have secondarily redeposited some artifacts, while covering others with deep sediments if they are at the base of peaks. Despite this, HEART has had significant early success in the recovery of prehistoric stone tools during "field-walking," as well as the promising discovery of stone structures that are part of a long-term program of excavation.

Survey and exploration of archaeological sites along the route of the Annapurna Circuit, northwest of Kathmandu, form a primary research trajectory (Figure 2). Discounting the many hundreds of "Sky Caves" in Lower Mustang, a total of nearly 50 sites and archaeological landscapes with potential or confirmed archaeological activity were identified along the 240-km stretch that was surveyed. The majority of sites that were recorded were rockshelters and caves, with rockshelters abounding in the boulderfields of the foothills, below ca. 2,500 m in altitude. Caves were found across the range of altitudes surveyed, but were concentrated on the high plateaus above 3,000 m, as well as the Sky Caves of the Kali Gandaki Valley. As a result, a program of survey and excavation focused on north-south valley systems that lead to some 30 traversable mountain passes with Tibet forms the long-term research agenda for HEART.

Heritage and Community Archaeology

One of the main humanitarian aims of HEART is to operationalize scientific approaches to the understanding of prehistoric mountain settlement for the purposes of bringing life-enhancing benefits to the mountain communities by collaborating on heritage development projects (e.g., museums, heritage curriculums in schools, ethically designed tourism ventures). The challenges facing local heritage extend beyond the realm of prehistoric archaeology, though, and HEART is working collaboratively with local groups and CAN to target vulnerable areas where traditional skills, monuments, and community buildings are threatened.

One such project is the restoration of the Buddhist monastery in Langtang (Figure 3). If you're lucky enough to visit the "Hidden Valley" of Langtang, a day's travel northwest of Kathmandu in Nepal, the scenes of historical high-altitude yak drivers' huts amid dense rhododendron forests

Figure 2. HEART explores, surveys, and maps archaeological sites, and field-walks high altitude plateaus in advance of excavation to target prehistoric settlements.

are not all that different from what early nineteenth-century explorers would have encountered in this region. Langtang is also the center of the rich Tibetan Buddhist culture, with monasteries dating back hundreds of years. But in recent decades, lack of investment following the decade-long Maoist insurgency (1996–2006) and political upheavals have caused many of these monuments to fall into disrepair placing their religious treasures at risk.

HEART has embarked on a community archaeology program to help locals restore the Langtang monastery, or *gompa*, using traditional artisan skills. The conservation and restoration work is coordinated jointly between HEART, the locally based Shree Samling Monastery Restoration Group, and Community Action Nepal, in the same spirit of mutual

Figure 3. As a joint scientific-humanitarian venture, HEART is working in partnership with the local community in Langtang to restore their Buddhist monastery.

responsibility that epitomizes the ideology of mountain Buddhism. At first glance, the monastery is a humble square building, barely held together by the centuries-old clay-based mortar that binds the tumble of hewn stones. It is not "iconic" heritage, but to the 600 inhabitants of the valley it is the home of nearly all their festivals, it is a meeting place, and it is an administrative center for decision-making about the running of the nearby villages. In other words, the monastery is a locus of century-old community values.

The original construction that was carried out at least 350 years ago used large, flattened granite stones as roof tiles. These were supported by a timber roof structure, which needs replacing. Of perhaps more imminent danger is the subsequent buckling to the exterior stone walls, because of the weight of the roof. The building has a dangerous lean and is bowed from the midline of the wall, and original carved wooden interiors are cracking under the pressure of the warping (Figure 4). The resulting compression from the roof is forcing precious Thanka murals away from the walls (Figure 5). These extensive murals date from the original construction and cover a large portion of the interior, but are most concentrated on the eastern second-story. Thanka is an intricate religious art form based on complex geometric principles that can take up to nine years for a novice monk to learn and a lifetime to perfect. Thanka is an essential tool in the teaching of Tibetan Buddhist philosophies, though, as well as recording the lineages of great masters who were instrumental in the Buddhist legacy of thought. Moreover, damp from the permeable structure threatens the monastery's 300 Tibetan manuscripts, written on handmade paper. It is the community's feeling that the only appropriate place to house such important works is a religious building.

Community involvement in the project is central, and local individuals are leading the restoration, collecting raw materials for the masonry and carpentry from the surrounding landscape. Some will undertake the dangerous journey to source rare white clay that is used to paint the exterior and can be found only in a single mountain location at an altitude of over 5000 m. Local master architect and woodcarving specialist Dawa Sonam will record the structure stone by stone and ensure that traditional techniques are used to restore the roof timbers and interior carvings.

The Langtang Gompa was founded by the Tibetan lama Mingur Dorje, a highly respected Gelung-pa master and reincarnation. The monastery was sited overlooking and honoring Langtang Lirung mountain (7,234 m). Like many mountains in the Himalayas, Langtang Lirung is believed to be the home of a local pre-Buddhist god in the Tamang culture. Before Buddhism reached the region in the seventh–eighth

Figure 4. The weight of the roof is causing the carved wooden interior supports to crack.

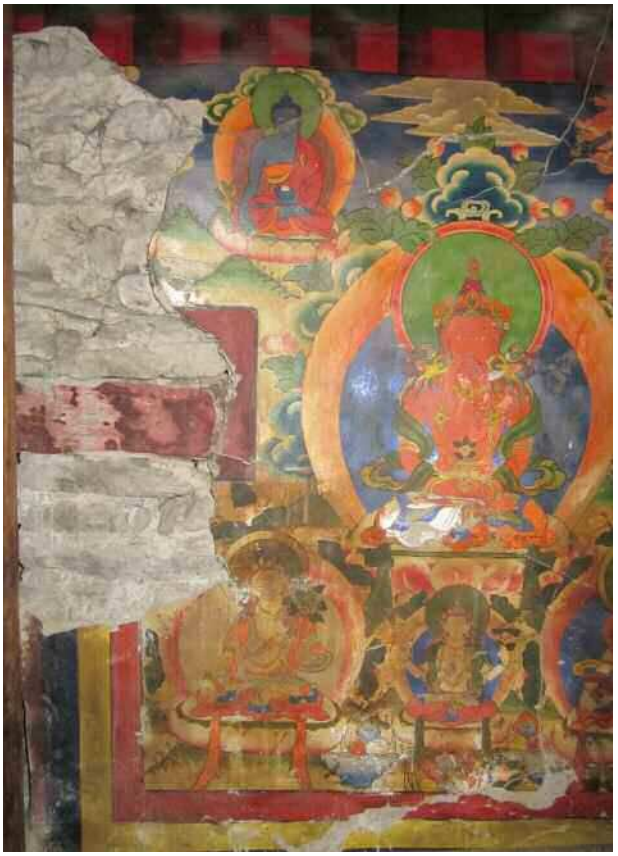

Figure 5. The walls of the building are bowing under the weight of the roof, causing original Thanka murals to crack and decay from the walls.

centuries A.D., the prevailing religion was a shamanic-based one, called Bön. The animism of landscape features such as mountains and rivers, as well as objects, with an essence of consciousness was a feature of *Bönpo,* the religion's adherents. Later, this veneration of places in the landscape would come to figure in the particular doctrines of the Tibetan branch of Buddhism, following its introduction from the Indian subcontinent. Particular features of the landscape are invested with the power to bring about certain altered states of mind, through meditation, or empowerment by the legacy of divinely touched beings that have been there before.

Mingur Dorje, the monastery's founding figure, is one such saintly character and, according to local history, it was a visit from this venerated master that stimulated the original construction. According to the biographies of the holy man, he was born in the Nangchen region of Kham in 1645. Stories of miracles surround the birth of Mingur Dorje, including the presence of auspicious marks on the boy's body, such as the letter *tha* on the sole of his foot. When he was 11 years old, another master named Karma Chakme identified him as a reincarnation of the great lama Trulzhik Chenpo Wangdrak Gyatso. This mentor bestowed the teachings of the Nyingma-pa Buddhist heritage, the semi-secular religious branch that flourishes in Langtang today and allows lamas to integrate into communities and have families (Dorje and Rinpoche 2006).

Mingur Dorje is credited with many esoteric abilities. He was said to have experienced visions of deities such as Padmasambhava, the sage said to have brought Buddhism to Tibet (Sihlé 2006), and the saintly Milarepa, who, despite his checkered past, is hero-worshipped nowadays for achieving enlightenment in a single lifetime. Perhaps most famously, though, Mingur Dorje was of a rare breed of "Treasure Revealers"—those gifted with the ability to discern arcane wisdom from particular places and objects. In the Himalayas, the Terma tradition of Buddhism holds that certain knowledge is hidden in the mountains or other signifi-

cant landscape features by antiquity's lineage-founders (Thondup Ringpoche 1997). This knowledge was to be revealed only when humanity was ready to receive it. It could take a physical form, such as a scroll or an object to meditate upon, or it could take the less tangible form of a hidden, perhaps transcendental doorway to realization, associated with a particular place (*beyul*) (Thondup Ringpoche 1997).

One such example of a treasure, or *terma*, which is said to have been revealed by Mingur Dorje was at a place called Maja Yong Dzong, where a statue of Padmasambhava was subsequently discovered in a cave (Thondup Ringpoche 1997). With his reputation growing, the lama received numerous invitations from all over the Himalayas to offer his teachings, and it is during these travels that he inspired the foundation of Nyingma-pa monasteries, like the one in Langtang. He was only 19 when he died, but his figure seems to have had a profound impact on the secondary spread and consolidation of Buddhism in the Himalayas, including Langtang.

Conclusions

Virtually nothing is known about the role of the Himalayas in wider prehistoric processes such as domestication and early state formation, and yet not only is very little fieldwork underway to counter this situation, but exemplars of "living heritage" are also falling into decay for a lack of resources to maintain them. The aims of the Himalayan Exploration and Archaeological Research Team are to mount joint scientific and humanitarian initiatives with the charity NGO Community Action Nepal and local community partnerships to provide sustainable heritage-based solutions to socioeconomic development in the high-altitudes. Here, some of the current projects being undertaken by HEART have been explained against the broader backdrop of the prehistoric research context, as well as the role heritage and archaeology can play to facilitate communities to meet their socioeconomic needs. Engaging with "community values" is a very relevant part of archaeological responsibility. In the compassionate Buddhist villages of the high Himalayas the idea of community is one that entails mutual responsibility for the well-being of others, and it is in this spirit that HEART was established: to operationalize science as a powerful tool to bring about economic development and to work in partnership with local groups to represent traditional values in the study of their heritage.

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WAS IT EUPHORIA OR OXYGEN DEPRIVATION?

REFLECTIONS ON CONDUCTING RESEARCH IN ALPINE SETTINGS

Christopher Morgan

Christopher Morgan is Assistant Professor and Graduate Program Director in the Department of Anthropology at the University of Nevada, Reno.

The title of this article alludes to a fundamental question driving a substantial amount of alpine archaeological research: are high-altitude environments so limiting in terms of biotic productivity, oxygen availability, pronounced seasonality, extreme cold, and unpredictability as to necessitate some sort of external mechanism (e.g., climate change, increased lowland population densities, the development of sociocultural complexity) to initiate their intensive exploitation and habitation (Aldenderfer 2006)? Or are they so seasonally productive and do they offer such novel opportunities not available in the lowlands that they entail their own incentives for intensive occupation (Walsh et al. 2006)? To be clear, people across the globe often used (and use) alpine settings sporadically, non-intensively, and opportunistically as hunting grounds for alpine fauna like sheep and goats and to travel and trade between locales separated by mountain ranges (Canaday 1997). The question is, why do they sometimes build permanent structures and start living in larger groups for longer periods of time (leaving behind substantial middens) in above-treeline environments? Answering this question drives a large part of my current research in the mountains of North and South America and is informed by nearly two decades of doing archaeological work in mountain settings. Rather than address this question with proxy data for population size, environmental productivity, and alpine settlement and subsistence patterns, here I take the opportunity to address these issues more intuitively by reflecting on the benefits and costs of working in high-altitude environments.

My first encounter with serious high-altitude archaeological research began in 1996, when I began working with Dr. Tom Jackson on a three-year-long CRM project driven by the relicensing of Southern California Edison's (SCE) aging hydroelectric facilities in the High Sierra. The project was a data recovery operation for a series of sites, some with buried paleosols capped by tephra, on the east side of the Sierra Nevada, just outside the alpine regions of Yosemite National Park. Its research agenda focused on figuring out the effects of Late Holocene volcanism, marked by those tephras (from nearby Mono and Inyo craters), on the region's prehistoric populations.

Beyond the archaeology, the thing that struck me about the project was its logistics. We had to work in the fall before the first snows but after the reservoir being relicensed had been drawn down (some of our best sites were below the maximum pool elevation of the reservoir)—maybe a one-month window of time. I had worked on plenty of camping-based projects before, from the Mogollon Rim to the top of the southern Sierra Nevada, but always out of vehicles. Here we had to get a full crew of people, excavation gear, and camping equipment up into the mountains for a two-week stay. The screens had to be broken down to fit on pack mules. The food had to be packed in and strung up in bear bags. That first year, we rode an open-compartment incline railway (a remnant of SCE's early-twentieth-century infrastructure and really just a small nine-person cart hauled up a set of tracks by winch-driven cable) up about a 45-degree slope, crossed a high-altitude reservoir by boat, and then proceeded by trail a few miles to our campsite. Our food was brought in by a string of mules. The following two seasons, we ditched the inline railway and boats (it was alleged that an equipment malfunction killed an SCE employee on it after our first trip), riding 10 miles on mules with the rest of our gear and food.

That first season, the weather was gorgeous, as only the early fall in the High Sierra can be. John Muir (1912) was spot-on in calling these mountains the "Range of Light." The archaeology was top-notch—we had sites with midden, bedrock mortars, and intact stratigraphy (quite rare in mainland California) at nearly 3,000 m in elevation. The second season was a different story. After we packed in, set up camp, strung hundreds of pounds of food up in the trees with a Gerry-rigged pulley system (to keep it away from Yosemite's notorious black bears), and renewed the excavations started the

year before, a blizzard blew in, dumping snow and coating the granite cliffs with ice. The Range of Light quickly became something more like Mt. McKinley's Alaska Range. Some of us had four-season tents, down jackets, Gore-Tex shells, and mountaineering-style boots. Some didn't and compensated with duct-tape, ending up looking like they were ready to join John Glenn on *Friendship 7*. We tried to work through the storm, but it quickly became apparent that some folks weren't well enough equipped to deal with the worsening storm. It got so cold, snowy, and windy one morning that we made the call to bug out and head back down the mountain. Without mules or full-sized backpacks, we left tents, food, and most of our gear behind, carrying what we could in our field packs. Tom and I rode up on mules the following week to inspect the damage and assess the possibility of trying again. The gear was intact and the forecast good, so we headed back up on mules the following week, many of the crew with expensive, brand-new Gore-Tex jackets and boots. Of course the snow melted, the weather was balmy (those expensive jackets stayed in their duffel bags), and the second field season was ultimately a success, as was the third.

Figure 1. Hauling gear by helicopter into the Sierran high country.

What did we learn? In terms of archaeology, something very interesting: that hunter-gatherers in the region adapted to the region's volcanism with mobility. When one Sierran pass was burned off and blanketed in volcanic ash, another nearby one was used more intensively (Jackson and Morgan 1999). The region's volcanic activity represented less a catastrophe than an inconvenience. But working in the High Sierra was costly, unpredictable, time-constrained, and required a lot more planning than the projects I had worked on in the lowlands. In addition to the normal costs of fuel, food, vehicles, and payroll, were the mules (not cheap!), SCE's outlays for logistical support (I thankfully never saw that end of the budget), the necessity of quality outdoor gear (REI being the main beneficiary here), and, especially in that second season, nearly doubling the logistical budget due to the weather.

The next six or so years saw me spending an inordinate amount of time in the central Sierra working on a slew of hydroelectric relicensing projects for SCE and conducting surveys for the Forest Service. We operated under much the same constraints as before. We often had to get in either right before spring thaw (prior to the reservoirs filling up) or late in the fall (after they'd emptied). In the spring, we took advantage of SCE's largesse and flew crew, gear, and a zodiac boat over the 3,000-m Kaiser Pass in a helicopter (Figure 1), excavated the sites on our itinerary, and worked through a late-season snowstorm. One crew member suffered pulmonary problems, to the point of being tent-bound the entire trip, but we couldn't evacuate her over the pass due to the storm (she recovered after the trip). In the fall, working again out of vehicles, we typically found ourselves trying to get one last site dug before the onset of winter. Inevitably, this meant breaking camp as the first storm of the season hit, cramming gear and crew into field vehicles and driving the icy one-lane road over Kaiser Pass in a blizzard. In the summer, we would survey the alpine zone. To move fast, we worked without pack animal support, carrying meticulously prepared camping and recording gear and 10 days of food on our backs. If the gear or food wasn't absolutely necessary or couldn't perform more than one function, it was left behind. The only exception was in packing a little extra high-fat foods (more calories per pound) and an extra layer of clothing as insurance against bad weather or worse. We came down the mountain only to resupply and head out again. No one complained—the alpine Sierra in the summer is without equal.

And the archaeology? Well, the first thing we noticed was that there was a lot more of it out there than you might expect. Site frequency, especially heading over 3,300- and 3,700-m passes, seemed inordinately high. I remember one plateau-like pass where we spent nearly a week frantically recording sites through afternoon thunderstorms (due to site density, we quickly fell behind our schedule) only to head over another pass and up to an amphitheater-like cirque higher than 3,300 m in elevation (a dead-end if you will) where we expected to find nothing but instead found a site covering acres. Not only was the site large, it had anthropogenic soils, abundant groundstone, and a dense surface deposit of mostly obsidian tools and debitage. It looked more like the type of site you'd find down at an elevation around 1,200 m, just below winter snowline. The more time we spent up there, the more this pattern was repeated: more sites, larger and more complex

sites, sites with milling tools and milling features and sometimes even house features either at or above treeline. The question as to why this was the case piqued my curiosity, leading me to write my dissertation on the region's settlement patterns (Morgan 2006). What I found most interesting about this research was that it suggested that the successful prehistoric exploitation of high altitudes was paid for, in part, by caching acorns from the montane forest as a means of offsetting the risks associated with early spring moves to the high country (Morgan 2008, 2010). Other researchers have identified similar patterns of using lowland resources to underwrite high-altitude occupations, for instance, in the White Mountains of California (Scharf 2009) and Utah's Uinta Mountains (Nash 2012).

By now the die had been cast and it was not long before I found myself doing similar research in places like Wyoming's Wind River Range. Here I was lucky enough to get involved in working with Rich Adams (Colorado State University), Ken Cannon (Utah State University), and Rich's then-students Matt Stirn and Bryon Schroeder to try to explain why there was a site (found by Adams and his volunteer crew) with 52 house features at an elevation of 3,300 m, a pattern at least superficially similar to only two other places in the American West: the high-altitude "villages" of central Nevada (Thomas 1982) and eastern California (Bettinger 1991).

Over the course of three seasons of running field schools there, funded by the National Geographic Society, the National Science Foundation (#BCS-1302054), the Charles Redd Center at Brigham Young University, and Utah State University (cobbling together the funding for this research was indeed its own challenge), I came to appreciate not only the uniqueness of the site, but also the ecological context of living and working at altitude. First, there's the elevation. The site is on a 23-degree slope, and I spent three summers running up and down that slope keeping track of excavations spread out across the site's 19-acre area. Barring the physiological changes (especially increased pulmonary capacity) associated with isolated populations in places like Tibet and the Andes, you do acclimate some, but you are always sucking wind above about 2,700 m in elevation. Second, people react to high altitudes differently. I remember being awoken in the pre-dawn hours by a student wheezing outside my tent, croaking, "Dr. Morgan, I don't feel so good." Recognizing the voice as one of the toughest students of the bunch, I was shaken. He showed all the signs of pulmonary edema: headache, shortness of breath, confusion, and deep rasping in the lungs. The only choice was to hike him down the mountain, drive to Jackson Hole so that he could be picked up by family, turn around, drive back to the Wind River Range, and hike back up to the site for the next day's work. The doctors confirmed the edema, commenting that another few days up there could have been fatal.

Figure 2. Wind River pack train led by Heath and Sarah Woltman of Bear Basin Outfitters, Fort Washakie, Wyoming, and by local expert guides Tory and Meredith Taylor.

Two summers later, I brought the largest crew yet to the site. At its maximum, we had 17 people in camp, with all the food, gear, wall tent, woodstove, and excavation gear once again brought up by pack train (Figure 2). Like the work in the Sierra Nevada, we were time-constrained, partly by the short summer season, but mainly by a limitation some people may not immediately think of in the mountains: water. We camped high on the mountainside, where the only water came from a few small springs. While one tended to trickle all summer long, it was only in late spring and early summer that there was a strong enough flow to sustain a large group. So up we went, as usual timing our trip with a close eye on the spring thaw and the possibility of late season storms. We'd been lucky the preceding two years and were hoping to pull off just one more field season in the notoriously unpredictable Winds. Of course it snowed. And then it snowed some more. We all packed into our wall tent with a tiny woodstove to stay warm and dry. Going stir-crazy and not wanting to miss the opportunity to dig the site, we went to work whenever the snow let up. It was something to do, it kept you warm, and it got the work done (Figures 3 and 4). The crew was resilient, punching though an inch of ice at the spring in the middle of the day to get drinking water and digging through a foot of snow to get to the tarp covering where we'd left off excavation the day before. There were cold feet and cold hands and some painful falls on the ice, but everyone had at least decent backcountry gear and lots of layers (easier to accomplish when the mules haul it in for you).

Figure 3. Excavating through the storm, right at treeline.

Figure 4. Back at work under better conditions two weeks later.

More importantly, it was calories that kept people going. I was lucky enough to have hired Shawn Patton as a cook, a friendly, pragmatic man with a lot of outdoor experience, and by now I'd been bringing crews into the wilderness, feeding and taking care of them for well over a decade. So we knew to bring a lot of food. But I have never seen people eat like that. It was cold, and the snow made getting to and from the site easily twice as hard. Shawn kept the stove going, ready with coffee, cocoa, pasta, beans, and anything with fat in it as soon as we returned from work. The food was inevitably gone in seconds and supplies began to dwindle. Shawn and I eyed our stores each morning with knitted brows. But the weather eventually cleared, the food held out, and we accomplished what we had set out to do. By the end of the project, between Adams' (2010) and Koenig's (2010) work and my own we had sampled nearly half of the 52 houses at the site. Analyses are still underway, but it is now clear that the main period of site occupation was between about 2000 and 500 cal B.P. (Morgan et al. 2012) and that this occurred during a period of increased effective moisture when treeline was higher than today by 100 m or more (Morgan et al. 2014), making the site less in the alpine than the subalpine zone when most of its houses were built. These preliminary findings lend credence to Stirn's (2014) hypothesis that sites like High Rise Village represent people mapping on to whitebark pine (*Pinus albicaulis*) and the pine nuts this tree produces. If true, this would be somewhat analogous to the Paiute and Shoshonean pattern of camping in lower elevation piñon pine (*Pinus monophylla*) nut camps in the Great Basin, but at much higher elevation and in the summer instead of the fall. Importantly, it implies that the pattern was driven by accessing low-return but abundant plants more than high-return animal resources.

Most recently, I've been fortunate enough to become involved with the excavation by Drs. Gil, Neme, Otaola, and Giardina (of the Grupo de Arqueología in San Rafael, Argentina) of a high altitude village site with 29 house features in the southern Andes. By now, the pattern should be familiar: packing food and gear in on horseback (50 miles one way; quite the experience for a novice rider!), dealing with rapid, unpredictable turns in the weather, and encountering rock-lined hunter-gatherer houses with deep midden in a beautiful but unforgiving landscape (Figure 5). And this really drives home the point I'm trying to make. Of course there are incentives to living at altitude. For the archaeologist, it's the opportunity to try to explain how and why people chose to live in such extreme settings. For people in the past, it was surely the good hunting (lots of guanaco bone in that site in the Andes) but also perhaps the opportunity to exploit seasonally abundant plant foods like the whitebark pine nuts in Wyoming's Wind River Range. Surely getting out of a cramped, dirty winter camp, out of the spring mosquitoes and into the beauty of the high country was incentive as well. But what is more telling are the costs of doing so. Hypoxia is always a problem for elevationally transhumant populations. Accomplishing what you want to at elevation is always constrained by season; the higher you go, the narrower the window of opportunity. Weather is unpredictable and requires insurance, in the form of extra and multifunctional gear,

Figure 5. A hunter-gatherer residential site in the southern Andes. Note the circular stacked-rock house features in the mid-ground, at the base of the talus slope.

extra food, extra fuel, and logistical flexibility. Add to this economies of scale—that is larger populations—and the implications are clear. Keeping people fed, dry and warm in alpine settings (and altitude's analogue, high latitude) not only takes a lot of planning, gear, and calories, but also carries with it significantly higher risks of failure than those in most lower-elevation settings. Thus, it's not that there aren't incentives to living and doing research in the high mountains, but that there are uniquely high costs associated with doing so, especially in the context of larger group sizes.

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HOW MUCH DIFFERENCE IS IN A THOUSAND METERS?

THE INCONVENIENCE OF HIGH ALTITUDE ON LOCAL RESIDENTIAL PATTERNS

Bryon Schroeder

Bryon Schroeder is a doctoral student at the University of Montana.

Almost 44 years ago, Dr. George Frison of the University of Wyoming excavated an archaeological site in east-central Wyoming, and found architecture unique for the area (Figure 1). The Shirley Basin Lodge site, as it is now known, was interpreted as a Shoshone encampment based on the presence of diagnostic stone tools, even though the site had unique stone domestic dwellings. The anomalous architecture on the site was thought to be a result of a rare occurrence of poor planning by nomadic Shoshone groups who had run out of hides and turned to stones to build (Ziemens 1975). This environmental explanation held simply because of the rarity of the site. Fast-forward 40 years and the site now has a new role in the understanding of alpine/basin settlement patterns. It is now clear that the once anomalous archaeological record seen at the Shirley Basin Lodge site is contemporaneous with occupations reported in western Wyoming. Current research on the high-altitude occupation in Wyoming has not considered local residential sites in lower elevations, focusing instead on nonlocal sites found at similar elevations. Before we focus on nonlocal sites using elevation as the comparison, however, we must study sites in the same region regardless of elevation because we do not yet understand the local sites or how these fit into a more local settlement pattern.

This special issue considers contributions of archaeologists actively researching the archaeological record in higher elevations. The Shirley Basin Lodge site, at an elevation of 2,258 m, some 1,100 meters below the mean height reported (3,300 m) for the North American high-altitude residential occupations, may seem like a poor fit for this edition (Adams 2010; Bettinger 1991; Thomas 2014). The vistas from the Shirley Basin Lodge site are not of picturesque alpine lakes, and bighorn sheep do not saunter through during excavations. The occasional domestic sheep wanders by a landscape of dull yellow rolling prairie, sprinkled with the spinning blades of wind turbines. Despite the less-than-mountainous environment, the remains of at least 60 horizontally coursed structures are extant, coeval in dates with occupations found in the Wind River Range of western Wyoming (Figure 2).

What the Shirley Basin Site and Wind River Villages have in common are dry-coursed masonry, very late prehistoric (ca. 500 YBP) radiocarbon dates, identical brownware ceramics, steatite vessels, and flaked stone tool assemblages, despite a 1,100-m difference in elevation. This exact cultural suite has a distribution spanning from central Wyoming to Death Valley in California, a distance of some 700 miles (Figure 3). Why is a temporally and technologically identical residential pattern found in such diverse environments and seen across 700 miles? I think this pattern of occupations and technology should be considered much more than an environmental response. Of course, this explanation may not hold for all of the high-altitude sites in the west and that could be an interesting result. In the Great Basin, it seems that environmental derogation opened up high-altitude environments to entire families (Thomas 2014). But we do not know why prehistoric peoples in Wyoming incorporated mountains into a portion of seasonal usage or where they went after they left the mountains. This is why sites like the one in the Shirley Basin of Wyoming are so important to the study of high altitude archaeology and the remainder of this article tries to put this important site in context.

The Alpine

High-country archaeology can be a logistical nightmare. It is physically taxing to get an archaeology crew into the high country in Wyoming (see Adams, this issue). The weather is

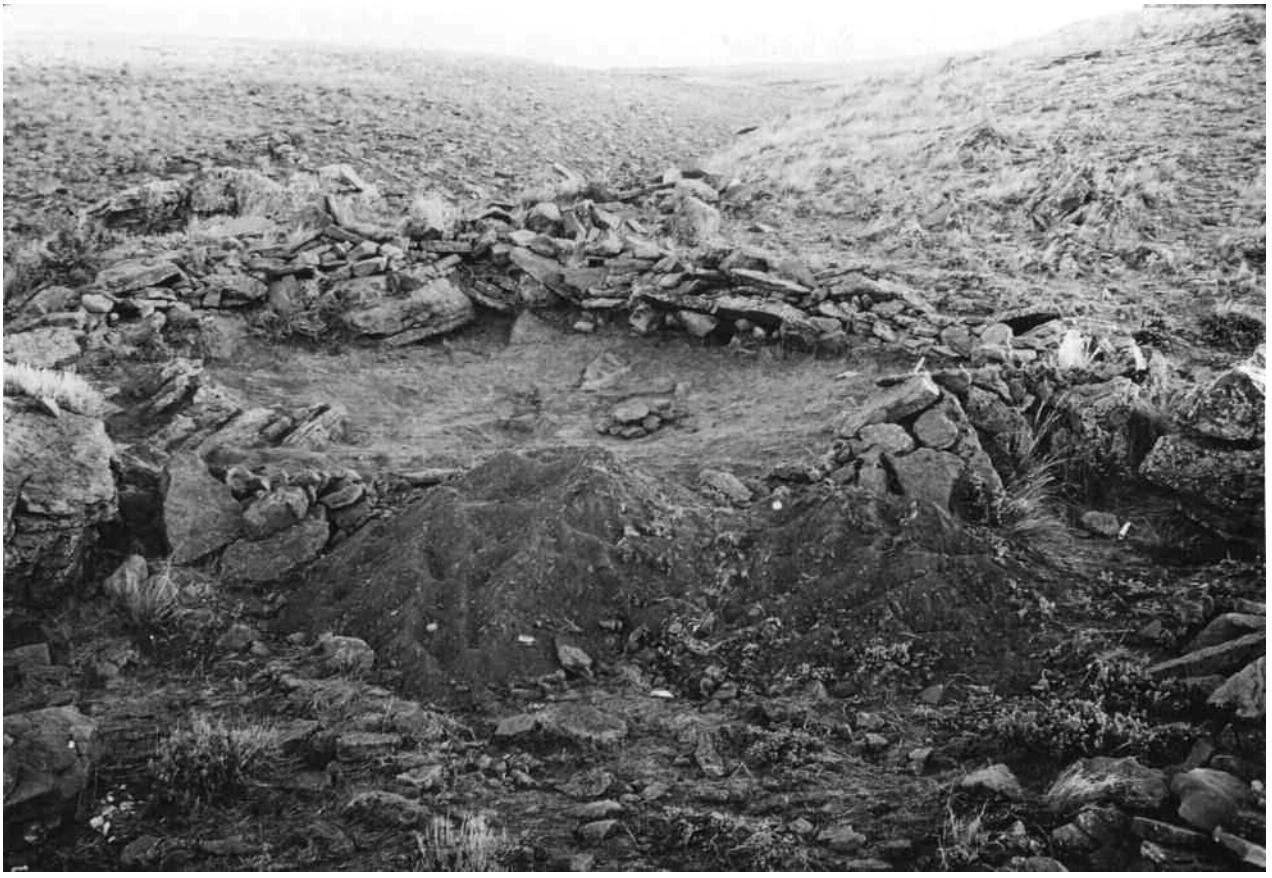

Figure 1. Overview of Shirley Basin Lodge site residential structure after 1969 excavation (photograph courtesy of Danny Walker).

unpredictable, excavation gear is heavy, transportation expensive, bugs prolific, and both water and food come with their own list of problems. It is fair to say that it is hard for humans in the 21st century to operate in alpine high-altitude environments. But has it always been difficult for human groups to operate and sustain themselves in higher elevations?

The High Rise Village site in the Wind River Range of western Wyoming (ca. 3,300 m) indicates knowledge of the alpine environment but also use of the lower elevations. Within the excavated domestic structures there are a high diversity of tools and high frequencies of artifacts (ca. 5,500 artifacts). The stone used to make these tools indicates that chipped and groundstone materials were locally procured, but a surprising amount of material was also carried in from lower elevations. The radiocarbon dates available for the alpine occupation in the Wind River Range suggest a long-term use of up to 4,000 years. However, radiocarbon dates are significantly affected by an old wood problem and the duration of the site's use is probably much shorter (possibly 1,200 YBP) based on relative dates provided by projectile points. Because of the old wood problem, interpretations centered on contemporaneously occupied domestic structures within the 10.5 hectare site area are limited.

The artifacts found inside excavated structures at the High Rise Village indicate anticipated reuse of the site. This evidence comes from cached artifacts found in the foundation joints of dwellings and the groundstone artifacts imported from lower elevation streams and adjacent mountains. The construction of the residential dwelling involved several labor intensive steps and may also be evidence of humans' anticipated return to the area. The first step in building a lodge was excavating a lodge platform. This platform was excavated into a steep slope (average grade of 23 percent) and

Figure 2. Coursed domestic structure at the High Rise Village site in Wind River Range of Wyoming (photograph courtesy of Richard Adams).

Figure 3. Example of domestic structure at the one of alpine villages in the White Mountains of California (photograph by Bryon Schroeder).

the fill was pulled towards the downhill side (Adams 2010). A rock wall standing two to three courses was placed on the downhill side to retain the dirt fill. The above ground architecture takes two forms: the first is a low rock retaining wall with some type of wooden structure set into a stone wall. The second type is entirely wood with cribbed wooden bases and walls. The labor intensive construction methods seen in the domestic structures, combined with the well-made and prolific artifact assemblage, indicate anticipated reuse of the site and possibly the protracted use of the alpine environment. If entire families spent long periods of time in the mountains, how did they manage to do so? Put another way, if hunter-gatherer groups managed months in the high country what did they eat?

To date, the archaeological record indicates that the alpine village residents subsisted on marmot (*Marmota flaviventris*) and large ungulates such as bighorn sheep (*Ovis canadensis*) or elk (*Cervus elephas*), in addition to gathering numerous plant materials as could be obtained from seed-bearing pines. The artifact assemblage present in excavations indicates that structures were not devoted simply to tool maintenance, but were also used for bighorn sheep butchering and plant processing. It is possible that bighorn sheep comprised a significant portion of the diet because they were easy to hunt. Our experience suggests that they are not skittish, as we have documented their presence on site almost every day during our excavations. Whitebark pine trees *(Pinus albicaulis*) are the dominant species on site and were an undoubted attraction for prehistoric peoples. Adams (2010) has argued that, in addition to bighorn sheep, Whitebark pine nuts comprised the bulk of the diet at High Rise Village. His work has shown that gathering pine nuts alone for five to eight hours a day from late August to mid-October would provide a comfortable food base for winter use. It was further demonstrated that, with hard work, gathered plants in the alpine environment are equal to "948 kg of meat, or the animal equivalent of 3 average-sized bison, 5 elk, 20 mule deer, 21 bighorn sheep, 33 pronghorn, or 1401 rabbits" (Adams 2010:103). When bighorn sheep and marmots are added to this caloric profile, the mountain alpine environment could easily finance sustained usage.

The Basin

A similar residential pattern to the Wind River Villages exists at the Shirley Basin Lodge site, located in central Wyoming, 194 miles east and 1,100 m lower than High Rise Village. The sites are temporally related, but to date no research has tested the possibility of a spatial relationship. In the Shirley Basin, the occupants of this large village site focused on bison hunts and possibly the processing of limber pine nuts rather than bighorn sheep and white bark pine nuts. The excavations of the site in the late 1960s did not produce reliable spatial data, making a direct comparison between the residential features from the alpine environments difficult. What we do know is that the artifact assemblages found in the Shirley Basin Lodge site structures indicate usage similar to what was found in the High Rise Village. Despite the spatial difference between the sites, both have high artifact counts, a rich but diverse artifact assemblage present in the domestic structures, and the same reliance on exotic tool

stones. This last point is important because, as others have noted, raw materials for making stone tools are ubiquitously distributed across the landscape in the Wyoming region (Larson and Kornfeld 1997:6). This being the case, it is interesting that groups in the mountains and basins chose to use the same nonlocal lithic raw materials in their residential sites. We have recently carried out limited testing at the Shirley Basin Lodge site, which further confirmed this pattern of nonlocal stone material use.

From the available data, the Shirley Basin Lodge site indicates that families were practicing the same residential pattern, with coeval radiocarbon dates, and the same technological suite as the residents of High Rise Village. The only significant differences between the sites are the subsistence strategies, which I think can be explained through seasonality. The current interpretation of the faunal assemblage found at Shirley Basin suggests an early spring/summer kill (Zeimens 1975:71), but it is uncertain how this conclusion was reached. Although slightly earlier in prehistory, work done at the nearby Muddy Creek bison corral indicates late fall/early winter bison kill episodes, indicating that the basin was used for large hunts in the winter months (Kornfeld et al. 2010). Clearly there is need for more work explicitly looking at the seasonal usage of both the high country and the associated basins during this late period of prehistory. Considering the current data, I think future work should test two scenarios focused on the seasonal usage of these residential sites. In the first scenario, the lower river basins had large spring bison hunts that provided groups with the necessary food to move into and successfully exploit high alpine environments in the late summer months. In the second scenario, the alpine environments provided the necessary food resources for groups to migrate downslope to bison habitats where groups could winter for long periods at a time and hunt bison. Given the high diversity and frequency of artifacts in the assemblages, the substantial architecture, and the obvious overlap of use in nonlocal lithic sources, I think that testing these scenarios will help partially explain the formation of these unique sites.

Discussion

Unlike the Great Basin (see Thomas 2014), there are currently no unquestionably Late Archaic (ca. 1,700 YBP) villages found in the high-altitude alpine environments of Wyoming. Dave Thomas (2014) demonstrates a different picture for the Toquima Range of Nevada (cf. Bettinger 1991). It appears that entire family groups slowly took to the higher elevations of the Great Basin to escape drought conditions in the lower basins. But the question is still wide open for researchers investigating the alpine villages in Wyoming: Why did these families decide to live in the "highest place in their world" (Thomas, this issue), and when did this happen? In answering these questions, we must also acknowledge the village sites of the lower basins. The overlap seen in the upland and lowland sites is too striking to ignore and must be examined before any origin of development is privileged (cf. Bamforth 2011).

The range of mobility represented in the artifact assemblage in the Wyoming villages indicates compelling patterns of overlapping land use. The residents of the Wind River Range and the Shirley Basin villages utilized local tool stones, but they also used the same exotic chert and obsidian sources. The quantities of these more exotic materials are not dramatic, but are also not insignificant given the distances from the sources (especially in the case of the Shirley Basin Lodge site). More curious is that these exotic tool stones are not found in every domestic dwelling, indicating differential or preferential access to raw materials used for tools. Also plausible is that these materials indicate land-use patterns, or similar trade partners. Another point to make here is that the reliable radiocarbon dates from both sites place at least some of the occupations into a period of equestrian usage (Eckles et al. 1994). If these groups had horses during the later portion of village occupation, this could explain the nonlocal tool materials. The long-distance transport of stone would have been made easier with horses, an issue which needs to be addressed as a possible explanation for the record seen in both villages.

The physical effects of high altitude are very real (Beall 2006), but the environment associated with the elevation is important. That is to say, 3,300 m in the Wind River Range is not 4,500 m on the Tibetan Plateau, 3,700 m on the Andean altiplano, or 3,500 m on the White Mountains. These elevations represent a diversity of environments, and human groups adapted successfully to each one. The high-altitude environment of the White Mountains of California or Mount Jefferson in Nevada is closer in comparison to that of the Shirley Basin of Wyoming; dry sage flats with limited water. But unlike the sites in the Great Basin, groups in Wyoming used the same cultural adaptations in an entirely different way. I think it is fair to say that our current understanding of the relationship between the sites in California, Nevada, and central Wyoming is poor. What we do know is that the same technology is present over a geographically large area and is associated with similar residential patterns. It is easy to project these similarities over a large area, but before we assume such a large link, we have to understand the local archaeological record. In what is now Wyoming, human groups

hunted bison at 2,258 m; they used materials from the mountains as well as from adjacent basins; and they also quarried stones for arrowheads and groundstone directly next to where they built large stone dwellings. Almost 312 km (194 miles) away, a very similar type of residential site is seen in the mountains at the same time. Work is currently underway to test whether these two sites are related; if they are not, it is going to be hard to support a link that stretches to California.

The presence of coursed residential structures indicates a level of permanence at both the Shirley Basin Lodge site and the High Rise Village residential sites. Adams (2010) suggests that the subsistence base exists in alpine environments to allow for daily as well as long-term caloric needs. The basin sites like Shirley Basin offer calories in the form of bison, which was a substantial portion of the subsistence base on site (Ziemens 1975). The efficient utilization of diverse environments could offer terrestrial groups the ability to practice reduced residential moves. We need to test whether these sites were part of an efficient widespread adaptation that allowed groups to exploit a diversity of environments. In doing so, this future research will acknowledge that there are real physical limitations imposed on groups in high-altitude sites in western North America, while furthering our understanding of the ways that these groups mitigated these effects and possibly flourished in the alpine environment.

Conclusion

George Frison first excavated the Shirley Basin Lodge site almost 45 years ago, and at the time it was a difficult site to explain. The site had large coursed stone wall structures that contrasted starkly with the clusters of expedient stone circles that regional archaeologists associated with residential sites. It did, however, have an artifact assemblage thought to be diagnostic of people who came from the Great Basin of North America (Ziemens 1975). In some ways, the interpretations of the site have not progressed much in the 45 years since the site's discovery. Many researchers see the site as associated with groups in the Great Basin, and that is where the interpretations end (Kornfeld et al. 2010). My contention here is that significant additional research will be necessary to further develop our understanding of relationships between lowland occupations like the one in the Shirley Basin of Wyoming and those of nearby alpine contexts.

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FRED E. COY, JR.
1923–2014

Dr. Fred E. Coy, Jr., passed away in Louisville, Kentucky, on Friday, January 10, 2014. Fred, who was an orthopedic surgeon, played a crucial role in revitalizing the study of the Native American rock art of eastern North America through field research in his home state of Kentucky, through his many presentations and publications, and through his role as the founder of the Eastern States Rock Art Research Association (ESRARA).

Fred was one of the best examples of the way an avocational archaeologist can make significant contributions to the study of archaeology. His many contributions in this regard were recognized late in his career when he received the prestigious Klaus Wellman Award from the American Rock Art Research Association (2002) and the ESRARA Lifetime Achievement Award (2003), among other honors.

Born in 1923, Fred served as a U. S. fighter pilot during World War II, flying 130 missions over occupied Europe, for which he was awarded the Distinguished Flying Cross and the Air Medal with 20 oak leaf clusters. In 1950, he obtained a Doctor of Medicine degree from the University of Louisville, specializing in gastric physiology and later in orthopedic surgery. During the same time, he worked with Diane Fossey, then an occupational therapist, at Kosair Hospital. By chance, Fred acquired two tickets to a Distinguished Professor Lecture to be given by Louis Leakey at the University of Louisville and invited Diane to go with him. Although she had met Leakey several years earlier, her chance reencounter with him in the early 1960s, thanks to the ticket provided by Fred, resulted in an invitation for Diane to accompany Leakey to Africa to study mountain gorillas.

Fred's interest in Native American rock art began in 1962, when he observed a group of prehistoric petroglyphs while on a trip to the Rough River in Kentucky. Over the next two decades, this chance encounter led Fred to begin an extensive program of field and archival research into the rock art of the state. Fred, along with three co-authors, synthesized the results of their research into an outstanding volume entitled *The Rock Art of Kentucky*, published by the University Press of Kentucky in 1997, which remains one of the best examples of a regional rock art study produced to date,

By the early 1990s, Fred also recognized the need for a regional conference though which rock art researchers working in the east could share the results of their research. This led Fred to organize and co-chair the 1993 Eastern States Rock Art Conference at Natural Bridge State Park in Kentucky. The need for continuing dialogue among such researchers led to the formation of the Eastern States Rock Art Research Association (ESRARA) in 1996, with Fred as the first president (1996–2000). The success of Fred's efforts to revitalize the study of Native American rock art in the east is demonstrated by the numerous articles and books on the subject produced by ESRARA members working in Illinois, Kentucky, Tennessee, Missouri, Alabama, South Carolina, New England, and other areas of the east over the past 30 years.

Fred and his wife Emily were fixtures at professional archaeological conferences for many years and visiting with them was always one of the highlights of any of these meetings. In addition to presenting professional papers, Fred also liked to give humorous presentations. I and others still remember the time at the 2001 SEAC meeting in Tennessee when Fred showed a absolutely hysterical episode of "Mr. Rogers Neighborhood" in which Mr. Rogers went to look at a rock art site in Ohio. I can guarantee that more people remember Fred's showing of that video than any other presentation they may have attended at those same meetings.

Even into his late 80s, Fred still actively visited as many rock art sites as he could in different parts of the Eastern Woodlands. This year's ESRARA meeting at Natural Bridge State Park in Kentucky was specifically intended to honor Fred, as well as to mark the 30th anniversary of the organization that he helped found. In closing, all I can say on the part of those of us who had the pleasure to know Fred over the past 50 years is that his presence will be sorely missed. This conference, as well as all future meetings, simply will not be the same without him. To his wife Emily, who survives him, we extend our deepest sympathies.

Mark J. Wagner
Acting Director
Center for Archaeological Investigations
Southern Illinois University Carbondale

documents. When the THC receives a request, staff has a specified amount of time to compile the relevant documents. Staff must review documents to determine what documents must be released and what documents may be subject to an exception to disclosure. If the THC determines that an exception may apply, the documents are then sent to the Attorney General of Texas to determine what can and cannot be released. During the many open records requests made by Dr. Taylor, hundreds of pages of documents were released to him. Any withheld documents were determined to be excerpted by the Attorney General of Texas. Dr. Taylor was free to appeal this decision by a regulatory process set up for this purpose.

Providing false or misleading information to the Texas Legislature is a Class A misdemeanor punishable by a year in jail and a hefty fine. While this statement by Dr. Taylor is true, it is unclear whom he is accusing of violating state law. Is he charging that the staff of the THC are guilty of a Class A misdemeanor for seeking the protection of all human burial sites in Texas, even those on private land? We are surprised and disappointed that Dr. Taylor would submit such vague and unsubstantial charges for publication in the *SAA Archaeological Record*.

Since the passage of H.B. 2927 and the promulgation of the implementing rules, Dr. Taylor has worked extensively with landowner rights groups in Texas to seek repeal of the bill. Repeal would once again make looting of unmarked graves, mostly Native American, fair game. We sincerely hope that this does not occur. Instead, as we have offered to Dr. Taylor in the past, we would hope we could work together to provide even better protection for human remains, whether through additional changes to the Health and Safety Code or to the rules that implement the statute. When Representative Howard passed H.B. 2927 in 2009, we fully anticipated that this achievement was only a first—albeit momentous—step in the protection of all burials in Texas, regardless of affiliation. We are ready to continue this effort.

Patricia A. Mercado-Allinger
Archeology Division Director and State Archeologist, Texas Historical Commission

Jim Bruseth
Former Archeology Division Director, Texas Historical Commission

nubbins and in honorable retirement). Since those formative days, the SAA remains a constant in my career, helping to maintain currency, challenge assumptions, key in to market changes, connect with colleagues, and reach out to new opportunities in research and employment.

In the near future, I plan to expand my volunteer experience through service on SAA publications and potentially membership on the Board of Directors. As a mixed-race archaeologist, I value the doors that volunteering has opened, and I hope that the twenty-first century brings ever more diverse faces to the SAA in its next century of advancing archaeology in America and worldwide.

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CALENDAR

2014

April 18

Deadline for acceptance of grant applications for the SRIF Dissertation Research Grants in Historic Preservation. For more information on applying, see http://www.srifoundation.org/ed_opp.html.

April 23–27

SAA's 79th Annual Meeting will be held on April 23–27, 2014 in Austin, Texas. Annual Meeting information is available on SAAweb, www.saa.org.

May 23–25

TAG 2014 will be in Urbana-Champaign from May 23–25. The theme is "Convergence," as theory and life are a convergence of thought and experience. For more information see www.regonline.com/tag2014.

August 8–10

SAA's Conferencia Intercontinental will be held on August 8–10, 2014 in Lima, Perú. For information on the conference, visit SAAweb, www.saa.org.