New Mexico Archaeology

The Newsletter of the Friends of Archaeology

Museum of New Mexico Foundation www.nmarchaeology.org February 2022

From the Director

Education: Need, opportunity, and challenge

Eric Blinman, Ph.D.
OAS Director

Within the past few years, New Mexico has seen increasing momentum to improve the quality of education, particularly in the presentation of multicultural history. Although serving minority communities is the focus of most initiatives, the benefits of shared understandings transcend community boundaries. Students in Clayton, Jal, Farmington, and Silver City need as rich an exposure to multicultural history as do students in Dulce, Acoma, and Magdalena. Although this discussion does focus on Native American communities, the underlying principles apply globally. The quality of life in New Mexico will improve through strengthening individual community identities while simultaneously building empathy between communities.

OAS has more than 30 years of experience in education outreach, including outreach to Native Americans. We have witnessed firsthand the potential of heritage education to strengthen and enrich cultural identities. Most of our programs, especially the sharing of ancient lifeway knowledge, have been explicit collaborations with tribal elders and teachers.

Our past Native community outreach has been built on personal relationships (which is a good thing), but that strength also has been limiting. This year we will be stretching our envelope. We have been honored with a grant from the Futures for Children Legacy Fund specifically to expand programming initiatives with Native American

See **Director**, on Page 6.

By Shelby A. Jones
and Marvin W. Rowe

University of Chicago chemist, Willard F. Libby, published the first radiocarbon (^{14}C) ages in the Dec. 23, 1949, issue of *Science* with a "curve of knowns." The Nobel Prize Committee praised Libby's "method to use carbon-14 for age determinations in archaeology, geology, geophysics, and other branches of science," awarding Libby the Nobel Prize in Chemistry in 1960. In the words of one of the scientists who nominated Libby, "Seldom has a single discovery in chemistry had such an impact on the thinking in so many fields of human endeavor. Seldom has a single discovery generated such wide public interest."

As the principle technique used to establish chronologies for dates over the last 50,000 years, ^{14}C dating has revolutionized archaeological research since the 1950s. In the words of archaeologist Brian Fagan, radiocarbon dating is "a spectacular find from the laboratory of a chemist, not the dig of an archaeologist. Its impact is so great that we list it separately: the single greatest archaeological discovery of the [twentieth] century." As a very personal aside from Rowe: "Ernest C. Anderson was Libby's first Ph.D. student in radiocarbon dating. When I started my scientific career at the Los Alamos Scientific Laboratory (now Los Alamos National Laboratory) 62 years ago, Dr. Anderson, along with physicist Dr. Marvin Van Dilla, were my first supervisors. Little did I know then that 40 years after Anderson's pioneering dissertation work, I would follow in his footsteps into ^{14}C research."

In the beginning, ^{14}C dating assumed that the production of ^{14}C in the Earth's atmosphere was constant over time and thus the ratio of ^{14}C to ^{12}C was predictable. That assumption was very quickly found to be only approximately

See **TV**, on Page 7.

Volunteers Needed

OAS and FOA are looking for volunteers to participate in the following opportunities:

FOA is looking for dedicated board and activities committee members to help guide Friends of Archaeology activities and support the mission of the Office of Archaeological Studies, which includes archaeological research, education, and community outreach. Contact Melissa Martinez at melissaj.martinez@state.nm.us.

Yucca fiber processing for the education program; cleaning and washing artifacts. Contact Mary Weahkee at mary.weahkee2@state.nm.us.

Organizing OAS printed journals and donated books for FOA sale and recycle. Contact Shelby A. Jones at saj012@ucsd.edu.

Implementing and maintaining the CNMA ethnobotanical garden and acquiring local plants, trees, and seeds for the garden. Contact Mollie Toll at mollie.toll@state.nm.us.

Illustrator Wanted

OAS is looking for a children's book illustrator who can assist FOA supporters, Paula and Jerry Sabloff, in their dream of making their children's text into an illustrated, publishable book. The book follows Nina and Elena on a visit to their grandfather's Mayan archaeological work site. It will have approximately 46 illustrations. For info, contact Melissa Martinez at melissaj.martinez@state.nm.us.

A New Perspective

MIAC exhibit highlights isomeric design elements in ancient Pueblo pottery

By Melissa Martinez

I fell backwards into the profession of graphic design fresh out of college. I graduated with a degree in humanities and, as an alternative to working in the local hospitality industry, I found a job as a secretary in the newsroom of a daily newspaper. Fascinated by the graphic design processes I saw going on all around me, I transferred to the copy and design desk as soon as I could.

Though my education in design followed more of a learning-by-doing approach, I got pretty good, earning national recognition on several occasions. Nonetheless, design for me was always more of an instinctual process than an intellectual one, with little thought to the preciseness of picas or point size or kerning.

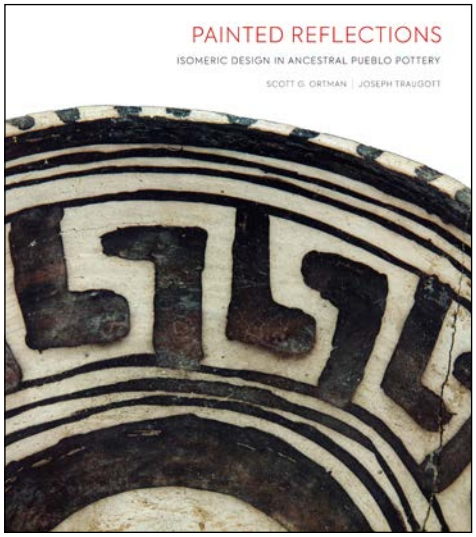
This came to mind during my most recent trip to the Museum of Indian Arts and Culture (MIAC) here in Santa Fe, where I stopped in to see the recently installed exhibit: Painted Reflections: Isomeric Design in Ancestral Pueblo Pottery.

Based on a book of the same name by Scott G. Ortman and Joseph Traugott, this exhibit presents examples of Pueblo pottery from throughout the Southwest and is deeply focused on the intricately painted geometric designs on each piece. The exhibit features several complete and reassembled vessels dating from today to as far back as 850 CE.

Ortman and Traugott examine what they call "the hidden source of the pottery's appeal," which they believe can be ascribed to a process they call "isomeric design."

According to the book, "the concept of isomeric design is based on an analogy with isomers in chemistry, which are chemically identical compounds that have mirror-image structures. In Ancestral Pueblo painted pottery, isomeric design is the use of paired forms that can be perceived as reversible."

The designs almost resemble Escher-style optical illusions. The interplay of



Painted Reflections, a new exhibit now on display at MIAC explores isomeric design in found in Pueblo pottery.

black-on-white or white-on-black allows viewers to change their perception by focusing instead on the abstract design present on a piece. Previously overlooked white space becomes a star or a series of z-shaped elements. Mirror and reverse images become more apparent. Similar elements can be seen in alternating black-on-white motifs, like checkerboards and individual and interlocked spirals, and in the relationship between hachured and unpainted shapes. The isomeric effect is also seen in repeated forms, like triangles, zigzags, and parallel lines.

While I've been an admirer of Pueblo pottery most of my life, I never really stopped to think how such beautiful designs were created. This exhibition posits that a great deal of thought, and advanced planning, went into the decorating process.

Most fascinating to me were the step-by-step depictions of the painting process. In one instance, the motif started out simply, as the painter divided the surface of a bowl into four sections. A simple geometric design was created, and then reproduced, in each of the four sections of the bowl.

See **NEW**, on Page 6.

Office of Archaeological Studies

The Office of Archaeological Studies (OAS) was the first museum program of its kind in the nation. OAS staff conducts international field and laboratory research, offers educational opportunities for school groups and civic organizations, and works to preserve, protect, and interpret prehistoric and historic sites throughout New Mexico.

Friends of Archaeology

The Friends of Archaeology is an interest group within the Museum of New Mexico Foundation that supports the OAS. To join the FOA, you need only become a member of the Museum of New Mexico Foundation and sign up. Visit www.nmarchaeology.org for information. We're also on Facebook; just search for "@FriendsofArchaeology."

Mission Statement

The mission of FOA is to support the OAS in the achievement of its archaeological services mandate from the State of New Mexico through participation in and funding of research and education projects.

Friends of Archaeology Board

Saturday, April 23, 2022

Explore Upper Pecos Valley this Spring

The Upper Pecos Valley has seen some itinerant migration or settlement for at least 11,000 years. The valley has provided suitable habitation possibilities, from Paleoindian hunter camps to the first pithouse dwellings (ca CE 800) to pueblo villages (CE 1200 on). By CE 1400, a major pueblo site (focus of the current National Monument) became the center of trade and culture for the region, but the smaller pueblos continued in use through the early Spanish occupation, although the population declined considerably after 1540. The last inhabitants persisted until the 1830s, when they relocated to Jemez Pueblo.

This FOA trip starts at 9 a.m., at the Pecos National Historic Park Visitor Center. The focus of this trip will be a 1½ mile round-trip hike (uneven but not strenuous and may require small stream crossing) to Forked Lightning Pueblo, first excavated by A. V. Kidder during his 1915 to 1921 fieldwork in the larger Pecos area. Forked Lightning was occupied in the 1200s and is an excellent example of Pecos development. Dr. Jeremy Moss, archaeologist and expert on the Pecos area and author of numerous articles in the field, will lead us on the hike.

Back at the visitor center, there will be a special tour of the center's pottery collection and the Kidder collection by Curator Rhonda Brewer. The tour will be broken up into smaller groups to accommodate social distancing.

After lunch (participants should bring their own lunches; drinks and snacks will be provided), those who wish can take the 1½ to 2 hour self-guided tour of the Pecos Pueblo and Mission.

This trip will depend on the proviso that COVID-19 regulations permit us to gather at the time. Participants will be asked to drive their own vehicles to and from the site and to wear masks when in a group. Proof of vaccination will be required at Pecos check-in. The cost for this tour will be $90 for members and $100 for non-members. Attendance will be limited to 12 people.

Sign-up and payment can be completed at https://friendsofarchaeology.eventbrite.com. ❖

After lunch, participants will be invited to take a 1½ to 2 hour tour of the Pecos Pueblo and Mission.

Details

$90 for FOA members. This trip will be limited to 12 participants in socially distanced groups of five or less. Proof of vaccination will be required at Pecos check-in. This trip will be subject to the discretion of DCA public health orders.

Form & Function

Volunteers helping archaeologists understand pottery

One of the fun challenges of archaeology is understanding form and function from the features and artifacts left behind that have managed to survive to excavation. This is especially true for pottery, where form (aka the shape and size) and technological design do not always have modern analogs for understanding their function. Understanding the varied forms and technologies of past pottery often falls into the realm of experimental archaeology. The experiments aim to fill in the gaps of our knowledge of the archaeological and cultural record through reconstruction and testing different functional models. It often requires a lot of time, energy, and resources, and as such isn't regularly a part of enterprise archaeology. But it has become a part of the OAS's repertoire of projects through the dedicated work of two volunteers.

Cristi Branum and Lydia Sanford, have been steadfast volunteers in the pottery laboratory, using the principles of experimental archaeology to understand the form, technological design, and function of two types of unique pottery – Micaceous wares and Chaco cylinder jars. Starting in 2016, these two potters

Cristi Branum, above, with micaceous pottery ready to be fired. Top left, Lydia Sanford, above, works on a pot at OAS.

honed their micaceous clay skills and created dozens of micaceous clay pots of various compositions. While the form of all the pots produced are the same, the quantities and types of clay, temper, and mica varied. The idea is to see how these varied composition pots respond to different stressors and understand why mica became such a prevalent inclusion in the pottery from the northern Rio Grande. The dozens of pots have been drying for far longer than any past piece of pottery would

See **FORM**, on Page 5.

Form

Continued from Page 4.

have experienced, thanks to delays from the COVID-19 pandemic that have prevented the firing of these beautiful works of art outside in a fire, rather than an electric kiln.

In the meantime, these wonderful volunteers are now assisting Dr. Patricia Crown (UNM) in a partnership with OAS to create Chaco style cylinder jars. This form of pottery is found almost exclusively in Chaco Canyon and especially at Pueblo Bonito. Their unique shapes and scarcity have prompted numerous studies, including Dr. Crown's discovery of theobromine, a residue of chocolate, within some jars. Chocolate played an important social role in ancient Mexico, which implies that these cylinders may have served a similar role in Chaco Canyon ceremony. But there are still many outstanding questions about how these cylinders were used, so when Dr. Crown approached OAS asking questions, the opportunity to make experimental cylinders was leaped upon!

Lydia and Cristi have been working to replicate the form of these cylinders, from photos in the original excavation report, from Dr. Crown's publications, and from published papers of OAS's own Dr. Wolky Toll. While the constraints of the COVID-19 pandemic continue to hinder their progress, they have been moving forward! These reconstructed examples of this enigmatic pottery form can be used (and even broken) in efforts to answer some of the questions that cloak these cylinders in mystery.

We are beyond grateful to Cristi and Lydia for their dedication to these incredibly important experimental archaeology pottery projects, in addition to their devoted friendship and support. Thank you! ❖

Looking for Us?

If you're planning a trip to OAS, we're at 7 Old Cochiti Road, off Caja del Rio Road. We're the first building on the left, just before the animal shelter.

Susan M. Moga: 1948–2021

OAS mourns passing of Susan M. Moga

OAS archaeologist Susan M. Moga passed away Nov. 13, 2021, following a brief illness.

Raised as a Green Bay Packer fan in the Milwaukee, Wisconsin area, Susan attended the University of Alaska in Anchorage and the University of Oregon in Eugene, where she graduated with a bachelor's degree in anthropology.

Susan's archaeological career began in 1981, when she served as a volunteer survey crew member for the State of Alaska Parks Division's Blueberry Campground project. She then served as a curatorial assistant at the Oregon State Museum of Anthropology from 1983 to 1986.

Other early work included the documentation and cataloging of fauna, lithics, and prehistoric and historic artifacts in projects throughout the state of Oregon. She also worked as an archaeological assistant, recording petroglyph sites in the White Rock/Los Alamos area, in 1987.

Her career at OAS began in 1988, when she worked as an excavator on the La Plata Highway Project in San Juan County. More recently, Susan served as crew chief on the downtown Santa Fe civic center project, the Madrid Historic District mines project, and the reconnaissance project at the Eugenie Shonnard House in downtown Santa Fe, among many others.

Susan was known at OAS for her frank and outright sense of humor and her strong work ethic. She could often be found working on projects around town, day or night, in summer heat or freezing cold. Her considerable knowledge of historic objects was one of her many talents that will make her irreplaceable.

She was a private person whose love for archaeology was surpassed only by her love of the outdoors and of long walks with her dog, the sweet but highly energetic Stella. Susan was preceded in death by her longtime partner, artist Kent Kraus. ❖

OAS scientist receives NSF award

OAS faunal analyst Caitlin Ainsworth was recently awarded a National Science Foundation Doctoral Dissertation Research Improvement Award for $9080.00. Her proposal is entitled "Between Wild and Domestic: Intermediate Bird Management at Paquimé and Pottery Mound," and focuses on the use and management of birds in the US Southwest and Northwestern Mexico prior to the arrival of European colonists.

Caitlin Ainsworth

"My interest lies in exploring the gray area between wild and domestic, an area that archaeologists sometimes refer to as low-intensity management," she said. "Managed birds include the ones people kept in and near their homes. These captive birds do not meet any of the classic definitions of a domesticated animal, yet they were undoubtedly involved in nuanced and lasting relationships with humans. A desire to better understand the process of captive bird-rearing in the past, and the dynamics of these and other human-bird interactions that took place in human settlements, led me to two archaeological sites famous for their birds— Pottery Mound Pueblo in New Mexico, and Paquimé, Chihuahua, Mexico."

The goal of this project is to establish how bird biology and human social organization together influenced human-bird interactions and to use this information to understand when and why birds were kept in captivity. Her analysis of bird bones from the two sites will focus on recording of skeletal portion, completeness, modifications, skeletal pathologies, age, and sex. These data will be combined with the results of archival and ornithological research and used to reconstruct details of bird use and management at these sites, addressing the following questions: 1) Does a bird species' biological suitability for human management relate to how it was obtained or kept in the past? 2) Are the birds under human control used for different purposes than wild-caught individuals? ❖

Director

Continued from Page 1.

children. To fulfill the potential of the grant, we need to add new relationships to our existing network, which means quickly reaching out to communities that don't have prior experience with OAS.

Unfortunately, quick outreach is not necessarily easy. Through the decades we have worked to overcome Native American hesitancy due to negative stereotypes of archaeology. There is a valid historical basis for this skepticism. Archaeology originated as a colonial institution, and much of archaeology's contributions have been perceived as insensitive misappropriations of Indigenous histories. There is understandable resentment that Euroamerican social and governmental policies included systematic efforts to eliminate cultural competency and participation (glossed as the "boarding school experience"), and that now Euroamerican "archaeology" is being offered as part of a remedy.

But the problem with any stereotype is that it fails to accommodate the capacity for change and can inadvertently dismiss underlying value. To escape the stereotype, OAS promotes archaeology as an approach to understanding ancient and modern lifeways based on principles of human ecology, principles that are explicitly cross cultural. Archaeology is a suite of techniques for reconstructing past solutions to day-to-day needs as well as community adaptations to changing circumstances. Archaeology provides information on past environments and technologies, and we document the creative ways people have both survived and thrived in New Mexico. Archaeology is evidence-based and scientific in that our stories (reconstructions of the past) are intended to be continually tested, criticized, and revised. Although we aspire toward a goal of veracity in our reconstructions, we acknowledge that we may not achieve an accurate history at any point along the way.

We are already working with the Native American Community Academy in Albuquerque and with summer programs at the Pueblos of San Ildefonso and Zia. Our role is to serve as a source of content and inspiration, including but not limited to our ancient lifeways demonstrations. A human ecology perspective allows educators to bridge traditional classroom subjects while encouraging inquiry and imagination. How schools use the information and perspectives we can provide will be up to the teachers, administrators, parents, and community leaders. ❖

New

Continued from Page 2.

The design became increasingly complex as additional elements were added one section at a time until each appeared nearly identical.

While the approach to this topic is a new one, I wonder what the ancient Puebloan peoples might say about such an in-depth examination of their designs. I imagine that, while they recognized the beauty of their work and the work of others, they may have had little notion of the complexities, isomeric or otherwise, attributed to their creations by Ortman and Traugott.

Like me, they learned by watching others, then by doing. If asked to define their work, what would they say? Did each brush stroke have a distinct purpose? Or was design, for them, more of an instinctual process?

Painted Reflections: Isomeric Design in Ancestral Pueblo Pottery is on display at MIAC through March 12, 2023. ❖

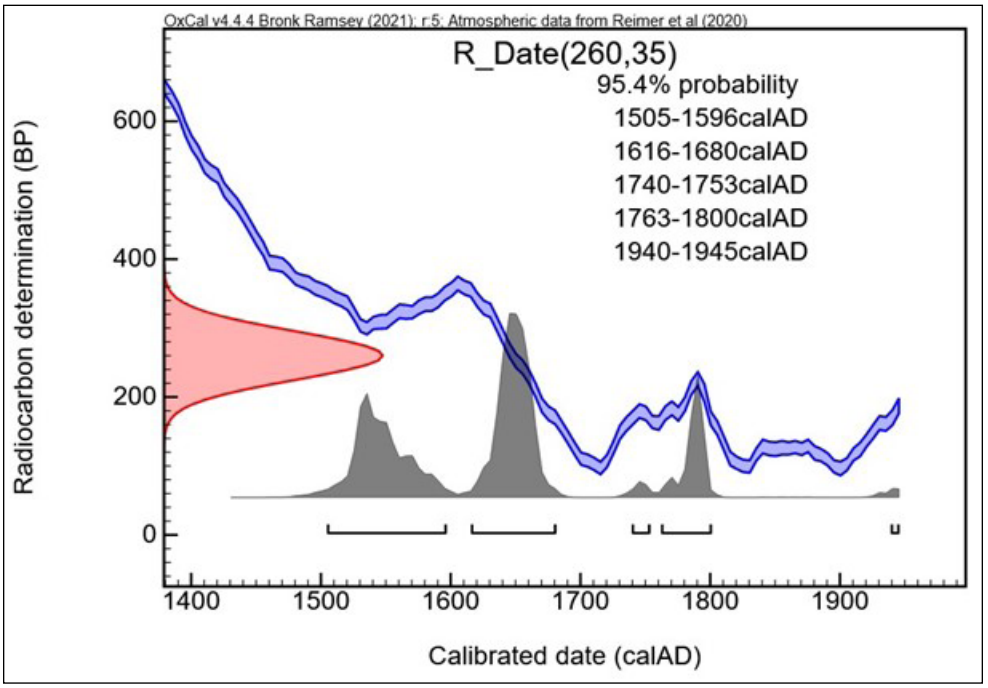
TV

Continued from Page 1.

true. ^{14}C production in the atmosphere naturally varies through time depending on external forces like the incidence of solar radiation. To accommodate this variation, scientists worked together to calibrate very accurate ^{14}C dates on materials of very well known age (i.e., tree rings during the past 5,000 years). This work is ongoing and results in the production of periodically refined calibration graphs constructed from ^{14}C dates versus the known calendar dates; these graphs and their respective data are used to calibrate ^{14}C dates into their calendric equivalent.

For the most part, the calibration curve has a straight, 45 degree line shape, but with many undulations, until about 1700. At that point the curve shape changes due to humans affecting the proportion of CO_2 isotopes in the atmosphere, artificially increasing the ^{12}C and ^{13}C isotopes with respect to ^{14}C through burning fossil fuels. The result of this anthropogenically influenced carbon ratio is that, from about 1700 until the mid-1950s, the calibration curve began to exhibit an undulating flat shape, which makes it incredibly difficult to discern one date from any others in that calendar age range. But, in 1954, humans influenced the carbon ratios yet again, this time in a way that is useful to ^{14}C dating.

The era of atomic bomb testing inserted enormous quantities of ^{14}C into the atmosphere very quickly, essentially doubling the ^{14}C atmospheric inventory at that time; this has permitted very accurate ^{14}C dates from 1954 to the present time. However, the precision and accuracy of dating young materials using ^{14}C will be short lived unless there are future nuclear detonations. Through time the natural processes of ^{14}C decay will return the ratio of ^{14}C:^{12}C in the atmosphere to equilibrium levels. Until then, this technique will continue to be of great use, especially in applications in forensic science, by providing birth and/or death determinations for people born/dying during 1954–2135 or so. And the popularity of this application can be seen in Hollywood, regularly—though not always in the most scientifically accurate manner.



Calibration curve of the mock radiocarbon date, 260 ± 35 years before 1050, the only radiocarbon date that yields a calendrical date of 1941.

As an example, on Dec. 6th, 2021, *NCIS: Hawai'i* aired an episode (S1 E9 – Imposter) that greatly exaggerated the accuracy of ^{14}C dating of human remains. The premise of the Pearl Harbor tribute episode was that a body was found washed into a small cave and buried beneath a few inches of sand and seaweed. Based on a brief evaluation of the clothes found on the remains, it was instantly recognized that the remains were likely old and the *NCIS: Hawai'i* field agents engaged in a short discussion.

NCIS agent Kai: "It's hard to tell how old, though."

Medical Examiner Carla Chase: "Actually, that is the easy part…We'll carbon date the textiles and bones as soon as we are back to the lab."

A few minutes later, the ^{14}C dating results were available, leading to a further discussion.

NCIS agent Kai: "Anyone want to guess how long ago?"

NCIS agent Lucy: "73 to 80 years ago."

NCIS agent Kai: "Carbon dating put them at that range."

NCIS agent Lucy: "Well, details of the trousers textile analysis says it's cotton. From what I can tell, this particular uniform was in use from the '30s to 1948. Except black shoes were more widely worn starting spring of 1941."

Although they made for an interesting and engaging episode, these conversations lack accuracy regarding ^{14}C dating in several ways. First, based on the conversations between characters, the timeline from finding the body to the receipt of the ^{14}C age date was less than a week, probably faster. This is a woeful underestimation of reality. High quality ^{14}C extraction and dating requires the sample to be 1) chemically pretreated, 2) submitted to an accelerator mass spectrometry (AMS) radiocarbon dating laboratory, presumably by mail, since there is no AMS lab in Hawai'i; and 3) measurement of the carbon isotopes by the AMS laboratory. Even rushed, this processed normally takes at least a month, usually longer. The bottom line: If OAS has been consulted about the radiocarbon dating of the trousers, we would have recommended against radiocarbon dating in favor of saving time, money, and energy by concentrating on stylistic textile analysis, as Agent Lucy did. Especially before 1954, textile style is far more accurate than radiocarbon dating ever

See **REAL**, on Page 8.

MUSEUM OF NEW MEXICO FOUNDATION
P.O. Box 2065
Santa Fe, NM 87504-2065

Real

Continued from Page 7.

could be.

Additionally, when Medical Examiner Carla Chase replies to Agent Kai's question of "How long ago?" with "That's the easy part…We'll carbon date the textiles and bones as soon as we are back to the lab." This is, in fact, not easy! The ^{14}C dating of cellulose (i.e., cotton textiles) is fairly straightforward, but ^{14}C dating of bone is notoriously difficult because bone is inherently porous and prone to contamination from carbon leaching into the bone matrix after death. No radiocarbon scientist would ever classify bone as easy. Nope. Never!

Further, there is no ^{14}C:^{12}C ratio that could yield a precise and accurate calibrated calendar date dating in the 1940s, let alone solely 1941, due to the flattened shape of the calibration curve. And we tested this! We put in dozens of ^{14}C dates (^{14}C:^{12}C ratios) into the internationally recognized calibration software. The only mock ^{14}C date that remotely could have resulted in a calibrated age date of 1941 is 260 ± 35 radiocarbon years before present (BP) and the range 1940–1945 was only one of five age range possibilities. But what surprised even us was that a mock ^{14}C date of 259 ± 35 years BP did not yield a usefully narrow a range, 1940 into the atomic bomb era. And ^{14}C date 261 ± 35 years BP does not overlap with 1941 at all! In practice, no AMS lab reports data to ± 1 year. These three dates would all be reported back rounded at 260 ± 35 years (BP).

While we did thoroughly enjoy the story of the episode, and the tribute to Pearl Harbor, we reject the premise that ^{14}C dating was useful to the storyline. It does not improve on the age estimate made through the observations of the Agent Lucy: "From what I can tell, this particular uniform was in use from the '30s to 1948. Except black shoes were more widely worn starting spring of 1941." Thank you Lucy for your wisdom. ❖

Make your mark on NM Archaeology!

Please consider supporting the Office of Archaeological Studies by making a gift to education or research by check, credit, stock, IRA rollover, or planned gift this year.

Your tax-deductible donation through the Museum of New Mexico Foundation will have a lasting impact throughout the state. One hundred percent of your donation will be directed to the Office of Archaeological Studies. No administrative fees are charged.

Give online:
www.museumfoundation.org/support-archaeology.

For questions about giving, or to donate, contact Lauren Paige, at (505) 982-2282, or via e-mail at lauren@museumfoundation.org