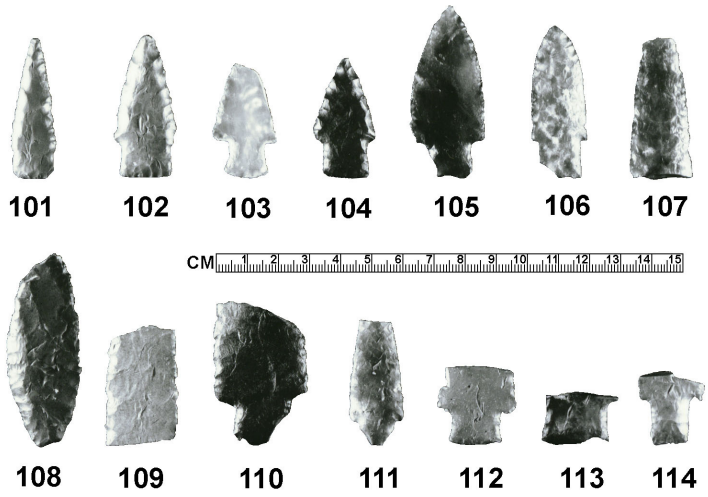
THE WYOMING ARCHAEOLOGIST



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THE WYOMING ARCHAEOLOGIST
VOLUME 44(2), FALL 2000

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WYOMING ARCHAEOLOGICAL SOCIETY
MEMORIAL GIFT or CONTRIBUTION FORM

Given by: Miss, Mrs., Mr., Ms., Dr. $ _____ (Amount)

_____

Name Last First Middle

_____

Address City & State Zip

Donor phone number ( ) _____

TYPE OF GIFT:

General Contribution [ ]

In Memory of: _____

Name City & State _____

In Honor of: _____

Name City & State _____

Specify where you would like your money to go _____
(e.g., Mulloy or Frison Scholarship Funds, The Wyoming Archaeologist, ???????)

Please make your check payable to THE WYOMING ARCHAEOLOGICAL SOCIETY
Carolyn Buff Executive Secretary/Treasurer 1617 Westridge Terrace Casper, WY 82604

OBITUARIES

GLENN SWEEM
1918-2001

Glenn Sweem, an original member of the Wyoming Archaeological Society, died May 8, 2001 in Sheridan. He is survived by his wife, Jean McKenzie Sweem, of Laramie; two sons, Glenn Jr., of Port Charlotte, Florida, and Craig of Sheridan, Wyoming; a daughter, Barbara Jean Barbour of Laramie; two sisters, Esther Kuchera of Sheridan and Lois of Arizona; three grandchildren; three step grandchildren; eight great-grandchildren; and two step-great-grandchildren.

Wyoming archaeology witnessed its first serious beginnings in the Sheridan, Wyoming area with the formation of the Wyoming Archaeological Society (WAS). Glenn Sweem was a strong supporter and member of the WAS established in 1953. Glenn was elected WAS president in 1959 and Sheridan Chapter president during the same year. Don Grey, physics instructor at Sheridan Community college, became a WAS member in 1958 and the team of Sweem and Grey provided a strong measure of help and guidance toward better archaeological field methods and analyses. Glenn and several other WAS members joined Dr. William Mulloy's excavations at Glendo Reservoir in 1957 and 1958 to better acquaint themselves with field methods.

Glenn and Dr. Ray Bentzen of Sheridan,, Wyoming, who immediately preceded Glenn as president of WAS, gave presentations on sites excavated by WAS at the Plains Conferences in Lincoln, Nebraska in 1958 and 1959. These reports were well received by the professionals and provided a strong measure of stature and support for Wyoming archaeology. As a result, Wyoming began to emerge as part of a regional repository of American archaeology.

Glenn was one of the few remaining personalities of the early days of Wyoming archaeology. His contributions to both Wyoming history and archaeology continued until a short time before his death. They have been substantial down through the years and should always be acknowledged and remembered.

Memorials may be made to the Big Horn Historical Society in care of Scott Burgan, P.O. Box 566, Big Horn, WY 82833.

George C. Frison
Professor Emeritus
University of Wyoming

PAULINE MCINTOSH YOST

Pauline McIntosh Yost of Tensleep died recently. She, along with Fred Hilman, Glaude Gettys, B urton Depue, Ray Bentzen, Bill Owsley and Margaret Powers, was one of the original signers of the incorporation of the Wyoming Archaeological Society in 1954.

George C. Frison
Professor Emeritus
University of Wyoming

BILL BARLOW

Bill Barlow of Gillette, Wyoming Bill passed away on March 29, 2001. Bill was a long-time member of the Wyoming Archaeological Society and instrumental in stimulating the organization of a chapter in the Gillette area back in the 1960s. He was tremendously interested in archaeological research, conducting some on his own and volunteering on several other projects. The Cache Hill site, which was reported in the last issue of the Wyoming Archaeologist, was a Late Prehistoric bison kill that he discovered and allowed us to test. He was a great friend to WAS and those of us who knew him will miss him greatly.

Mark E. Miller
Wyoming State Archaeologist

WYOMING ARCHAEOLOGICAL SOCIETY, INC. 2001 ANNUAL MEETING MINUTES

WYOMING ARCHAEOLOGICAL SOCIETY 2001 ANNUAL MEETING MINUTES

8:20 a.m. – Foster's Country Corner – Laramie, WY
Saturday, May 6, 2001

PRESIDING: Eva Peden, 1st Vice President

CALL TO ORDER: 8:20 a.m.

ROLL CALL AND CERTIFICATION OF DELEGATES: Secretary/Treasurer Carolyn Buff certified the voting delegates: Absaroka, Barbara and Stewart Keiry; Ancient Trails, Cher Burgess; Casper, Mavis Greer and Kerry Lippincott; Cherokee Trail, John and Sonna Swanson; Cheyenne, Nick Palmer; Fremont, Don Bailey and Leneigh Schrinar; High Plains, Mary Ann Coons; June Frison, Janice Baars and Mark Miller; Platte, absent; Rawlins, Bill Scoggin; Sheridan/Johnson County, absent; and Sweetwater, Bill Current.

Roll call showed ten chapters represented: Absaroka, Ancient Trails, Casper, Cheyenne, Cherokee Trail, Fremont, High Plains, June Frison, Rawlins, and Sweetwater. Not represented at the meeting was Platte County, and Sheridan/Johnson County.

MINUTES OF LAST ANNUAL MEETING April 22, 2001: Approved as printed in the spring 2000 issue of *The Wyoming Archaeologist.*

TREASURER'S REPORT: Secretary/Treasurer Carolyn Buff gave the treasurer's report showing a total net worth as of March 31, 2001 of $37,764.03, an increase of $3,420.37.

AUDITOR'S REPORT: Dewey and Janice Baars performed the annual audit and found the accounts to be in order. Motion by Mark Miller, second by Don Bailey to file the treasurer's report for audit. Carried.

EDITOR'S REPORT: Danny Walker: *The Wyoming Archaeologist* is one year behind in publication, due to a lack of manuscripts. Anyone can submit a manuscript—amateur or professional. Any information of interest is acceptable. There are currently enough manuscripts for the Fall 2000 issue. The project is now being done electronically, which cuts costs and time. This is also the last issue the Office of the Wyoming State Archaeologist will pay for.

LIBRARIAN'S REPORT: Danny Walker reported 10 exchange journals on file in the Wyoming State Archaeologist's Office. Material in the library is available to members to check out.

SCHOLARSHIP COMMITTEE: Carolyn Buff announced that the committee would have a lunch meeting to evaluate the scholarship applications and choose recipients.

SAA/COAS: Marcel Kornfeld: COAS is a component of the Society of American Archaeology, with a goal of communication with other societies. There are 27 societies in the SAA Council of Affiliated Societies. There is a newsletter published approximately once a year, with one copy going to the representative and one copy going to the secretary/treasurer. The SAA is working to provide information and links between society members and has asked for information from the societies. COAS is trying to get more societies to join and get more people involved.

COAS sponsors the annual poster contest and Wyoming's Archaeology Awareness Month poster received a first place again.

The 2002 SAA meeting will be in Denver.

CHAPTER REPORTS: The chapter reports will be printed in *The Wyoming Archaeologist* if there is enough room.

STATE ARCHAEOLOGIST'S REPORT: Mark Miller: The Scholarship Committee met on Friday night to revise the criteria for awarding scholarships. The committee recommended that the Society offer two scholarships each year if funding is available. It was suggested that the William Mulloy scholarship be made available to undergraduate applicants and the George Frison Scholarship be made available to graduate applicants. The GPA requirement was also raised. One of the two letters of recommendation must be from a professional in the field of anthropology/archaeology. The other can also be from anthropology/archaeology or from someone in a related field. Motion by Sonna Swanson, second by Bill Current to approve the scholarship criteria recommended by the committee. Carried.

Miller reiterated that the WAS is where other organizations are with respect to the increase in dues. The increase was absolutely necessary to pay for the printing of *The Wyoming Archaeologist*.

The Wyoming Archaeologist is made up of both professional and avocational manuscripts, with peer review being done only on professional submissions. All members were urged to submit material for publication.

The spring meeting for 2003 will be the 50th anniversary of the Wyoming Archaeological Society. It is hoped that the Sheridan/Buffalo Chapter can sponsor the annual meeting that year.

The Archaeology Awareness Month keynote address, by Dr. George Frison, will be held in Sheridan on Saturday, September 15. This activity will replace the fall workshop.

OLD BUSINESS:

Wyoming Archaeology Awareness Month: Mark Miller: Motion by Barbara Keiry, second by Janice Baars to donate $200. Carried. The focus of Archaeology Awareness Month this year will be Devil's Tower. Posters will be distributed at a later time.

Wyoming History Day: Carolyn Buff announced that no award was given this year because none of the entrants met the criteria.

Web Page: Danny Walker has received approval to include the Wyoming Archaeological Society information on the State of Wyoming's web page. Dewey Baars mentioned that information must be updated continuously in order to keep viewer's attention, thereby necessitating the need for chapter input. Chapters were asked to forward information to Danny to be included on the web site.

Friends of the George C. Frison Institute: Marcel Kornfeld announced that the latest bulletin is available. Marcel invited everyone to visit the new facilities.

Directory of current members will be published in *The Wyoming Archaeologist* if there is room. If no room and if chapters want the directory, they can contact the secretary/treasurer and the information will be forwarded. Barbara Keiry volunteered to do a directory.

***Lobbying efforts*:** Nick Palmer reported no action has been taken.

NEW BUSINESS:

Logo: Mary Lou Larson: A contest was conducted over the past year with ten designs submitted for a new logo: six from Cheyenne East High School, one from Wheatland, and three from Wyoming Indian High School.

Chapter Report Format: Dewey Baars will revise the Chapter Report and add an instruction sheet.

WYOMING ARCHAEOLOGICAL FOUNDATION: Janice Baars announced that the Foundation would have a breakfast meeting at 7:00 a.m. Sunday morning. The Foundation has entered into a long-term agreement with the George Frison Institute. The Hell Gap property has been leased to Albert Martin for grazing, water and hunting. A building has been constructed over part of the site and the road has been improved into the site. All members were invited to visit the site.

ELECTION OF OFFICERS: Barbara Keiry and Kerry Lippincott announced the slate of officers: President, Eva Peden; 1st Vice President, Margot Joy; 2nd Vice President, Don Bailey; and the three-year term on the Foundation, Barbara Keiry. Motion by Dewey Baars, second by Cher Burgess to cast a unanimous ballot. Carried.

2002 NOMINATING COMMITTEE: Don Bailey, chair, Dewey Baars and Danny Walker.

2001 SUMMER MEETING: Marcel Kornfeld announced that field work will be conducted at the Hell Gap site from May 28 through June 20. Motion by Tom Young, second by Sonna Swanson to hold the summer meeting at the Hell Gap Site on Saturday and Sunday, June 16 and 17. Carried.

2002 ANNUAL MEETING SITE: Will be in Riverton or Lander with the Fremont County Chapter hosting.

INTRODUCTION OF OFFICERS:

President – Eva Peden
1st Vice President – Margot Joy
2nd Vice President – Don Bailey
Wyoming Archaeological Foundation (term expires 2004) – Barbara Keiry.

ANNOUNCEMENTS:

Carolyn Buff mentioned that she has membership cards available.

The need for current names, address, phone numbers, and e-mail addresses from chapters was reiterated.

George Frison announced that Bill Barlow had died. Carolyn said that she had sent a donation to the Rock Pile Museum in his memory.

Connie Robinson is the author of the art work on the meeting brochure and has done much of the work in Frison's books. Motion by Mark Miller, second by George Frison that we give her a special Golden Trowel Award. Carried.

ADJOURN: 9:38 a.m.

BANQUET: Dr. Payson Sheets presented the banquet address, "Following in Their Footsteps: Remote Sens-

ing, Tombs, and Footpaths in Ancient Costa Rica."
GOLDEN TROWEL AWARD: Cher Burgess
LOGO WINNER: Matthew Lubeck of Wheatland. He will receive a one-year membership to the Society and a $100.00 savings bond.

/s/ Carolyn M. Buff
Executive Secretary/Treasurer
/s/ Eva Peden, President *pro tem*
1st Vice President

WYOMING ARCHAEOLOGICAL SOCIETY, INC. SCHOLARSHIP COMMITTEE

MINUTES – May 6, 2001
PRESIDING: Carolyn Buff, Chair
PRESENT: Dewey Baars, Carolyn Buff, Mary Lou Larson, Mark Miller, Barbara Keiry, Eva Peden, and guest Stewart Keiry.
Motion by Mark Miller, second by Eva Peden to award the Frison Scholarship to Molly Boeka, and the Mulloy Scholarship to Alison Hofbauer, both in the amount of $350. Carried.

/s/ Carolyn M. Buff
Carolyn M. Buff
Scholarship Committee Chair

AUDITING COMMITTEE REPORT

March 31, 2001
In compliance with the bylaws, the Auditing Committee has reviewed the Treasurer's books and records for the Wyoming Archaeological Society, Inc. for fiscal 2000.

AUDITING COMMITTEE SUMMARY

March 31, 2001
The Wyoming Archaeological Society, Inc. checking account number is #######-##, the savings account number is #######-##, the money market account number is #######-##, and the certificate of deposit account number is #######-## at the Natrona County School Employees Federal Credit Union, 900 Werner Ct, #100, Casper WY 82601.
Balance on hand March 31, 2001 - $34,343.66
Receipts:
Interest Earned - $1,560.90
Deposits - $7,468.00
Disbursements - $5,608.53
Balance on hand March 31, 2001 - $37,764.03
Includes 0 outstanding check(s) for $ _____, _____ to _____

Audited and found correct.
/s/ Dewey Baars – 05/05/01
/s/ Janice Baars – 05/05/01
/s/

MEMBERSHIP SUMMARY

Total memberships as of March 31, 2001 - 243 (down from 369 in 2000 – a decrease of 126)
Absaroka = 20 family, 6 single
Ancient Trails = 3 family, 4 single
State Archaeologist = 2
Associate = 35
Casper = 5 family, 11 single
Cheyenne = 3 family, 4 single
Cherokee Trail = 13 family, 9 single
Dept State Parks/Cultural Resources = 2
Exchange = 10
Fremont County = 9 family, 9 single
Honorary = 18
High Plains = 1 family, 6 single
Institutional = 33
June Frison = 7 family, 10 single
Platte County = 0
Rawlins = 0 family, 5 single
Sheridan = 0 family, 6 single
Sweetwater County = 0

Chapters = 12 (2 inactive)
Of Chapters: Single = 70; Family = 61

WYOMING ARCHAEOLOGICAL SOCIETY, INC.

Treasurer's Report for Fiscal Year Ending March 31, 2001

CHECKING ACCOUNT - NC SCHOOL EMPLOYEES FEDERAL CREDIT UNION	**INCOME**	**EXPENSES**	**BALANCE**
Beginning Balance	$ 2,258.07		
Deposits	$ 6,669.50		
Interest Earned	$ 28.60		
TOTAL INCOME - CHECKING			$ 8,956.17
EXPENSES			
Sweetwater Chapter - Overpayment		$ 6.00	
Builder's Mart - Trowel		$ 12.99	
Merback Awards - Trowel Engraving		$ 19.39	
Wyoming Archaeological Foundation - Annual Payment		$ 409.50	
Dewey Baars - Petty Cash - Editor		$ 50.00	
Craig M Lee - Scholarship		$ 300.00	
David Byers - Scholarship		$ 300.00	
Robyn Watkins - Scholarship		$ 300.00	
Chris Finley - Bradley Lunch		$ 11.86	
Bruce Bradley - Honorarium/Air Fare		$ 712.00	
Absoraka Chapter - Student Registrations		$ 81.00	
Holiday Inn - Bruce Bradley Lodging		$ 105.84	
Rahel Graphic Design - Wyoming Archaeology Awareness Month		$ 550.00	
Withdrawal - Mailers/Labels		$ 100.00	
Casper College - Stamps		$ 33.00	
USPS - Bulk Permit		$ 250.00	
Kinko's - Wyoming Archaeology Awareness Month		$ 22.50	
David Hurst Thomas - Wyoming Archaeology Awareness Month		$ 400.00	
SAA - Dues		$ 30.00	
Alzheimer's Association - Winnie Belz Memorial		$ 25.00	
Wyoming Press Association Advertising Service - Wyoming Archaeology Awareness Month		$ 300.00	
Casper College - Postage		$ 4.85	
David Hurst Thomas - Wyoming Archaeology Awareness Month		$ 706.96	
Wyoming Council for the Humanities - Grant Funds Not Used		$ 114.04	
Checks		$ 39.00	
Casper College - Stamps		$ 6.60	
USPS - Bulk Permit		$ 100.00	
Casper College - Stamps		$ 34.00	
Ebsco Subscription Service - Overpayment		$ 25.00	
Wyoming Secretary of State - Corporation Tax		$ 25.00	
Casper College - Stamps		$ 34.00	
TOTAL EXPENSES		$ 5,108.53	
ENDING BALANCE			$ 3,847.64
SAVINGS ACCOUNT			
BEGINNING BALANCE	$ 114.11		
Interest Earned	$ 2.67		
ENDING BALANCE		$ 116.78	
MONEY MARKET ACCOUNT			
BEGINNING BALANCE	$ 5,502.91		
Deposits	$ 798.50		
Interest Earned	$ 203.14		
Withdrawals		$ 500.00	
ENDING BALANCE			$ 6,004.55
CERTIFICATE OF DEPOSIT			
BEGINNING BALANCE	$ 26,468.57		
Interest Earned	$ 1,326.49		
ENDING BALANCE			$ 27,795.06
SCHOLARSHIP ACCOUNT			
Balance			$ (7,780.00)
ARCHAEOLOGY WEEK ACCOUNT			
Balance	$ (212.48)	$ -	
TOTAL NET WORTH AS OF MARCH 31, 2001			**$ 37,764.03**
Total Income	$ 43,372.56		
Total Expenses		$ 5,608.53	
Net Increase			**$ 3,420.37**

/s/ Carolyn M Buff

Executive Secretary/Treasurer

2001 WAS CHAPTER REPORTS

ABSAROKA

Field Trips – Platt Site, Black Mountain, Blue Wash

Testing/Excavation – Platt Site, Black Mountain, Sand Draw Dump

Public Education – Cody Enterprise, flyers and posters throughout Park County, 2000 Spring Meeting, Archaeological Awareness Month, Presentations to local schools and students, including home schoolers

Publications/Reports – 2000 Spring Meeting, Cody Enterprise

Programs Presented – Field Lab Training, Chris Finley; Reopening of Platt Site Training, Chris Finley; Platt Site Field School, Absaroka Chapter and Northwest Community College; Black Mountain Field School; Summary of 2000 field schools, Vickie Finley; Slide presentation, Platt Site and Black Hills

ANCIENT TRAILS

Programs – Hell Gap Revisited, Marcel Kornfeld; Licking Bison Kill Site in Northwestern South Dakota, Michael Fosha; Australian Outback: Australian Aborigines and Their Rock Art, Alice Tratebas

Field Trip – Agate Basin

Survey and Research Projects – Cheyenne-Deadwood Trail byway drive, Clifton historic town site

Public Education – Island in the Plains Conference, and Plains Anthropological Conference

Other – The chapter lost three members, leaving the total membership at 10. The membership size is marginal for conducting programs and activities. The chapter has recently decided to hold four special meetings per year. Three would probably involve guest speakers, and the fourth, held in the summer, would be a field trip or survey/excavation project. Between meetings, the executive board would meet on business matters. One conclusion of a brainstorming meeting was that people do not like to sit through business meetings, but will attend interesting programs, which nonmembers also like to attend. The membership size, however, is still too small to be useful for volunteer projects like surveys, excavations, and public education efforts without the same people always doing all the work.

The chapter also decided to send out a newsletter about four times a year. The newsletter will inform members about upcoming programs and volunteer opportunities and cover other news. This will help involve the members who cannot participate regularly because of physical condition or travel. The newsletter will also be used to help recruit new members.

CASPER

Survey – Site recording at two sites on the Garber ranch near Douglas. Work was done at one tipi ring site and one terrace occupation site.

Programs Presented – Historical Overview of the Arikara of South Dakota, Kerry Lippincott; Native American Plant Use lecture and demonstration; Natural Trap Cave, Kerry Lippincott and John Albanese; Sheep Wagons, Nancy Weidel; Thunder Basin Grasslands and Medicine Bow National Forest Cultural Resources, Ian Ritchie; Rock Art of South Africa, Julie Francis; Peopling of the New World, Robert Kelly

CHEROKEE TRAIL

Public Education – Suggested alerting local art teachers about logo contest

Programs Presented – Archaic and Paleoindian Skeletal Traits: How Caucasoid were the Clovis Hunters and Why?, George Gill; Miner's Delight, Danny Walker; Survey of the National Guard Range, Dave Reiss; Archaeology in Siberia, Rod Laird; Rock Art, Mike Evans; Various Sites, Rod Laird; The Shuare People, Justin Howe; Anasazi film

Other - Field trips to Black Hills on Sage Creek, Indian Bath Tubs

CHEYENNE

Programs Presented – Sand Draw Dump Site, Danny Walker; Chaco Canyon, Susan and Larry Adams; Summer Field Trip to Western History Center; Colorado Archaeology, Steve Cassells; Parowan Gap Petroglyphs, Larry Adams; Nine Mile Canyon, Larry Adams; Wreck and Salvage of the Monitor, Susan Carlson; Archaeoastronomy of the Bighorn Medicine Wheel, George Durako; Expanding Environments Youth Job Program, George Zeimens

FREMONT COUNTY

Testing/Excavation – Sand Draw Dump; Williams Springs; Krmpotich

Field Trips – Sand Draw Dump, Jeffrey City, Krmpotich, Dubois Sheep Traps and Buffalo Drivelines

Work With Other Organizations – Recorded petroglyphs at rock shelters at Canyon Creek and Tensleep

Programs Presented – Indians of the West, video; Miner's Delight, Danny Walker; City of Petra in Jordan, video; Alaska and Mexico, Tom Duncan; Mystery of the First Americans, video; Pompeii of the Prairies, video; Urban Archaeology based on three tribes: Cahokia of Illinois, Mayans of Central America, Incas of

South America; Sterkfontein Caves in South Africa
Other – Archival Project – 40 years of chapter materials

HIGH PLAINS
Testing/Excavation – Lazaro Pueblo, Santa Fe, New Mexico; fossil bed south of Torrington
Public Education – Field school, West Elementary Science Day; Historic Craft Demonstrations; Botany Tour; Upper Paleolithic Period in Russia, George Frison; Artifact display of Lazaro Pueblo, Platte Valley Bank; museum displays; library display
Work With Other Organizations - Western Plains Historic Preservation Association, Inc.; schools, Chamber of Commerce; UW Extension
Programs Presented – Prehistoric Pottery Manufacturing, Mark Russ; Geological Formations, Del Bass; Arctic Oil Exploration and Ice Surveys, Peter van Eck; Jay Em Historic Community, Margie Sanborn; mammoths; Light Show with Rocks and Minerals, Letter Heumier; Horse Creek Treaty, John Beard
Other - Miscellaneous cataloging and curating

RAWLINS
Survey – Extensive survey of Overland Trail
Testing/Excavation – Tested for a possible pioneer burial that was being eroded away. Cleaned up and researched pioneer cemetery from the 1800s.

ANNOUNCEMENTS

GUIDELINES FOR APPLICANTS WILLIAM T. MULLOY UNDER GRADUATE SCHOLARSHIP OFFERED BY THE WYOMING ARCHAEOLOGICAL SOCIETY

Who may apply:

1. An undergraduate student in Anthropology at the University of Wyoming with preferred, but not required, emphasis toward Archaeology as a subdiscipline.
2. The student is expected to make Anthropology a vocation and to contribute constructively to its subfields.
3. Student must have maintained a minimum 3.00 GPA in Anthropology courses and an overall 2.75 GPA.

What needs to be included in application:

1. Cover Page:
   a. Completely filled out cover page for the scholarship, including name, date, and full address.
   b. Applicant must show that he/she maintains a minimum 3.00 grade point average in all Anthropology courses, and a 2.75 overall grade point average. The Department Secretary must sign in the space provided to verify the student's GPA.
   c. Applicant must sign the release statement on the cover page.
   d. Briefly state your current level of progress toward your degree.
   e. Include a short paragraph stating your future archaeological intent — career goals.
   f. Provide a title and abstract of your proposed activity.
2. A maximum two-page, typed double-spaced explanation of the proposed activity.
3. A short vita (maximum of one page, typed double-spaced).
4. Two letters of recommendation.
   a. At least one of the two letters must come from a professional Anthropologist/Archaeologist in Wyoming. The second letter may come from a professional in a related field outside Anthropology.

Where to submit the completed application:

1. Submit two copies of the complete application packet, including the cover page, explanation of proposed activity, and vita to the Mulloy/Frison Scholarship Committee, in the Department of Anthropology office, Anthropology Bldg. Room 123, University of Wyoming, Laramie, WY 82071. The Department Secretary will keep a file to hold all applications until they are delivered to the committee for review. These materials must be in to the Department Secretary by the deadline posted for the year of the award (usually sometime in April), or applications will not be considered.
2. The applicant is expected to work with authors of recommendation letters to ensure their receipt by the Department Secretary by the posted deadline.

What happens if I am awarded a scholarship:

1. The Executive Secretary/Treasurer of the Wyoming Archaeological Society will mail you a letter notifying you of your award, and the check will be included. If you attend the spring meeting the year you apply, the award is usually made and you are recognized as a scholarship recipient at that time.
2. The scholarship recipient can use this support to conduct independent study, to help with travel expenses related to research, or other pertinent activities.
3. Recipients are encouraged, though not required, to deliver a presentation about their activity at a spring meeting of the Wyoming Archaeological Society following the year of the scholarship award.

GUIDELINES FOR APPLICANTS GEORGE C. FRISON GRADUATE SCHOLARSHIP OFFERED BY THE WYOMING ARCHAEOLOGICAL SOCIETY

Who may apply:

1. A graduate student in Anthropology at the University of Wyoming with a preferred, but not required, emphasis toward Archaeology as a subdiscipline.
2. The student is expected to make Anthropology a vocation and to contribute constructively to its subfields.
3. Student must have maintained a minimum 3.25 GPA in Anthropology courses and an overall 3.00 GPA.

What needs to be included in application:

1. Cover Page:
   a. Completely filled out cover page for the scholarship, including name, date, and full address.
   b. Applicant must show that he/she maintains a minimum 3.25 grade point average in all Anthropology courses, and a 3.00 overall grade point average. The Department Secretary must sign in the space provided to verify the student's GPA.
   c. Applicant must sign the release statement on the cover page.
   d. Briefly state your current level of progress toward your degree.
   e. Include a short paragraph stating your future archaeological intent — career goals.
   f. Provide a title and abstract of your proposed project.
   g. A maximum two-page, typed double-spaced explanation of the proposed project.
2. A short vita (maximum of two pages, typed double-spaced).
3. Two letters of recommendation.
   a. At least one of the two letters must come from a professional Anthropologist/Archaeologist in Wyoming. The second letter may come from a professional in a related field outside Anthropology.

Where to submit the completed application:

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2. The applicant is expected to work with authors of recommendation letters to ensure their receipt by the Department Secretary by the posted deadline.

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2. The recipient can use this support for an independent research project (i.e., thesis), to help with travel expenses related to research, or other pertinent activities.
3. Recipients are encouraged, though not required, to give a presentation about their project at a spring meeting of the Wyoming Archaeological Society following the year of the scholarship award, or submit a written version of their research to the editor of The Wyoming Archaeologist for publication.

2001 GOVERNOR'S PROCLAMATION FOR WYOMING ARCHAEOLOGY AWARENESS MONTH

ARCHAEOLOGY is the scientific study of material remains from past human history and prehistory. Through archaeology, we gain a greater understanding of the tools humans used, the sites they occupied, and the places they called home. Archaeological clues reveal the unique substance of different cultures that existed in Wyoming over the past 12,000 years.

CULTURAL DIVERSITY is one of Wyoming's most precious resources. Our cultural heritage is expressed through a rich human history that breathes life into every landscape. Our heritage symbolizes Wyoming as the "Equality State."

WYOMING ARCHAEOLOGY AWARENESS MONTH was created to better acquaint the public with the discipline of archaeology, and to help strengthen the enduring bond between past and present in the fabric of human society.

THE FOCUS for this year's Wyoming Archaeology Awareness Month celebration is Devils Tower/ Bear Lodge, one of the best-known traditional cultural properties in Wyoming. President Theodore Roosevelt designated the area surrounding this spectacular butte as the nation's first National Monument in 1906. The area has been a significant landscape to human groups for millennia, serving as a spiritual place for Native Americans, a beacon to generations of explorers and travelers, and an important destination for recreational pursuits.

THE TOWER is known by many names, and citizens can learn much about human nature by understanding the way different cultures designate significant places. Our social life finds meaning in the names we assign to our natural surroundings; a meaning that gives us a sense of place in the world. The wisdom of the ages abides in place-names, and there are lessons here for all of us to learn.

AS WE LIVE THIS NEW MILLENNIUM, we can reflect on the enduring role that important places have in shaping culture. Such reflection allows us to recognize the diversity of human experiences through time on the same landscape, making us more aware of our differences and appreciative of our similarities.

FOR THESE SIGNIFICANT REASONS, I, JIM GERINGER, Governor of the State of Wyoming, do hereby proclaim September 2001 to be

"WYOMING ARCHAEOLOGY AWARENESS MONTH"

in Wyoming and urge the people of Wyoming to take part in the activities planned to enhance public awareness of archaeology.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Wyoming to be affixed this 4th day of September, 2001.

(Signed) (Jim Geringer, Governor)

WAS 50TH ANNIVERSARY COMING SOON

In the June 1963 issue of "The Wyoming Archaeologist" (Vol. VI, No. 2, page 2), Elaine Hilman wrote an article on the 10 year history of the Wyoming Archaeological Society. She reminded us that WAS had been born in February 1953 with an organizational meeting at the home of Fred Hilman south of Big Horn, Wyoming.

Less than two years from now, WAS will observe its 50th anniversary. Members should begin thinking what, if anything, they would like to do to celebrate the occasion. The 2002 spring meeting will be sponsored by the Fremont County Chapter, and that might be a good opportunity to talk about the anniversary. Hope to see you all there, and bring some ideas.

NEW PUBLICATION FROM THE NATIONAL PARK SERVICE

The National Park Service has recently web-published "Strategies for Protecting Archeological Sites on Private Lands." The volume serves as a guide to the wide variety of tools available for protecting archeological sites on private lands. It contains information on strategies that are currently being used throughout the country, contact information, and other sources of useful information. Anyone interested in the topic should view the document. It is available at http:\\tps.

cr.nps..gov/pad/index.html

WAS LOGO CONTEST WINNER ANNOUNCED

The winer of the WAS Logo contest started over a year ago is Matt Lubeck, of Wheatland, Wyoming. His winning submittal is reproduced below, and on the front cover of this issue of the journal.

CALL FOR PAPERS: ANNUAL MEETING OF THE WYOMING ARCHAEOLOGICAL SOCIETY April 29-31, 2002

The 2002 annual meeting of the Wyoming Archaeological Society and the 2002 spring meeting of the Wyoming Association of Professional Archaeologists will be held in Riverton. This is an excellent opportunity for all those interested in archaeology/ anthropology to get together. Many UW anthropology students will be presenting research papers and professionals are encouraged to give papers on recent fieldwork they have done. All aspects of anthropology are open for discussion with this group.

Those interested in submitting papers should send title and abstracts (150 words or less) to Dr. Danny Walker at Dnwalker@uwyo.edu before March 15, 2002. Or mail to: Danny N. Walker, Assistant State Archaeologist, P.O. Box 3431, Laramie, Wyoming 82071-3431; fax to (307) 766-4262.

SVP HAILS FOSSIL PRESERVATION BILL

The Society of Vertebrate Paleontology expressed its strong support for H. R. 2974, the Paleontological Resources Preservation Act, which was introduced on Tuesday by Congressman James P. McGovern and a bipartisan group of fellow House members.

" We're pleased to see legislation which recognizes that vertebrate fossils from public lands are an educational and scientific resource for our generation and those yet to come. This bill will ensure that these fossils will not be removed from the public domain, but preserved for the enjoyment and education of all Americans for all time," said SVP President Richard Stucky.

The Paleontological Resources Preservation Act codifies the existing practice of requiring that vertebrate fossils and other rare and scientifically significant fossils be collected only by qualified researchers who obtain a permit, and agree to deposit the fossils in public institutions which will ensure their future availability to researchers and the public. It incorporates the recommendations contained in a report to Congress issued last year by the Secretary of the Interior after receiving input from federal land management agencies, the Smithsonian Institution, the United States Geological Survey, the paleontological community and the general public.

This report found that most vertebrate fossils are rare, some invertebrate and plant fossils are rare, penalties for fossil theft should be strengthened, effective stewardship' requires accurate information, federal fossil collections should be preserved and available for research and public education, and federal fossil management should emphasize opportunities for public involvement. It also found that there is a very serious problem with illegal collecting and theft of fossils from public lands.

Stucky added that he was happy to see that the interests of the wider paleontological community were recognized as the Paleontological Resources

Preservation Act puts no new restrictions on amateur collecting.

" It's great to see that this bill reflects the shared consensus of the federal land management agencies, the paleontological community, and the general public," he said. Stucky concluded by stating, " This bill will ensure that future generations will be able to learn from the fossil record, the only resource in the world by which we can learn about the history of past life"

News Release from Society of Vertebrate Paleontology Headquarters, October 23, 2001.

PUTTING THE BITE ON CRIME

POT-HUNTING CHARGES DISMISSED AGAINST COUNTY RESIDENTS

The case against two Montezuma County residents cited for charges stemming from alleged pot-hunting in October was dismissed last week by Assistant U.S. Attorney Bob Kennedy in Durango. Kennedy said the cases against Danny Keith Rose of Dolores and Tammy Woosley of Cortez were dismissed without prejudice to further investigate "factual and legal matters."

"There was a recent 9th Circuit Court of Appeals decision which indicates that the prosecution has to prove beyond a reasonable doubt that the individual knew that the items in question were an archaeological resource. That is contrary to prior law, so we have to research that and see whether that precedent is still going to be binding," Kennedy explained.

Woosley and Rose were allegedly caught by a BLM law-enforcement officer digging near McPhee Reservoir on Oct. 1 and were cited with digging in an archaeological site listed on the National Register and disturbing prehistoric human remains. Archaeological sites are protected by Congress under the Archaeological Resources Protection Act of 1979.

"The case is definitely still under investigation," said Kennedy. "I think it needs to be researched further and investigated further in light of that recent court decision."

Kennedy is continuing the prosecution of two other local defendants, Donald Wayne Johnson and Donald Leonard Johnson, on similar charges. On Sept. 16, the Johnsons, a father and son from Dolores, were cited for digging in an archaeological site listed on the National Register of Historic Sites near McPhee Reservoir. The citations are a Class B misdemeanor, with penalties of up to six months in jail and/or a $5,000 fine and fines for restitution. The Johnsons' next court appearance is set for March 15. "Their attorneys have just been appointed, so we'll see where the case is going on (March) 15th," said Kennedy. (By Janelle Holden, Cortez Journal Staff Writer, Feb. 13, 2001, The Cortez Journal Online:http://www.cortezjournal.com/1news1108.htm)

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VANDALISM TO U.S.S. CAIRO

Vicksburg NMP (MS) - On July 25, 2000, a man - later identified as Charles Morfin, 26, of Los Angeles - climbed over a security barrier at the U.S.S. Cairo and broken off a section of wood from the hull of the gunboat. Morfin subsequently surrendered the section of the hull to rangers and was arrested and charged with an ARPA violation. On March 7th, Morfin pled guilty to a misdemeanor ARPA violation in federal court in Jackson. He was originally charged with felony ARPA, but accepted a plea agreement in which he had to pay a $1,000 fine and $2,000 in restitution to the park, serve three years of supervised probation, submit a 5,000-word written report on the significance of ironclads in the Civil War and the importance of ARPA in protecting them (due within 120 days), and submit written apologies to the local papers within 90 days and to the American public, to be posted on the park website. Morfin is also banned from all national parks for a period of three years. (NPS Morning Report - Friday, March 16. 2001)

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TWO CHARGED WITH TRYING TO SELL STOLEN NAPOLEON DOCUMENT

NASHVILLE, Tenn. - Two men have been charged in a conspiracy to sell the 1814 Treaty of Fontainebleau, signed by Napoleon and stolen 12 years ago from the French National Archives in Paris. The document had forced Napoleon to renounce his claim to the French Empire and consigned him to exile on the island of Elba.

An indictment filed in U.S. District Court in New York says John William Rooney, 69, allegedly stole the historic document, and Marshall Lawrence Pierce III, 39, also known as Frederick Tomcezak, approached

Sotheby's auction house about selling it. Both men were arrested Tuesday in the home they share in Monteagle, Tenn., a mountaintop community about 83 miles southeast of Nashville. They were each released on $20,000 bond and ordered to appear in court April 5.

The document, believed to be the only copy of the treaty, is being held by the FBI in New York. While Sotheby's listed its value as between $50,000 and $75,000, a spokesman for the French Press Service in Washington said its historic value is far greater.

Assistant U.S. Attorney Tammy Combs of Chattanooga said she has little information on the defendants except that they "both have Ph.D.s." Rooney was a visiting history professor at the University of the South in Sewanee, about six miles from Monteagle, during the 1995-96 school year, said university spokesman Joe Romano. He had no record of Pierce. The federal indictment alleges Rooney stole the Treaty of Fontainebleau and its four letters of ratification signed by Napoleon I, King Frederick William III of Prussia, Emperor Francis I of Austria and Tsar Alexander I of Russia. It alleges he also stole about 30 letters of King Louis XVIII of France.

The indictment says Pierce approached Sotheby's in 1995 or 1996 claiming to have bought the treaty from a woman in Lyon, France, about five years earlier. He later mailed the treaty to Sotheby's, signed an agreement consigning it to be sold at auction, and inquired about selling the letters as well, the indictment said. Sotheby's spokesman Matthew Weigman said the auction house listed the treaty for a 1996 sale, which alerted the FBI. "Our consigner had no idea there were title issues or that the material in any way had been stolen," Weigman said. Attempts Wednesday to reach the archives were not immediately successful. Assistant U.S. Attorney Nicole LaBarbera, who is prosecuting the case, did not immediately return phone calls. (The Associated Press) (March 29, 2001)

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ARPA GUILTY PLEA

Las Cruces, NM - On March 28, 2001, a 55-year-old Albuquerque man pleaded guilty in U.S. District Court in Las Cruces, NM, to one misdemeanor count of violating the Archaeological Resources Protection Act (ARPA). This individual was indicted on a felony ARPA count but was allowed to plead to a misdemeanor as part of a negotiated plea agreement.

The conduct in the case involved bulldozing a road across BLM Land through a prehistoric Mimbres Pueblo of at least 25 rooms. A portion of the pueblo lies on BLM Land and a portion on private land belonging to the offender. Two of the pueblo rooms on BLM Land were bulldozed. The plea agreement calls for the individual to deed to the BLM the portion of his private land containing the pueblo site, to pay full restitution for the damage to the archaeological site on BLM Land, and to pay for a media campaign to promote public awareness of archaeological resources and their protection. Final sentencing is pending approval by the U.S. District Judge.

The case was investigated by a Special Agent from the BLM Arizona/New Mexico Law Enforcement Team and the BLM Las Cruces Field Office District Ranger.

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BILL WOULD PROTECT NATIVE AMERICANS' REMAINS:

PEOPLE WHO DISTURB UNMARKED SITES WOULD FACE FINES, JAIL TIME UNDER STATE MEASURE. Native American leaders voiced support this week for a bill in the (New York) Assembly that would make it a state crime to remove human remains or burial objects from unmarked Indian graves in New York. The bill, which would require anyone who uncovers an unmarked grave to immediately stop disturbing the ground, could cause delays on construction projects, supporters concede. But they say New York is one of only four states in the country without laws protecting unmarked graves.

"It's always a big struggle to protect the sanctity of the graves of our ancestors," said Rick Hill, who lives on the Tuscarora reservation and chairs an Iroquois Confederacy committee on protecting graves. "We're philosophically and spiritually opposed to desecrating graves."

Assemblyman Stephen Englebright, D-East Setauket, introduced the "Unmarked Burial Site Protection Act" last week at the urging of Hill's committee. Native American leaders hope a Republican sponsor will introduce the bill in the Senate, said Syracuse lawyer Joseph Heath, who represents the Onondaga Nation Council of Chiefs.

The bill: Makes it a violation, punishable by a fine

of up to $1,000, to fail to report to a county coroner the disturbing of an unmarked grave; Makes it a misdemeanor, punishable by fines of up to $5,000 and 90 days in jail, to intentionally remove human remains or burial objects from an unmarked grave; Makes it a felony to deface a grave site, or to sell or attempt to sell human remains or burial objects. The penalty would include up to a $10,000 fine and one year in jail; Requires the state archaeologist to notify a committee that includes Native Americans of any disturbance of an unmarked Native American grave. Officials from a culturally linked tribe would tell the committee if it wants the remains reburied in the grave or buried at another site.

Leaders of the Iroquois nations, which are also called the Haudenosaunee, prefer that no graves be moved, Hill said. The Haudenosaunee fear that as development spreads onto former farmlands, contractors will start to dig up burial sites, said Peter Jemison, a Seneca who is manager of the Ganondagan State Historic Site, a 17th century Seneca town near Victor.

Stephen Schaurer, executive director of the Associated Builders and Contractors Association, which represents New York's nonunion contractors, said Tuesday he was not familiar with the bill and couldn't comment on it. In 1999, Native Americans protested, but could not prevent American Rock Salt Co. from moving some Native American skeletal remains from graves near Mount Morris.

He said the proposed new law is necessary because the state Department of Parks, Recreation and Historic Preservation is not enforcing an existing state law. A law passed in 1971 permitted the parks department to designate any Indian burial ground as a "place of historic interest" and make it illegal to destroy or alter the site without the state's permission. Representatives of Gov. George Pataki and the parks department would not comment this week on Englebright's bill. Parks department officials also would not comment on criticisms regarding their enforcement of the existing law.

Assistant Attorney General Christopher Amato, who represented the state in a federal civil suit against an archaeologist last year, said he supports Englebright's effort. Amato represented the state in a suit against former Canisius College professor Richard Michael Gramly, who removed 16 Native American skeletal remains from a state historic site in Hamburg without permission. The suit was resolved when Gramly, founder of the American Society for Amateur Archaeology, agreed to return the remains. "We had to use a federal law," Amato said. And he said the federal law was applicable only because Gramly was employed by Canisius College, which receives federal money. (By Mike McAndrew, Syracuse Post-Standard, Saturday, April 7, 2001)

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MINERAL MATERIALS THEFT, DESTRUCTION OF NATURAL FEATURES

BOUSE, AZ - A Law Enforcement Ranger received a tip that an individual was removing mineral material from a wash in the Bouse area. A subsequent investigation by the Ranger revealed that the individual was using earth-moving equipment to remove sandstone from a wash located on Public Land to decorate his home and recreational vehicle park. Working in conjunction with an Archaeologist, it was discovered that the earth-moving and mineral removal caused damage to part of a historic water diversion net built to protect the nearby historic railroad grade. The entire diversion system and railroad grade are approximately 94 years old. The individual was cited for offenses of Theft of Mineral Material, and Damage to Natural Features and Historic Features.

The subject initially pleaded not guilty to all three counts before a U.S. Magistrate Judge on March 13, 2001, then changed his plea to guilty on all charges. He received a fine of $750.00 and three years probation. The individual voluntarily used the same earth-moving equipment to reclaim all surface disturbance. The reclamation was conducted in accordance with guidance from the Lake Havasu Field Office Archaeologist and supervised by the Law Enforcement Ranger. (Bureau of Land Management National Law Enforcement Office Weekly Activity Report, April 7, 2001)

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VALLETTA, Malta -- Vandals have attacked a world heritage site in Malta, toppling huge stones which have stood for more than 5,000 years. Maltese Archaeological Museum officials said on Saturday that the Mnajdra temples near the southwest coast of the Mediterranean island had been devastated. "This was the worst act of vandalism ever committed against Malta's historical heritage," a distraught official said. The attack comes

a month after Afghanistan's ruling Taleban destroyed of the age-old Buddhas at Bamiyan.

Mnajdra is recognised as a world heritage site by UNESCO. Parts of the complex resemble Britain's Stonehenge, but the site is more than 1,000 years older. The official said about 60 stones had been dislodged or toppled, some breaking into pieces with the impact. The scale and astronomical alignment of the Mnajdra site has long fascinated archaeologists. He added that runic symbols scratched on some stones suggested the vandalism might have been connected to a Satanic ritual.

The UNESCO website says: "On the island of Malta, the temples of Hagar Qin, Mnajdra and Tarxien are unique architectural masterpieces, given the very limited resources of their builders. "The Ta'Hagrat and Skorba complexes bear witness to the development of the temple tradition in Malta."

The vandals are believed to have cut a hole in a boundary fence and entered the site late on Good Friday evening, when there was a full moon. An investigation has been launched. (http://asia.cnn.com/2001/WORLD/europe/04/14/malta.vandals/index.html ; web posted at: April 15, 2001 6:13 AM)

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LOOTERS OF ARTIFACT SITES RAKED: 'LIKE SPITTING ON HISTORY

YANKEETOWN -- Archaeologists say incidents of looting and damage at Indian sites are increasing, in part because Internet Web sites tell looters where to go and how to retrieve the artifacts.

Gary Ellis has spent a lifetime digging in the dirt but invoked a celestial image to describe the damage looters inflicted at an American Indian site on the bank of the Withlacoochee River. "It looked like a lunar landscape," the 51-year-old scientist with a long, white moustache said aboard a 20-foot landing craft that cruised along the Withlacoochee on a recent sun-splashed morning. As the boat skidded to a stop, Ellis leapt across to the shore and walked up a small bank, brushing aside tree limbs. Under ideal conditions, the director of the Gulf Archaeology Research Institute would have visited this site for research.

Instead he has spent the past two months repairing, as best he can, the damage caused by freelance artifact hunters, who were probably in search of projectile points that can sell for hundreds of dollars. More than 50 holes were dug on this 1-acre site, halfway between Yankeetown and the Gulf of Mexico. The area, known as a midden, or trash mound, was probably utilized from 2000 B.C. to the 11th or 12th century. "It makes me sick," Ellis said. "It's a total disregard of the past in every way. It's like spitting on history, or history doesn't matter except for personal gain."

Sites in Citrus County and across Florida have been looted over the years, but now some experts say the incidents may be on the rise, in part because of the Internet. Some Web sites offer detailed instructions where to find the artifacts and how to retrieve them. There are several sites along the Withlacoochee that are popular among looters because they are remote and loaded with points and other tools. "Word gets out that good artifacts are coming from a site; literally dozens of people could show up the next weekend," said Jim Miller, the state archaeologist.

"It seems that it's going to become a bigger problem. There is a market out there for these artifacts," said Guy Wheaton, a law enforcement officer for the Department of Environmental Protection in Crystal River. Late last month, Wheaton came upon five men on a private island near here who were suspected of digging in submerged lands. The men were issued notices to appear in court on trespassing notices but the property owner later dropped the charges. One of the men was linked to the site Ellis is working on, which is part of the Crystal River buffer preserve, but no charges have been filed. Another investigation is under way in salt marshes in Bennett's Creek, off the Withlacoochee.

Digging and removing artifacts from state lands can be a felony. Items can be removed from private land but not if the land contains a burial site. Prosecuting such cases is difficult, Wheaton said, because "you need to catch them in the act."

Sensing a need for increased enforcement, the state has partnered with the Coast Guard, which has an outpost in Yankeetown. The Guard was given maps of the upland areas, informed of the laws regarding looting and trained to be on the lookout for the tell-tale signs of looting: people with shovels or people caked with mud from digging. "We will try to stop a lot of the illegal diggings," Coast Guard officer Alan Romero pledged.

Aside from the obvious loss of historical artifacts, looting can undermine the natural landscape and set back legitimate excavation efforts because it makes it

difficult to retrace the historical timeline, experts say. Armed with shovels and stacks of sod, Ellis and his crew have tried to replace the soil to preserve what historical value is still left and to prevent erosion by the Withlacoochee. One of Ellis' crew members, Chuck Taylor, used vivid language to describe the looting during a break. "It p----- me off," Taylor said, sweat running down his face. "The total lack of concern shown by the people who do this sort of thing is disturbing." (By Alex Leary, St. Petersburg Times, published April 18, 2001: http://www.sptimes.com:80/News/041801/Citrus/Looters_of_artifact_s.shtml)

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ARKANSAS: MAN WHO STOLE CIVIL WAR ARTIFACTS SENTENCED

A man who admitted he stole nearly 100 Civil War artifacts from a national park has been sentenced to four months in prison. He was also ordered to do 400 hours of community service and pay $16,508 in restitution. Russell Beeson of Springdale pleaded guilty in February to one count of violating the federal Archeological Resources Protection Act in taking artifacts from Pea Ridge National Park north of Fayetteville. Mr. Beeson was sentenced Friday in federal court in Fayetteville. An archaeologist estimated the loss at $32,000, including the time federal agents and park rangers spent investigating the January theft, as well as the loss to history for disturbing the items. The items included bullets, artillery pieces and an 1858 "brass eagle" button that probably was part of a Union soldier's uniform. (Dallas Morning News, October 1, 2001).

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ARPA GUILTY PLEAS

Farmington, NM - On June 18, 2001, three Aztec, New Mexico residents pleaded guilty in U.S. District Court to charges of excavating, removing, damaging or altering archaeological resources on BLM Land within the Farmington Field Office area. These three were among seven individuals indicted by a Federal Grand Jury in Albuquerque, New Mexico, on January 30, 2001, for 14 felony counts of violating: 16 U.S.C. 470ee(a) Unauthorized Excavation, Removal, Damage, or Alteration of Archaeological Resources; 18 U.S.C. 371 Conspiracy; and 18 U.S.C. 2 Aiding and Abetting. One individual pleaded guilty to a felony count and two individuals pleaded guilty to misdemeanor counts. The original charges remain pending against the other four individuals.

These charges result from a two-year undercover operation and subsequent investigation conducted by the BLM Arizona/New Mexico Law Enforcement Team, the BLM Farmington District Ranger, and the U.S. Bureau of Indian Affairs in the Four Corners area of New Mexico. Other agencies who participated in or supported this effort include: the U.S. Attorney's Office for the District of New Mexico; investigators and prosecutors of the New Mexico 11th Judicial District Attorney's Office; the BLM National Office; the National Park Service; the U.S. Forest Service; and the U.S. Customs Service.

This investigation is ongoing. Additional suspects have been identified, and more indictments are anticipated through the U.S. Attorney's Office for crimes on Federal land, and through the New Mexico 11th Judicial District Attorney's Office for crimes on State and private land. These indictments are expected to include new counts of the above crimes, as well as charges of theft of Government property, trafficking in archaeological resources, tampering with evidence, and related state crimes.

To date, this case has also resulted in recovery of approximately 300 prehistoric Native American artifacts including a very rare mask from the Navajo Nightway Chant and portions of two other sacred masks excavated and removed from a site on Public Lands, believed to be a prehistoric ceremonial site. The destruction to this single archaeological site caused damage assessed at more than $31,000. Additional sites were also damaged and will be addressed in the continuing investigation. (Bureau of Land Management, Weekly Activity Report, June 23, 2001)

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PLEADS GUILTY TO ILLEGAL EXCAVATION OF ARCHAEOLOGICAL SITE

Jerry Lee Young of Hollister pled guilty this afternoon in U.S. District Court in Boise to one felony count of violating the federal Archaeological Resource Protection Act. Young, 51, admitted to illegally excavating a site located on public land near Milner Dam on the Snake River west of Burley between February 25, 1996, and January 26, 1998. He and federal officials placed the loss at the site — officially known as 10JE47

— at $117,203.18.

In documents filed this afternoon, prosecutors agreed to drop four other criminal counts against Young. The remaining counts in the original indictment were forfeiture counts. Young agreed to forfeit all artifacts and other archaeological resources removed from public lands at the investigated sites, along with any trucks or other equipment used to excavate the Milner site. He also agreed to pay restitution of $7,724.50 to the Bureau of Land Management and assist in the investigation and prosecution of other illegal digging on public lands. As part of that assistance, Young agreed to review all artifacts in his possession and turn over any that came from public lands, and to provide any information he has about illegal digging or the location of archaeological sites on public lands. Young also agreed to cooperate in efforts to raise public awareness of the importance of preserving and protecting archaeological resources. He faces a maximum penalty of two years in prison and a fine of $250,000. Under the agreement, both sides agreed to recommend to the court that half of his sentence be served under home detention rather than in prison.

Interim U.S. Attorney Marc Haws commended the Bureau of Land Management for its lengthy and exhaustive investigation. He said the agreement will serve the threefold purpose of punishing Young for his actions, deterring others from doing similar things, and educating the public about threats to the nation's archaeological treasures. "In an historical and cultural sense, these artifacts are priceless," he said. "I'm pleased that we were able to recover them and at the same time help protect similar treasures in the future." (U.S. Department of Justice News Release, July 13, 2001)

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GRAVE THIEF TO PERFORM 100 HOURS OF SERVICE

OWENSBORO, Ky. — When 21-year-old Sean Long told two men about the joys of showing off his collection of Indian grave goods and human remains to schoolchildren, he didn't know he was talking to the FBI. It was a conversation he'd come to regret, but if federal prosecutors have their way, Long will be back in the classroom again soon. Only this time, he'll be there as a felon, confessing his crime. On Wednesday, the Madisonville, Ky., man was sentenced to perform 100 hours of community service, after he admitted he violated a federal law when he tried to sell three ancient Indian skulls to two undercover FBI agents.

The law, known as the Native American Graves Protection and Repatriation Act, makes it illegal for anyone to trade in Native American remains and artifacts that have been looted from burial sites. Under the terms of the plea agreement, Long will also serve two months of house arrest and be put on probation for a remaining 16 months. "This is a hate crime," said Randy Ream, the assistant U.S. attorney who prosecuted the case. "These were Indian skulls and the only motivation for the crime was the race of the people these skulls belonged to."

Long was arrested in February 1999, after he placed an ad in a newspaper offering to sell Native American artifacts. Two undercover FBI agents posing as artifact collectors responded to the ad. After meeting them, Long offered to sell them the three skulls for $900, taking a discount on one of them because it was damaged. But instead of making the deal, Long was arrested and later charged with two misdemeanor counts of violating the Native American Graves Protection and Repatriation Act, and one felony count of lying to federal agents about where he got the skulls.

Ream told U.S. District Judge Joseph McKinley that he'd asked for the 100 hours of community service in hopes that some good could come of Long's crime. "If he's truly remorseful, I'd like for him to go back to those schools he visited, only this time with an archaeologist and a tribal representative," Ream said. Whether that will happen remained unclear after the sentencing.

During the undercover operation, Long told the two FBI agents that he frequently "excavated" Indian burial grounds for the grave goods that native tribes buried with their dead. He showed the agents photographs of himself and a friend digging in a cave, and even offered to take the agents to Indian burial sites. But after Wednesday's sentencing, Long's attorney said his client was simply "puffing himself up" with the stories. "I don't believe he's ever dug any Indian graves," said defense lawyer Ron Sheffer.

The plea agreement which allowed Long to escape prison time had disappointed the Native American leaders who will rebury the three skulls and about 50 grave goods seized by the FBI from Long's home. "How would he like it if I dug up his ancestors' graves?" said John Froman, chief of the Peoria Tribe of the Indians of

Oklahoma. Froman, who will take part in the reburial ceremony, said he feels a sense of grief and disgust. "Is there such an ignorance of morality?" Froman said. "How can anyone not understand the moral value placed on a body after death?" (By Maureen Hayden, Courier & Press staff writer; http://www.courierpress.com/cgi-bin/view.cgi?200107/26+grave072601_news.html+20010726)

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NC BEACH BONFIRE MAY COST A BUNDLE

COQUINA BEACH -- Two visitors in need of firewood found some seasoned timber to throw on their bonfire Sunday morning. But it didn't come cheap. When National Park Service ranger Michael Ice approached a group of young people on the beach north of Bodie Island Lighthouse at 1 a.m., he noticed an unusually bulky hunk of wood in the flames. "Mike saw what appeared to be a 6- to 7-foot piece of hull," recounted John Anglin, Bodie Island district ranger. After Ice asked where they found the wood, two young men led him to the half-buried Laura Barnes, a four-masted schooner that ran aground in 1921, Anglin said. A 20-foot piece of hull had been pulled away from the wreck, with fresh drag marks trailing behind it, he said.

Matthew A. Stover, 20, of Mount Carmel, Pa., and Alan R. Huffort, 20, of Lebanon, Pa., were cited with disturbing a cultural resource, a misdemeanor that carries a penalty of up to six months in jail, a $5,000 fine, or both. The charred wood in the fire was removed as evidence, Anglin said. The other piece was left with the wreck.

The remains of the ship were moved to Coquina Beach in 1974 from its original resting place 2 miles north. The wreck, placed on pilings about 80 yards west of the high tide line, is roped off and marked by interpretive signage. But the dune has swallowed much of the fence, and the larger signs have been sandblasted to a near-illegible condition. Another sign, smaller but still clear, says: "Please respect the Laura Barnes and her resting place. Stay outside the fence." Anglin said if the men didn't know the site was a shipwreck, they should have. "How they could not have been aware, I don't know, because it was signed," he said. "They are very lucky it was not 100 years old because they are not facing felony charges."

The federal Archaeological Resources Protection Act of 1979 states that it is a felony to harm a cultural resource 100 years or older. The more severe charge could carry a sentence of up to two years, a $20,000 fine or both. The law also provides a civil penalty that includes payment of costs to rehabilitate the site, costs of an archaeological re-evaluation and costs for the investigation.

The Laura Barnes was built in Camden, Maine, in 1918. After it went aground, its masts were cut and planks and decking were removed. The remains then faced the elements on the beach, as well as fire and vandals, until it was relocated.

District ranger Steve Ryan said he remembers that on at least two occasions a number of years ago, visitors not only viewed the schooner remains as fuel, they went as far as building their fire in the middle of the wreck . "That was their little campfire," he said. And others have been known to sneak off with parts of beached wrecks, Ryan said. "People do take souvenirs, whether they turn them into a mantel piece or some kind of decorative wood," Ryan said. "Nevertheless, they're stealing a bit of history, and that's no fun."

Although it will continue to protect the Laura Barnes, the park service has no plans to unbury the wreck or its signage out of the windswept dune, Anglin said. With budgets tight, he said the service does not have the resources available to constantly dig out sand-covered displays. But that's not all bad as far as the Coquina wreck goes. "As it is, if the Laura Barnes is exposed, and people can get to it, it is in jeopardy," he said. "It will be better preserved if it is protected from the elements." (By Catherine Kozak, The Virginian-Pilot August 7, 2001; http://www. pilotonline.com/news/nw0807bur.html)

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ITS NOTORIOUS PAST UNEARTHED, DUMP LOSES LANDMARK STATUS

FRESNO, Calif., Aug. 28 - The United States Department of the Interior moved on Monday to make this city's municipal landfill a national historic landmark, but the move was trumped later that day by another designation, a less illustrious one, on the federal Superfund list. When officials learned the landfill was on the Environmental Protection Agency's list for Superfund cleanup, the designation as a historic site was quickly rescinded, though the site could still wind up on the National Register of Historic Places.

"We're going to consult with local officials in Cali-

fornia and the E.P.A. to see if it can move forward as a landmark," said Mark Pfiefle, an Interior Department spokesman. The National Park Service sponsored the site, the nation's first sanitary landfill, for inclusion with some of the nation's most prestigious landmarks, like Mount Vernon and those in California like the Rose Bowl, Alcatraz and Hearst Castle. More than 2,300 landmarks are listed among the some 73,000 sites in the national register.

The park service said the landfill's designation was part of a movement to document the history of civil engineering in the United States. Fourteen other sites received historic designations on Monday. "These landmarks guide us in comprehending important trends and patterns in American history," said Fran Mainella, director of the park service, in a statement regarding the landmark status. "This landfill has those qualities that help us as a nation understand trends in emerging and developing technology."

The designation prompted immediate questions and criticism. "It seems to me that somebody didn't do their homework and didn't do any thinking," said Carl Pope, the executive director of the Sierra Club. "What can I say, it's just weird." Mr. Pope was also quoted by The Associated Press as saying: "This is what the Bush administration undoubtedly would like to do to the entire state of California. Trench it, compact it and shovel dirt over it."

Before nominating the landfill as a historic site, the park service had contracted with Dr. Martin Melosi, a professor of history at the University of Houston who is an expert on the history of sanitation innovations in the United States. Dr. Melosi endorsed its nomination as a historic site because the first sanitary landfill was a landmark for public health. The Fresno landfill was the first to use a trenching method of covering trash with dirt every day, rather than burning the trash or just letting it sit. The result was a significant reduction in infestations of rats and other vermin and set a national standard that is still in use. Dr. Melosi's sentiments were echoed by Fresno's interim director of public works, who said after the announcement on Monday, "It's an appropriate designation for something that was a major evolution in the protection of public health."

The Fresno Municipal Sanitary Landfill was the work of the city's public works director, Jean Vincenz, who in 1937 developed the process of digging trenches, filling them with garbage, compacting it and then covering it with dirt. The landfill was a model for others across the country. But the area was not lined, and in the early 1980's, officials found that methane gas was being produced by the landfill and that noxious substances were seeping into groundwater and surrounding land. The site was placed on the Superfund list in 1989, city officials said. Nearly $38 million has been spent cleaning up the site, which contains an estimated 79 million cubic yards of waste. The site has been capped, the methane gas vented and the water treated. Now a dusty mound, it and surrounding land are being transformed into a park and sports complex in the southwest section of town.

"It could still become a landmark," said Elaine Sevy, a public affairs officer in the Washington offices of the National Park Service. While some city officials expressed amazement on hearing of the designation, the city took a neutral position. But city officials noted other landmarks had been Superfund sites, including mines in Montana. "The reality of the situation is it's something the National Park Service brought to us," said Randy Reed, public affairs officer for the city. "We're certainly pleased our technology was exported across the country and around the world, and the way the landfill is being transformed into a park will be a model as well. We're turning trash into treasure." By Barbara Whitaker, NY Times. August 29, 2001.

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EX-CURATOR CHARGED WITH STEALING FROM TRIBE: CARVED BEAR STATUE DISAPPEARED FROM LAC DU FLAMBEAU'S MUSEUM

LAC DU FLAMBEAU – A former curator for the Wisconsin Historical Society convicted of stealing more than $120,000 worth of Indian artifacts from the society's museum in Madison is now charged with taking items from the Lac du Flambeau tribe's cultural center. David W. Wooley, 53, was convicted in Dane County Circuit Court in June of 14 counts of felony theft and three counts of failure to file state income tax returns for 34 artifacts he admitted taking from the historical society's American Indian collection while he worked there from 1995 to 1999. Wooley quit his job with the society in July 1999 to take a similar job with the Lac du Flambeau tribe's George W. Brown Museum and Cultural Center. The new felony theft charge filed in Vilas County alleges that Wooley removed a carved bear statue from the center while he

was the director there.

Wooley is free on $10,000 bail and must still meet the bail terms for Dane County pending his Oct. 9 sentencing hearing, where he could receive a maximum of 100 years in prison. An arraignment that had been scheduled for Monday in Vilas County was postponed, and a new date was not set. "When we arrested (Wooley) last October the (state) crime lab took photos of everything in his apartment and we did too," said Capitol Police Detective Sgt. Ed Bardon, who is working with the Lac du Flambeau tribal police on the case. "The statue, unbeknown to us, was something from the George W. Brown Museum picked out of a photo by a former head of the museum."

According to the criminal complaint, the bear is one of five 12-inch statues carved by James F. Frechette Jr., in the 1980s to help teach the history of the Menominee people in the schools. Frechette told police that the bear is the beginning of the origin story and without it the Menominee history would be nonsensical. An appraiser told Bardon the bear statue alone could be valued between $12,000 and $15,000.

Vilas Country Assistant District Attorney Dewitt Strong says he may request consolidation of the cases in Dane County. Strong notes that the George W. Brown Jr. Museum and Cultural Center has begun an inventory to determine if any other items are missing. State Historical Society Museum director Ann Koski says at least 175 items turned up missing from its collection since a December 1994 inventory, and only 35 items have been recovered. Lt. Ron Mersch of the Lac du Flambeau tribal police says the Wooley case remains open-ended. Wooley's attorney, Christopher Van Wagner, has maintained that Wooley is cooperating with the state's investigation. But Mersch says he is awaiting a response from Wooley or his attorney to written questions posed in May. In June, Van Wagner said Wooley intended to use the items he stole from the Madison museum only for artifact shows or lectures he would give. (By Meg Turville-Heitz, Milwaukee Journal Sentinel, Aug. 29, 2001,,http://www.jsonline.com:80/news/state/aug01/tribal29082801a.asp)

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TRESPASS CASE

NAVAJO NM (AZ) - In late August, the park completed an investigation into and the prosecution of an ARPA case involving an Air Force major. In early April, a visitor notified park staff that there was a web site containing a narrative and photographs of an off-season and illegal hike into the ancestral Puebloan village of Keet Seel. The web site described the major's personal visit to the park and his account of being denied access to the village of Keet Seel, as it was out of the permitted season. In his narrative, he states that he was denied a permit at the front desk because it was pre-season, but believed that the summer season is much too hot for hiking. He describes getting up early before park staff arrived at work and stealthily hiking into Tsegi Canyon. The narrative also describes the number of gates he passed through, "each of which is marked with a 'Permit Required' sign." The paragraph describing his first view and encounter with Keet Seel was well written, as was his observation that he saw the no trespassing and ARPA violation warning signs and his description of how he "proceeded intrepidly" past these signs on his own recognizance. Evidence on the web site shows that he entered the village, climbed on walls, and photographed old Anasazi jars that still remain perched high in the dwelling. It was determined that an admission would be needed to tie the major to the activities described and to the photographs on the website, so ranger Brenton White set up an email account and began a series of communications which eventually produced a confession with further instructions on illegally visiting the village. The email dialogue was continued until investigators felt certain that no other ARPA or CFR violations had taken place. The major was sent a certified letter with a mandatory appearance CFR citation. During his pre-trial meeting, he plead guilty to "engaging in an activity subject to a permit, without a permit" and agreed to remove the trespass content from his web site. Park staff felt this was in the best interest of protecting the cultural resources of the park and that this action will serve to prevent future trespasses. (NPS Morning Report, August 26, 2001)

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COUPLE CHARGED IN DINOSAUR THEFT

SALT LAKE CITY (AP) — A husband and wife suspected of buying a dinosaur fossil stolen from Federal land in central Utah were charged Tuesday with theft. The nearly complete Allosaurus skeleton – one of only a dozen in the world – was hacked from the earth on Bureau of Land Management property in the early 1990's. Scientists and prosecutors did not learn of the

fossil until 1998, after an informant told officials it was stolen from BLM land about 200 miles south of Salt Lake City. Prosecutors said a Utah man sold the fossil to Barry James, a Pennsylvania dinosaur buff who then sold the bones to a Japanese collector.

James and his wife, April Rhodes-James, of Sunbury, PA., are the only ones who can be charged because the statute of limitations has expired for the people who dug up the fossil, U.S. Attorney Paul Warner said. The couple face not only the State theft charges but a Federal lawsuit seeking $2.1 million in damages. "The money cannot begin to replace the value this fossil would have," Warner said. Because the fossil was damaged when it was taken out of the ground, priceless information about how the creature died will never be known, said Laurie Bryant, regional paleontologist for the Bureau of Land Management. A professional excavation by legitimate paleontologists would have taken six months. Instead, amateurs using picks, shovels and wheelbarrows dug it up in nine days, said Don Johnson, head of the FBI office in Salt Lake City.

The Japanese company that bought the fossil did not know it was stolen and no one at the company will face prosecution, officials said. The name of the company was not released. To non-scientists, the Allosaurus remains would have looked like ordinary rocks, Bryant said. Investigators say the fossil is worth $700,000, but that James bought it for $90,000 and sold it for $400,000. The couple are still subject to prosecution because they have been living out of state. The statute of limitations for Utah crimes does not run while people are living outside the state's borders.

Allosaurus lived in the late Jurassic Period, 154 million to 144 million years ago. A three-foot skull full of serrated steak knives for teeth made it the great predator of its time, Bryant said. It measured about 40 feet from nose to tail and stood about nine feet tall at the hips, she said. The creature either hunted live animals or scavenged carrion – scientists aren't sure which. (By Rich Vosepka, Associated Press Writer, Wednesday September 5, 2001)

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ARPA INDICTMENTS

ALBUQUERQUE, NM - On January 30, 2001, a Federal Grand Jury in Albuquerque, New Mexico, indicted seven individuals for 14 felony counts of violating: 16 U.S.C. 470ee(a) Unauthorized Excavation, Removal, Damage, or Alteration of Archaeological Resources; 18 U.S.C. 371 Conspiracy; and 18 U.S.C. 2 Aiding and Abetting. Six of the individuals live in Aztec, New Mexico. The seventh lives in Fargo, North Dakota. These charges result from a two-year undercover operation and subsequent investigation conducted by the BLM Arizona/New Mexico Law Enforcement Team, the BLM Farmington District Ranger, and the U.S. Bureau of Indian Affairs in the Four Corners area of New Mexico. Other agencies who participated in or supported this effort include: the U.S. Attorney's Office for the District of New Mexico; investigators and prosecutors of the New Mexico 11th Judicial District Attorney's Office; the BLM National Office; the National Park Service; the U.S. Forest Service; and the U.S. Customs Service.

This investigation is ongoing. Additional suspects have been identified and more indictments are anticipated through the U.S. Attorney's Office for crimes on Federal land, and through the New Mexico 11th Judicial District Attorney's Office for crimes on state and private land. These indictments are expected to include new counts of the above crimes as well as charges of theft of Government property, trafficking in archaeological resources, tampering with evidence, and related State crimes.

To date, this case has also resulted in recovery of approximately 300 prehistoric Native American artifacts including a very rare mask from the Navajo Nightway Chant and portions of two other sacred masks excavated and removed from a site on Public Land, believed to be a prehistoric ceremonial site. The destruction to this single archaeological site caused damage assessed at more than $31,000. Additional sites were also damaged and will be addressed in the continuing investigation. (Bureau of Land Management, National Law Enforcement Office, Weekly Activity Report, February 3, 2001)

THE CONSERVATION OF ARCHAEOLOGICAL METALS: THE COPPER ALLOY CARTRIDGE CASES AND LEAD SLUGS FROM WYOMING'S FORT FRED STEELE

By
MARK D. HANSON

ABSTRACT

North American archaeology is well behind European archaeology in effectively addressing the special conservation concerns for metal artifacts. The primary threat to archaeological metals is corrosion. The copper alloy cartridge cases and lead slugs recovered from Fort Fred Steele, Wyoming, are excellent examples of metal corrosion and conservation in North America. With a basic understanding of corrosion and corrosion products, effective recovery, cleaning, and storage techniques can be devised to preserve the physical integrity and research potential metal artifacts possess. Relative humidity, temperature, and pollutants are the primary factors which must be controlled for effective conservation and preservation of archaeological metals. Effective conservation of archaeological metals also benefits the public. Archaeological artifacts, especially those from public lands, are held in public trust. Therefore, effective conservation becomes the responsibility of archaeologists and curators on behalf of the public. Also, stable, well-preserved artifacts improve the quality of public education programs and museum exhibits.

INTRODUCTION

Fort Fred Steele (48CR480) in Carbon County, Wyoming is located along the North Platte River at the Union Pacific Railroad crossing. The Fort Fred Steele garrison protected Union Pacific Railroad workers, fought Native American Indians, quelled labor riots in nearby mining districts, channeled goods and materials to other U. S. Army garrisons, functioned as a police force, and even incarcerated civilian criminals from its establishment in 1868 until its abandonment in 1886 (Murray1972). In August of 1990, an archaeological survey of Fort Fred Steele revealed a high concentration of metallic cartridge cases (Figure 1) at Feature 162 (Miller and Wedel 1991, 1992). Avocational archaeologists subsequently discovered three concentrations of lead slugs (Figure 2) (Miller and Wedel 2000).

Unfortunately, many North American archaeologists and curators of archaeological materials are unfamiliar with the basic conservation of metal artifacts. Up until historic times, the North American archaeological record predominantly contains lithic, ceramic, and faunal material. European archaeologists have a much better understanding of archaeological metals, because the European archaeological record represents a much longer period of metal use, and therefore many more metal artifacts. Consequently, conservation of North American archaeological metal is often misunderstood or neglected. This paper will address the conservation of North American archaeological metal artifacts through the copper alloy cartridge cases and lead slugs

EDITOR'S NOTE: While the preferred firearm nomenclature uses "slug" as a lead projectile fired from a shotgun (Douglas Scott, personal communication to editor, 2001), the author of this paper prefers to use the term to also refer to fired lead bullets. He states this imparts the idea of the projectile being spent and probably deformed, which almost all of the Fort Steele projectiles are. His terminology has been preserved throughout this paper.

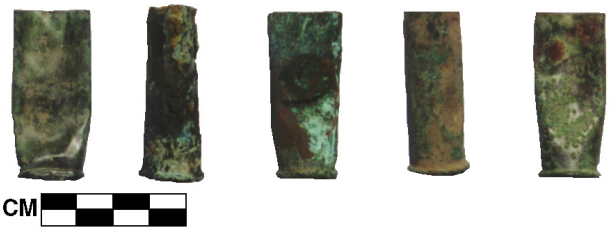

FIGURE 1: Sample of cartridge cases from Fort Fred Steele. Artifact numbers, left to right: 48CR480-1583,1544,1569,1619,1556.

FIGURE 2: Samples of lead slugs from Fort Fred Steele. Artifact numbers, left to right: 48CR480-3149,1713,3146,1712.

recovered from Fort Fred Steele.

Corrosion is by far the most serious concern facing archaeological metals. The following discussions address corrosion mechanisms and appropriate conservation measures, including proper field recovery, artifact cleaning, and storage and handling. The objective is not to provide an all-encompassing analysis of corrosion and the myriad of issues which it embodies, but rather to provide a basic understanding of corrosion, and highlight practical conservation techniques used on the recovered cartridge cases and slugs.

MATERIAL SCIENCE

Archaeological copper alloy and lead artifacts are damaged by both mechanical and chemical alterations. Much like lithics, ceramics, and bone, copper alloy and lead are readily dented or gouged by careless excavation, bent or flattened if transported or stored inappropriately, and scratched or marred by harsh cleaning methods or research practices. However, copper alloy and lead artifacts, like all metals, are much more susceptible to chemical attack, or corrosion.

Basic Corrosion

Corrosion is the process of chemical and electrochemical reaction between a refined metal or metal alloy and the surrounding environment. The reaction strives to transform the unstable metal into stable, metal bearing compounds, which may result in the transformation or destruction of the refined metal.

Rarely is a metal found naturally in a refined state. Instead, metallic elements occur as minerals in an ore, a metal bearing rock formation without metallic properties. Metal bearing ore is refined to reduce metallic minerals to metal through the input of large quantities of energy. Corrosion is a side effect of the ore refinement process, which imparts electro-ionic instability within the metal chemical and electro chemical reactions try to alleviate. Stambolov (1969:7) explains: "The expenditure of energy used to reduce minerals, technically known as ores, to metal demonstrates that the latter are thermodynamically unstable, so that they strive to liberate free energy in order to acquire the stable state of their compounds with non-metallic elements."

An atom is the smallest occurrence of a chemical element, composed of protons, neutrons and stacked orbitals of electrons (Figure 3). Metal atoms form metallic bonds, which allow atoms to share electrons as they form basic atomic structures, the building blocks of a metal (Figure 4). "As the atoms are packed together into a solid . . . outer orbitals readily, overlap and the electrons which they contain cease to 'belong' to any particular atom" (Moncrieff and Weaver 1992a:80). The result is an electron gas, or cloud of shared electrons (Figure5), acting as a "pervasive glue that moves freely among the ions and binds them together" (McManus 1990:O:4). However, metals strive for a net occurrence of eight electrons in a stable outer orbital, and therefore readily lose extra electrons.

Corrosion occurs when extra metal electrons are transferred to non-metallic atoms, such as oxygen and chlorine. The result is an electrical charge differential. The metal atom becomes a positively charged cation, since the loss of an electron causes an imbalance between the positively charged protons and negatively charged electrons. Inversely, the non-metallic atom becomes a negatively charged anion, since it gained

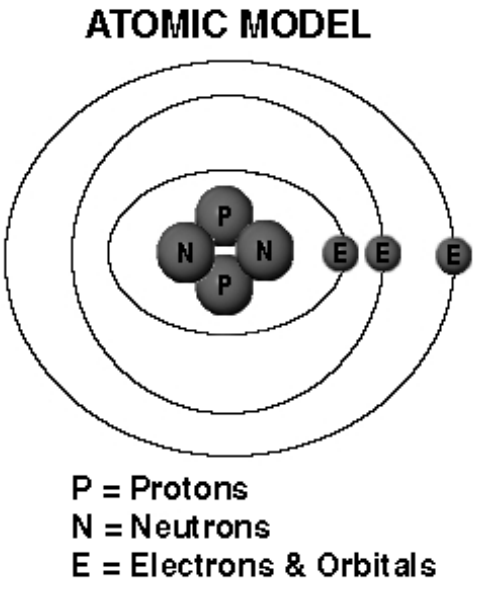

Figure 3: Generalized atomic model.

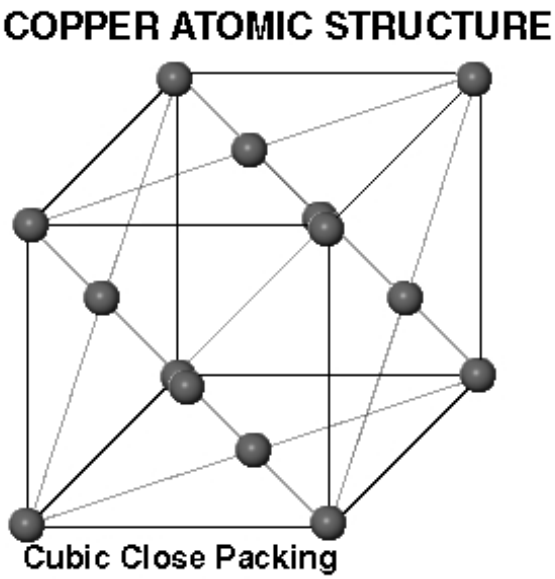

Figure 4: Atomic structure of pure copper (from Norton 1965).

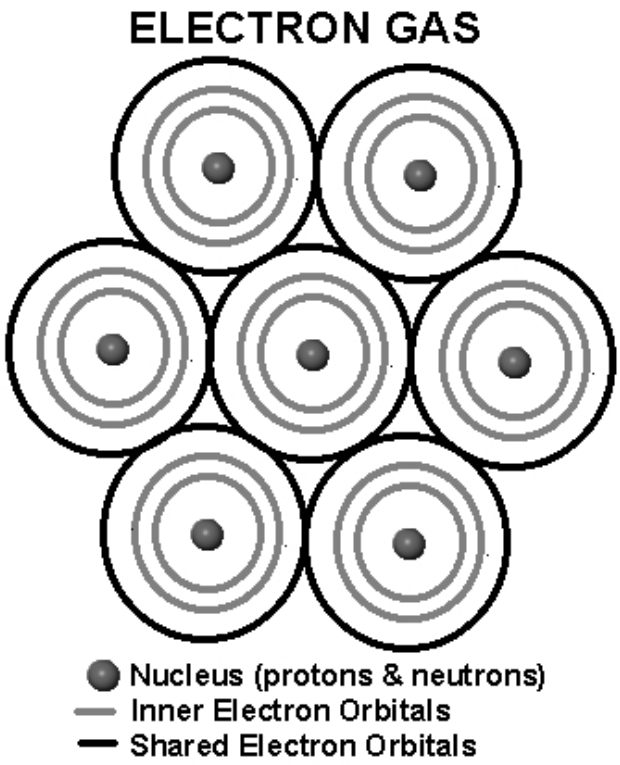

Figure 5: An electron gas formed by shared electrons in the outer orbitals (from Moncrieff and Weaver 1992a).

an electron. The charge differential causes the cation and anion to attract each other, forming an ionic bond. The metal cation is removed from the metallic structure, forming a stable compound with the anion on the surface of the parent metal. Removed ions leave holes in the metallic structure, perpetuating further ionic bonding and corrosion production. The result is the destruction of the original metal structure, "theoretically [proceeding] until the complete disappearance of the metal" (Stambolov 1969:7).

The stable compounds formed by corrosion are called corrosion products, and often take the form of metallic minerals found in metal bearing ore (David Blanchfield, personal communication, 2001; Cornet 1970; Cushing 1965; Jones 1992). Therefore, corrosion is "a loss of metallic properties due to remineralization" (Zycherman 1992:97). Aside from a difference in chemical composition, corrosion products also have a greater volume than the replaced parent metal.

Corrosion products are not always detrimental, and self perpetuating. They may be quite stable and protective. For example, both copper alloy and lead almost immediately oxidize after refinement. Oxidation is the process of ionic bonding between airborne or waterborne oxygen ions and metal ions, which form metal oxides. Metal oxides envelope an object's surface, often forming a protective layer which insulates the underlying metal from further corrosion. Artists often artificially applied stable patinas to bronze statuary for aesthetic appeal, and navy issue firearms used during the American Civil War were often patinated to hinder corrosion from the salt air.

According to Stambolov (1969:99): "The corrosion layers covering objects made of copper or copper alloys are often called patina. This term is quite general . . . [and] has always been an ambiguous term." For clarity, the term patina here refers only to uniform corrosion products either naturally or intentionally applied, which appear to be either beneficial or inert, posing no threat to the integrity of the artifact. Destructive corrosion products, which have clearly damaged, or continue to damage, an artifact are simply called corrosion. Generically, the term corrosion product is used. The corrosion process is not equal for all metals, or even the same metal. For example, gold corrodes very little, while iron is readily destroyed by corrosion. Pure copper, copper alloy, and lead fall in between, being relatively durable but still subject to corrosion. Metal alloys, metals combined with other metals to exploit their joint beneficial properties, corrode differently than their parent metals. Impurities affect metal corrosion,

as do the environmental conditions in which the metals were made, used, recovered, or stored. Stress on the atomic structure caused by cold working, or later mechanical damage, will increase the corrosion potential of the stressed area, while leaving the remaining areas unchanged (Stambolov 1969). For example, dented Fort Fred Steele cartridge cases are often corroded much more heavily in the dented areas opposed to the undamaged areas.

Copper Alloy Corrosion and Corrosion Products

As Cornet (1970), Jones (1992), Stambolov (1969), and Tylecote (1962) suggest, most metals are actually alloys, either intentionally or unintentionally. The cartridge cases from Fort Fred Steele are no exception. Copper is primarily alloyed with zinc to produce brasses and tin to produce bronzes, but may also be alloyed with nickel, lead, arsenic, and antimony (McManus 1990). Government issue cartridge cases manufactured from 1866 to 1873 were primarily copper or copper-tin alloy (Reuland 1991), while those made from 1873 to 1886 were made from gilding metal, a malleable brass (McChristian 1981; Reuland 1991; Scott 1989). Cartridge cases of these eras are more accurately identified as copper alloy, since visual metallic composition identification is difficult, and misidentification is common (McManus 1990). For archaeologists and curators, determining the exact composition of a copper alloy is not essential, because the corrosion mechanisms and products for copper and copper alloy artifacts are quite similar.

Color is the most obvious characteristic of corrosion products. Reactions producing different copper bearing minerals each produce different colored corrosion products. The color of any given copper-based corrosion product may vary greatly based on chemical composition and environmental conditions, but the basic colors are reds, blacks, greens, and blues.

Red and black corrosion products are typical of oxidation (Stambolov 1969), but the production of sulfides will also produce black coloration (Cushing 1965; Stambolov 1969). Lead- rich copper alloys are especially prone to black corrosion products if lead sulphate is formed (Stambolov 1969). Green corrosion products are the result of carbonates, chlorides, and sulfates, while the presence of ammonia produces corrosion products with a blue color (Canadian Conservation Institute 1989; Cushing 1965; Stambolov 1969).

The Fort Fred Steele cartridge cases primarily exhibit pale green, green, and bluish green corrosion products, ranging in severity from destructive corrosion to uniform stable patina. All the cartridge cases were collected near a dump, stone corral, and later domestic sheep drive route. Therefore, the chemical agents interacting with the copper alloy are probably derived from the soil, and supplemented by garbage and animal waste. Animal waste is a recognized source of ammonia, and detrimental to metals (David Blanchfield, personal communication, 2001; Jones 1992). Airborne pollutants, such as wood and coal smoke are also probable corrosion contributors.

One cartridge case exhibits an anomalous black color. This cartridge case has a semigloss, extremely uniform black finish, in sharp contrast to all of the other recovered cartridge cases. It is unclear if this black coloration is a corrosion product, or an intentional manufacturing patina. Doug Scott (personal communication, 2001) suggests the cartridge case may have a natural, black "desert varnish," while others suggest it may be a corrosion coating used by the U. S. Navy (Tom Peterson, personal communication, 2001), or an experimental cartridge made for the U.S. Army (Norman Carey, personal communication, 2001). Patrick Owens (personal communication, 2001) suggests it was not uncommon for this type of ammunition to be japanned, a process in which a laquer is baked onto an object. Unfortunately, records do not seem to exist for any U.S. arsenal patinating cartridge cases from this era in any form.

Composite artifacts, objects made of more than one material type, allow for corrosion to damage an artifact mechanically as well as chemically. The early .50-70 Government cartridge cases, manufactured from October 1866-September 1869, were constructed of a copper alloy case, with either a crimped iron anvil or iron cup internal primer (Figure 6). Iron is much more reactive than copper alloy, especially in the presence of water (Cushing 1965; Zycherman 1992). Iron may then corrode, or rust, much faster than copper alloy. Pressure builds up inside the cartridge case, as the internal iron primer corrodes and expands in volume. The pressure eventually tears the head surface from the rim, longitudinally splits the case, or both (Figure 7). However, if the crimps fail to hold the primer in place, especially for iron bar anvil primers, mechanical damage may not occur, since the corrosion can freely expand inside the cartridge case. Several early issue cartridge cases exhibit mechanical damage from the

corrosion of their iron primers.

Lead Corrosion and Corrosion Products

Like copper, lead may be an intention or unintentional alloy. Slugs manufactured during the latter stages of black powder use were usually alloyed with tin, antimony, or both to increase projectile velocities by hardening the slug (Bearse 1966). In fact, .45 caliber Government slugs were made of varying parts lead to one part tin (Pitman 1991).

Many of the Fort Fred Steele slugs are believed to be a lead alloy, due to their apparent hardness. However, the composition of the recovered slugs is generally unclear, with the exception of the .45 Government slugs. Therefore, the slugs will be identified only as lead, as in most of the relevant literature (Bearse 1966; Johnson and Haven 1943; Logan 1959; Pitman 1991; Reuland 1991; Shockley 1958). Determining the exact composition of the slugs is not essential, because the corrosion mechanisms and products for lead and lead alloy artifacts are similar.

Lead rapidly oxidizes, changing from a silver color to a dark gray or black color with the formation of lead oxide. Oxide coatings "are very hard, and under normal atmospheric conditions, act to protect the object" (McManus 1990:O:6). As corrosion progresses, lead carbonate is produced, forming a uniform white coating which may actually protect an artifact (Cushing 1965; Lane 1975). However, in the presence of pollutants, such as organic acids and chlorides, destructive lead carbonates and lead acetates are formed.

The lead slugs recovered from Fort Fred Steele appear to exhibit both lead oxides and varying degrees of white to tan colored lead carbonate. The tan color is believed to be coloration from the soil. These corrosion products appear relatively stable. The lead carbonate layers are relatively compact, and rarely cover the entire surface of a slug. The oxidation products are usually a uniform dark gray.

The formation of lead carbonate greatly increases an object's volume. Therefore, lead composite artifacts may exhibit mechanical damage from lead corrosion. Though not from Feature 162 or the slug concentrations, a single unfired .38 caliber Smith & Wesson cartridge was recovered from Fort Fred Steele. The cartridge case is moderately corroded, but the lead slug is heavily corroded. As the slug corroded, pressure built up inside the cartridge case where the slug was seated, and longitudinally split the cartridge case down the side (Figure 8).

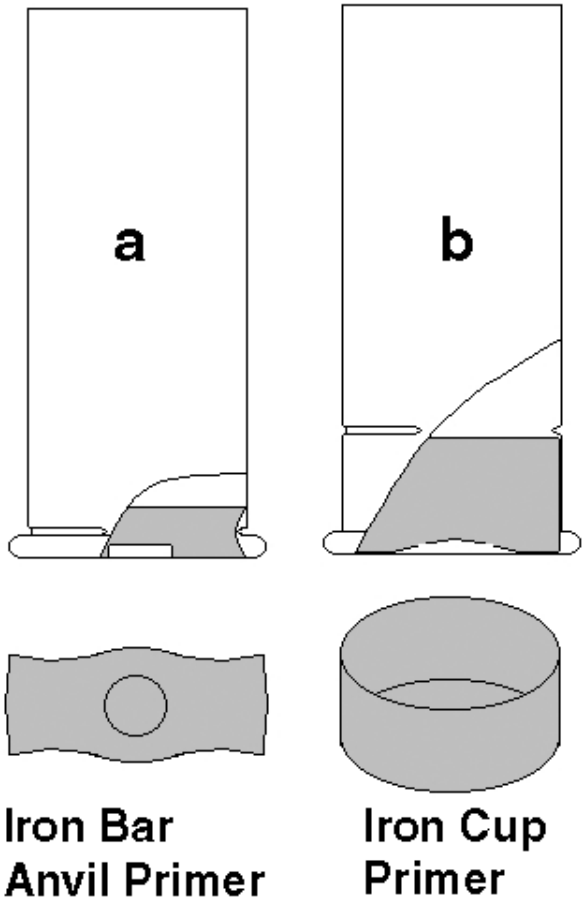

Figure 6: Iron bar anvil and iron cup internal primers. A = Iron bar anvil, October 1866-March 1868 (Logan 1959:92; B = Iron Cujp, March 1868-September 1869 (Lewis 1972:40).

CONSERVATION

The successful conservation of archaeological cop-

Figure 7: Mechanical damage from iron cup internal primer. Artifact number 48CR480-1503.

per alloy and lead artifacts easily becomes as complicated as the corrosion mechanisms which affect them. However, "the basic tenet of conservation is above all do no harm," with an emphasis on preventing "deterioration though control of the environment, in climate, storage, and on exhibition" (Bachmann 1992:2-3). The conservation of copper alloy and lead artifacts depends on three primary environmental characteristics: 1) relative humidity (RH), 2) temperature, and 3) pollutants. Relative humidity is the percentage of airborne water vapor in relation to temperature. High relative humidity is a catalyst for corrosion, since it transports the necessary oxygen for oxidation and initiates chemical reactions with pollutants. Chemical reactions, like corrosion, are accelerated by high temperatures. However, excessively low temperatures are usually associated with increased relative humidity and condensation (McManus 1990). Airborne pollutants are often corrosive. Dust may also contain corrosive chemicals, and trap moisture (McManus 1990).

The conservation of the copper alloy cartridge cases and lead slugs may be divided into three categories: 1) field recovery, 2) cleaning, and 3) storage and handling. In each of the conservation categories, the three environmental characteristics must be addressed to successfully stabilize, prevent, or remove corrosion products. However, a professional conservator is a valuable ally, and should always be consulted, especially prior to cleaning.

Field Recovery

Proper field recovery techniques are relatively simple. The techniques used to minimize mechanical damage, such as packing and transport, will not be discussed, since they are identical for virtually all artifacts. However, the corrosion of metal poses unique problems. Perfect conservation environments are probably not possible in the field, nor do they need to be, but several simple suggestions are important to keep in mind.

Figure 8: Mechanical damage from slug corrosion. Artifact number 48CR480-994.

Metal objects should not be washed in the field (Singley 1981; Sease 1988). Chlorinated water, or water with high chemical concentrations can accelerate existing corrosion or initiate a new outbreak. Water in most field situations is simply not chemically suitable for washing artifacts. Also, proper drying of washed metals is essential (David Blanchfield, personal communication, 2001). Appropriate drying may prove difficult and inconvenient in the field.

Only rudimentary field cleaning should be attempted. If metal artifacts are damp, they should be allowed to thoroughly dry in a cool, shaded place, never in direct sunlight or near a heat source (Sease 1988). Sunlight is not damaging to metal objects in and of itself, but direct sunlight and heat sources dry objects unevenly, causing expansion and contraction and possible damage. Loose dirt should be gently bushed away, but attempts should not be made to actively remove corrosion products. As Singley (1981) points out, corrosion products may contain wood or textile impressions, and mechanical corrosion removal with a pick or wire brush will probable damage an artifact. Corrosion products may also be stable and protective.

Metal objects should not be packaged in cardboard boxes or paper bags. Cardboard and paper produce organic acids which readily initiate corrosion, especially on lead (Bob Herskovitz, personal Communication, 2001; Sease 1988). Polyethylene (a stable inert plastic) bags are perhaps the best option for packaging. Caution should be used before using other plastic bags, because they may contain, or emit, corrosive chemicals. Ideally, silica gel (a desiccant) should be placed in each bag (Sease 1988; Singly 1981). If silica gel is not used, bags should not be sealed. Changes in temperature due weather or transport may cause condensation in sealed bags, and it is possible to establish chemically detrimental microclimates, despite external conditions. Also, bagged metal artifacts should be stored in a shaded, dry, cool location.

Metal artifacts found in a waterlogged environment, such as a marsh, river, or bog, should not be allowed to dry out, nor removed from the water in which they were found. Waterlogged metal artifacts, especially if they are composite artifacts, require specialized attention (see Brysbaert 1998; Storch 1997). Mistreatment can lead to rapid artifact destruction. A

conservator should be consulted immediately when waterlogged artifacts are found.

Cleaning

Cleaning is often an important part of a metal artifact's stabilization and preservation, but it can also be detrimental (Moncrieff and Weaver 1992b). McManus (1990:O:17) writes: "Archaeological artifacts are often over-cleaned because of a desire to see what is under the layer of corrosion, or because of the mistaken assumption that corrosion is like a 'cancer', and unless every last bit of it is removed, the object will continue to corrode." The presence of corrosion products does not automatically necessitate cleaning. Corrosion products may form protective patinas, or contain scientific or historical significance. Cornet (1970) even suggests the possibility of corrosion dating techniques, though such techniques have not been adequately developed.

Often corrosion is seen as a contemporary problem, which did not affect an artifact during its original manufacture and use. This is definitely not the case. For example, copper alloy cartridge cases, like those found at Fort Fred Steele, were historically prone to corrosion. Up until the1876 adoption of the canvas "Prairie Belt," copper alloy cartridge cases were carried in leather ammunition belts (McChristian 1981). The acids imparted to the leather during tanning quickly attacked cartridge cases, producing a green corrosion product often refereed to as verdigris. The reaction is said to have been so rapid cartridges needed cleaning "every few days" (McChristian 1981).

Why clean archaeological metal artifacts at all then? Cleaning is essential when dirt or active corrosion is damaging an artifact beyond the control of environmental stabilization methods, or when stable patinas or dirt incrustations are deemed expendable because they obscure underlying details or hamper research.

Active corrosion is usually easy to spot. "Active corrosion can be identified by a rapid expansion in volume as the metal alters to form a corrosion product. Flaking or powdering of the surface may occur. Any metal artifact surrounded by flakes or by loose powder can be considered actively corroding" (Canadian Conservation Institute 1989). Pitting is also an important indicator (David Blanchfield, personal communication, 2001; Henry Ford Museum 2000).

On copper alloy artifacts, stable corrosion products may vary in color, but remain uniform, compact, and smooth. Active corrosion is often marked by an eruption of light green powdery spots, known as bronze disease. Bronze disease is usually associated with extremely high relative humidity (Canadian Conservation Institute 1989). Active copper alloy corrosion may also appear as expansive powdery layers.

The corrosion products on the recovered cartridge cases are currently stable, though many exhibit severe damage from once active corrosion, including mechanical damage from iron primers, pitting, cracking, and fragmentation. Many of the stable corrosion products are smooth, compact, and strongly adhered to the cartridge case surface. Powdering and flaking is generally not present.

Another indicator of stability is the damage caused by earlier analysis. After the cartridge cases were recovered, corrosion products were aggressively scratched away from an area to reveal bare metal for identification. As a result, deep scratches were left in many of the cartridge cases. This type of analysis is definitely not recommended, especially in light of the ineffectiveness of visual identification and the number of sources which provide the basic composition of metallic cartridge cases (Bearse 1966; Johnson and Haven 1943; Logan 1959; Pitman 1991; Reuland 1991; Shockley 1958). However, the damage was done in the early 1990's, but many of the deep scratches still exhibit bright, uncorroded metal, while others only exhibit the natural darkening due to oxidation, suggesting destructive corrosion has not taken place since the initial analysis.

Active corrosion products on lead are loosely adhered white powdery layers of lead carbonate (Canadian Conservation Institute 1989). Stable corrosion products are usually dark colored oxidation patinas, or dense, uniform white layers. The recovered slugs are predominantly inactive. The majority of slugs display varying degrees of dark oxidation layers, and compact, smooth, and relatively thin lead carbonate layers. Also, bagged lead slugs exhibited little or no loose powdery deposits.

The storage climate of the cartridge cases and slugs in the University of Wyoming Archaeological Repository (UWAR) is another indicator of stability. The relative humidity is extremely low. Since the research for this paper began, the repository's relative humidity has only been 16-18%. Though the temperature is dangerously variable, approximately 65-95°, the repository's relative humidity usually remains stable at 15-18%. Despite the temperature variations, such low relative humidity inhibits active corrosion.

Cleaning Technique for Cartridge Cases

The cartridge cases from Fort Fred Steele were all cleaned to remove heavy dirt incrustations, and facilitate firearms identification. Cleaning processes for copper alloy are extremely diverse. They include sonic cleaning (Scott 1989), silver oxide treatment (Organ 1961), acid solution immersion, alkaline solution immersion, and electrolytic cleaning (Stambolov 1969). However, most of these methods are extremely complicated, and should not be undertaken by the average archaeologist or curator.

Robert Herskovitz, Chief Conservator for the Minnesota Historical Society, and David Blanchfield, Metal and Arms Conservator for the Colonial Williamsburg Foundation, were consulted to develop a conservative cleaning method for the cartridge cases. The cleaning process which was developed is divided into two stages: washing and polishing. Washing serves to remove dirt and oils from the metal, and polishing actually removes corrosion products.

Sonic cleaning, recommended by Scott (1989), was not used. Sonic baths use vibrations and "ultrasonic bubbles" in a liquid to remove dirt and corrosion (Moncrieff and Weaver 1992b:34). Sonic baths lack sufficient control, and may be considered "radical" (Stambolov 1969:62). The cartridge cases exhibit varying degrees of dirt and corrosion. Therefore, sonic cleaning would subject relatively clean surfaces to additional, and potentially damaging, cleaning to effectively clean the heavily soiled or corroded surfaces. More importantly, the majority of recovered cartridge cases are crushed, often with soil trapped inside. By submerging a crushed cartridge case in a sonic bath, the interior of the cartridge would be wetted, and thorough drying would be impossible. Trapped soil will retain moisture, which can combine with chemicals in the soil to initiate internal corrosion.

All of the cartridge cases were washed in a solution of 30mL of Triton XL 100 detergent per 2000mL of distilled water using a soft tooth brush. Triton XL 100 is a gentle detergent often used by conservators, but any gentle detergent, such as Ivory, is also acceptable (David Blanchfield, personal communication, 2001). Only distilled water was used. "Because water is such an effective solvent for ionic compounds you would expect water taken strait from the tap to contain ions dissolved from the rocks it has percolated through and flowed over" (Moncrieff and Weaver 1992b:78), and tap water is often chlorinated. Therefore, for conservation use, water must only contain water molecules to protect objects from inadvertent exposure to undesirable chemicals. Only distilled or deionized water is suitable for washing.

After washing, the cartridges were rinsed in distilled water and chemically dried with acetone. Acetone is quite volatile, meaning it readily, and rapidly, evaporates. Acetone applied to a water wetted object will "collect" the remaining moisture and rapidly evaporate away. A fan will accelerate the drying process by further dispersing evaporation products. Keep in mind acetone may remove artifact numbers physically applied to an artifact. Close attention to detail is essential to avoid confusion.

The several cartridges selected for firearms identification were polished after washing, in hope of improving their condition further. A paste of 20mL of distilled water, 20ml of ethyl-alcohol, and 53 g of whiting (precipitated calcium carbonate), was applied using a soft toothbrush, and then rinsed away with straight ethyl-alcohol. The whiting polish removed soil incrustations too hard to be removed by washing, and began removing corrosion products. Ethyl-alcohol readily mixes with water and is volatile, helping the drying process. However, the alcohol content of the whiting polish actually dried out the polish, making rinsing incredibly difficult. In hindsight, a better option may be to leave the ethyl-alcohol out of the whiting polish, rinse in distilled water, and acetone dry. Whiting must be used with caution. It is a fine abrasive when originally wetted, but if a whiting polish drys out, it may precipitate coarser granules, that if not rewetted and mixed thoroughly, can badly scratch an object (David Blanchfield, personal communication, 2001).

A secondary polish was also used. Autosol metal polish was applied using a felt pad, and thoroughly rinsed away using acetone. Most commercial metal polishes are not appropriate for cleaning archaeological metal. Commercial polishes, especially those labeled as brass cleaner, often contain harsh abrasives and significant quantities of ammonia. The result is a "clean," shiny finish, but scratching also occurs, and ammonia immediately and irreversibly attacks the metallic structure of copper alloy (David Blanchfield, personal communication, 2001). In addition to Autosol, commercial silver polishes are also often safe. However, caution is advised.

It must be made clear that cleaning, especially the polishing phase, is actually inflicting controlled dam-

age. "Polishing is always abrasive" (Canadian Conservation Institute 1988), and ineffective rinsing may leave unsightly, damaging residues, or redeposit dirt. Over cleaning can be as damaging as not cleaning at all. The goal of cleaning the cartridge cases was not to remove all traces of corrosion products, or return the cartridges to a "pristine" state. Rather, only enough cleaning was done to effectively remove visible dirt and corrosion to allow for effective firearms identification analysis. Polishing did not greatly improve the overall condition of most cartridge cases, and was discontinued. The value of the advice from a professional conservator cannot be overestimated. Many effective cleaning techniques exist, and educated decision making and conservative application will minimize the damage to archaeological artifacts, while maximizing their preservation and research potential.

Cleaning Technique for Slugs

Acid immersion, electrochemical reduction, and ion exchange resins are all suggested to clean lead (Lane 1975; Werner 1965), but most are again beyond the capabilities of most archaeologists and curators, and should only be attempted by professional conservators. Sonic cleaning is also ineffective for lead objects, because lead is "so soft and malleable that it 'soaks up' the vibrations" (Moncrieff and Weaver 1992b:34). Although the recovered lead slugs did not need cleaning, a simple cleaning technique was still devised. Lead corrosion products are toxic, so particulate respirators and exhaust hoods should be used for any cleaning.

David Blanchfield and Robert Herskovitz (personal communications, 2001) simply recommended wiping, or brushing off the corrosion products, and coating the lead with a microcrystalline wax. Blanchfield further suggested using a natural bristle brush to mechanically remove the corrosion products, followed by an ethyl-alcohol wash.

Storage and Handling

Storage and handling are the primary agents of archaeological metal stabilization. Stable storage for lead and copper alloy is the direct result of successfully addressing, relative humidity, environmental temperature, and pollutants. Active corrosion, such as bronze disease, is inhibited or stopped when relative humidity reaches 30-35%, or below 40% (Robert Herskovitz, personal communication, 2001; McManus 1990; Pye 1992; Zycherman 1992). For the storage of stable, or uncorroded objects, the relative humidity should be 45%, or well below 55% (David Blanchfield, personal communication, 2001; Henry Ford Museum 2000; Organ 1961; Zycherman 1992). The recommended relative humidity levels embody significant variability, but in general, the lower the relative humidity the better.

The recommended ambient temperature for storage areas is 16°C (60°F)-27°C (80°F) (McManus 1990). "Temperature is chiefly important for its effect on the relative humidity" (Pye 1992:400). Large temperature fluctuations may inadvertently increase relative humidity, and the likelihood of corrosion. Large temperature fluctuation may also cause metal objects to rapidly expand or contract, causing mechanical fatigue and damage. It is important to keep in mind different artifact material types have different recommended climate characteristics. For example, organic materials have a recommended relative humidity higher than metal. Therefore, climate characteristics for storage areas must take into account the needs of all the present material types, so a suitable compromise can be made.

Perhaps the greatest storage concern for copper alloy and lead artifacts is the accumulation of dust and airborne pollutants. "Dust is abrasive, can contain chemical pollutants, and is hygroscopic [moisture retentive]" (McManus 1990:O:23). Dust accumulation can lead to corrosion as well as mechanical damage. Dust may also instigate excessive cleaning.

Airborne pollutants are virtually impossible to eliminate. In marine environments, airborne chlorides are abundant, and recognized as a "major factor in the deterioration of copper artefacts in the museum environment" (Faltermeier 1997). Industrial centers produce sulfides, which are also detrimental to copper alloy and lead. However, the greatest contributor to airborne pollutants may actually exist inside museums, repositories, and labs. Organic acids, ammonia, and sulfides are unintentionally expelled into the air by wooden shelving, display cases, paper, cardboard, paints, rubber, leather, and janitorial cleaning supplies.

The best solution to neutralizing the effects of pollutants on lead and copper alloy artifacts is to limit their exposure to dust and contaminated air. Unlike bagging artifacts in the field, polyethylene bags can be used to set up beneficial microclimates, if external environmental conditions are stable (McManus 1990). Individually bagged artifacts can be stored in acid-free boxes, with acid-free paper tags. Silica gel can be used to control relative humidity, and activated charcoal and Pacific cloth can absorb or block corrosive pollutants. Many different vapor barriers exist to seal display cases

or storage cabinets. Most important, archaeological metal artifacts should never be handled with bare hands. Moisture, oils, and salts may be deposited through contact with bare skin, possibly initiating corrosion or eventually etching metal surfaces (Grossbard 1992; Henry Ford Museum 2000; Newey 1992; Zycherman 1992).

Large scale methods to reduce the exposure of metal artifacts to pollutants include using only metal shelving and storage cabinets, instead of wood. Remove unnecessary lumber, display cases, or miscellaneous wooden items from storage areas, especially if they are oak or pine. Separate metal object from other possibly damaging artifacts, such as those made of rubber, and keep metal objects together. What is most important, regularly inspect metal objects. Recognizing a corrosion problem early is essential for initiating an effective and efficient response.

The Fort Fred Steele copper alloy cartridge cases and lead slugs will each be individually bagged in four mil polyethylene bags, with an acid-free paper tag. Each individually bagged artifact will then be placed in an inert ethafoam padded acid-free box, the slugs by artifact number and model and the cartridge cases by artifact number, caliber and primer type. Once bagged and boxed, the artifacts will be stored in a metal cabinet.

CONCLUSION

The copper alloy cartridge cases and lead slugs recovered from Fort Fred Steele are only one example of the types of archaeological metals found in North America. Other archaeological metals include cast iron, steel, tin, silver, and various metal plated objects. North American archaeologists and curators must be accountable for the conservation of archaeological metals, not only to preserve the objects themselves, but also the research potential they may contain and their public education value.

The primary threat to metal artifacts is corrosion. Corrosion is an incredibly complex process, but with a rudimentary understanding of corrosion mechanisms and products, metal artifacts can be effectively conserved. The recovered cartridge cases and slugs provide examples of simple techniques to control artifact storage environments, namely relative humidity, temperature, and pollutants, to minimize the risk of corrosion. The conservation of archaeological metals requires a bit more effort than other artifact material types, but the benefits to the research community and general public are well worth it.

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A BRIEF DESCRIPTION OF HELEN LOOKINGBILL'S SOUTHERN SUBLETTE COUNTY COLLECTION

by
James A. Lowe

The Southern Sublette Collection was accumulated by the late Helen Lookingbill over a period of about ten years in southern Sublette County, during the 1970s and 1980s. The actual geologic and archaeological context of each artifact in the collection is unknown . This is due to a lack of any geomorphological study and the fact the general geographical location for each artifact was known only to the collector. The context is thus unknown and therefore has little scientific importance because the artifacts were removed from their original location. The collection represents separate surface finds from a small deflated area about one hectare in size.

The collection consists of 44 lithic pieces: one complete projectile point, 15 fragmentary projectile points (some nearly complete), ten projectile point bases, two bifaces, one graver, three scrapers, seven utilized flake tools, one small cores and four large debitage flakes (Figures 1-3; Table 1). This artifact assemblage displays characteristics very similar to those of the Paleoindian time period represented by the Scottsbluff and Eden point cultural varieties of the Cody Complex (Wormington 1957:118-137; Frison 1978:181-191; Frison and Todd 1987:199-231).

The material used in the construction of the Southern Sublette artifact assemblage is a variety of porcelanite and chert with the exception of a single ignimbrite artifact. Except for artifact numbers 105, 118, 129, and 132, the material used for manufacture is from localized sources within twenty to fifty miles of the site location.

EDITOR'S NOTE:

This paper was originally written for Dr. George C. Frison, Professor Emeritus at the Department of Anthropology, University of Wyoming as a term paper in the 1990 Paleoindian Seminar at the University of Wyoming. Dr. Frison suggested it be submitted for publication in *The Wyoming Archaeologist* because of its content and providing a record of the site.

TYPOLOGY

Of the 44 artifacts represented in the Southern Sublette collection, 16 are projectile points in various states of condition ranging from one complete point to partial blade-stem fragments. These are represented by artifacts 101-107 and 109-127 (Figures 1-2). Of these, three represent the Eden style of the Cody Complex and the remaining thirteen represent various Scottsbluff variants of the Cody Complex. Artifact 108 (Figure 1) is a nearly complete biface while artifacts 119-127 (Figure 2) are stem fragments showing Scottsbluff characteristics similar to others described by Frison and Todd (1987:figure 6.8b and 6.17a).

Artifact 128 (Figure 3) is a utilized flake while artifacts 129 and 130 (Figure 3) are edge retouched scrapers. Artifact 131 (Figure 3) is a graver with retouched edge work. Artifact 132 (Figure 3) is a large biface which may have been broken and with the sides and one end having been retouched by pressure flaking. Artifact 133 (Figure 3) appears to be a utilized flake, and may represent a small scraper because there is some edge retouch. Artifact 134 (Figure 3) is a small scraper made of Morrison quartzite with edge retouch and appears to be worn along the longest edge.

Artifacts 135, 137, and 141-143 (Figure 3) are debitage flakes. Artifacts 136 and 140 (Figure 3) are utilized flakes with reworked edges, especially artifact 136. Artifact 140 (Figure 3) has a small notch with edge retouch which may have been used to smooth objects.

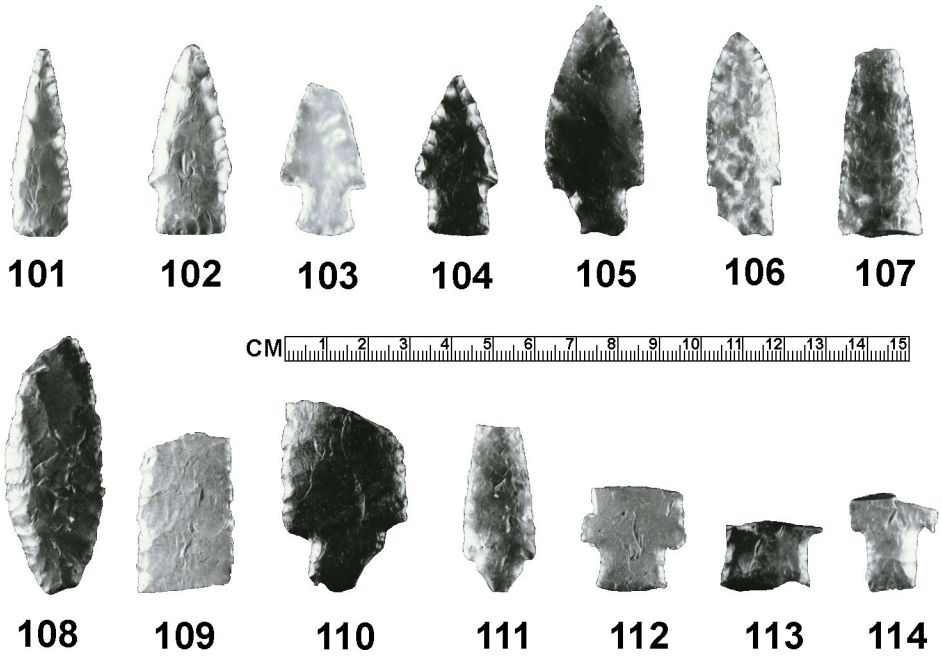

Figure 1: Artifacts from the Helen Lookingbill Southern Sublette County collection.

Artifact 138 (Figure 3) is puzzling, and appears to be a broken tool, yet the shape of the remaining piece may suggest a preform. Artifact 139 (Figure 3) appears to be a small core remnant and artifact 144 (Figure 3) seems to be a utilized flake with fine edge retouch.

All artifacts were numbered by the collector and will be referenced in this report (left, right, top, bottom) as if this number were oriented in reading position.

CHARACTERISTICS OF PROJECTILE POINTS AND STEM FRAGMENTS

Artifacts 101 and 102 are projectile points made of the same material and are virtually complete. Number 101 is long and narrow with two flat faces and is uniformly thin in thickness. It has a small portion of the tip missing or worn and resembles the Horner I examples (Frison and Todd 1987:208, a, i). Number 102 is quite thick in comparison to artifact 101 and is

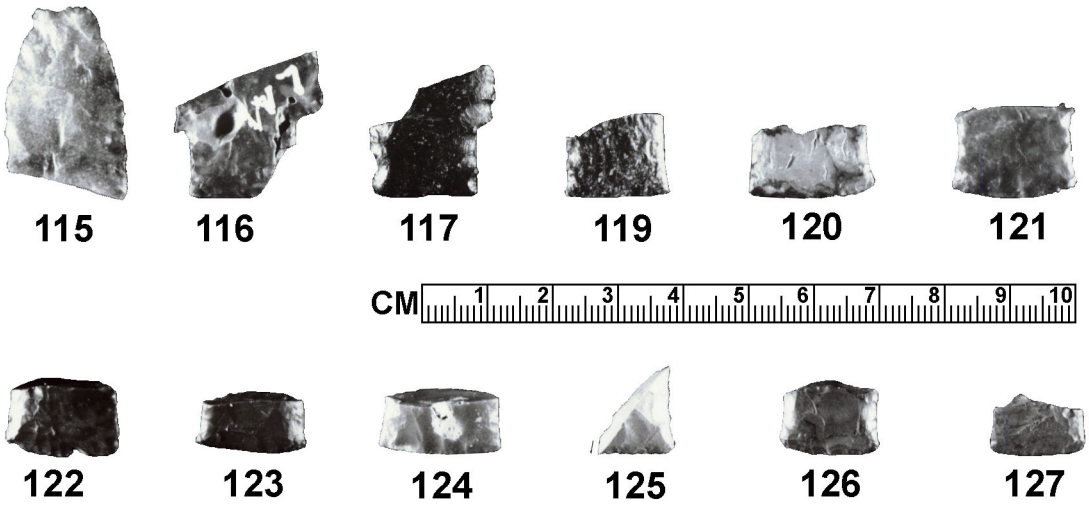

Figure 2: Artifacts from the Helen Lookingbill Southern Sublette County collection.

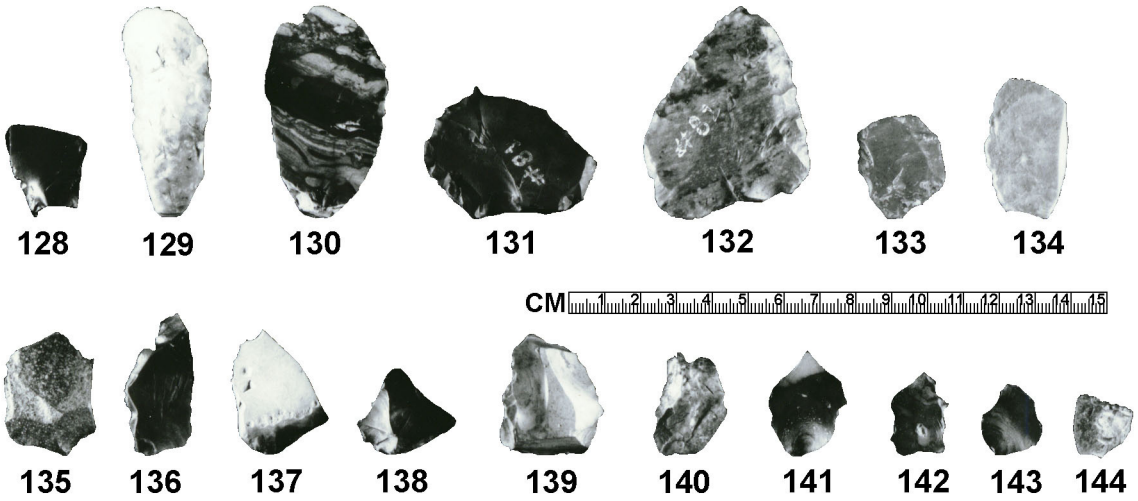

Figure 3: Artifacts from the Helen Lookingbill Southern Sublette County collection.

also uniform in thickness. The left corner tip of the blade is missing at the side notch and resembles the Horner II example (Frison and Todd 1987:202, Figure 6.1g). Artifact 103 is made from a semi-transparent white chalcedony. The tip is broken and there is a uniform break or burination down the left side of the blade from the remainder of the tip to the corner with most of the corner still intact. The stem flares outward from the shoulder to the base. The style of this is quite pronounced (Frison and Todd 1987:465, Figure 6.4g). The thickness of the blade and stem is quite thin and uniform. There is some fine retouch along the right side of the blade edge.

Artifact 104 is a complete projectile point with convex blade edges and is very distinct compared with the rest of the collection. The blade is short from stem shoulder to tip and is quite thick with a relatively long base in comparison. The blade, while thick in cross section, thins toward the stem. Blade edge flaking is relatively course while the stem flaking and retouch is finely done. This projectile point resembles a Horner site specimen (Frison and Todd 1987:209, Figure 6.5c). Artifact 105 is nearly complete, although the right basal portion of the stem is broken. The right corner tip of the blade is also broken. Both edges of the blade are finely pressure flaked. The blade curves slightly upward in an arch from the blade base to the tip. In addition, the edges have been finely retouched (Frison and Todd 1987:46s, Figure A 6.2B). There is a large flat area on the bottom side of the blade where a large flake appears to have been removed. This caused an irregular flatness which results in the thickness of the blade being irregular.

Artifact 106 is complete except for the missing right basal portion of the stem. It represents the fine workmanship characteristic of the square-based Eden point style found at the Finley site with transverse collateral flaking and diamond shaped cross-section (Wormington 1957):125, Figure 40, center of page). The corner notches represent a true 90 degree angle. The length of the blade point tapers quickly to the tip in both thickness and width. Artifact 107 is incomplete and also represents the Eden point style. Both tip and stem are missing. The large intact portion of the blade displays transverse collateral flaking and diamond-shaped cross-section (Frison and Todd 1987:218, Figure 6.13c). Artifact 108 is a nearly complete biface which is thin and uniform in thickness. Both ends are missing and there is some fine retouch along the edges. The condition and workmanship suggest a preform.

Artifact 109 represents the central portion of a large projectile point blade. Most edge flaking is course and the thickness is thin and uniform. Artifact 110 is the remainder of a large projectile point representing the Scottsbluff style. A large portion of the tip is missing. The bottom left portion of the stem is broken and the thickness is relatively thin and uniform. Artifact 111 is an incomplete projectile point with tip missing and both basal corners of the stem are also broken. This point represents the Eden style of manufacture, showing a fine transverse collateral flaking and diamond shaped cross-section. The blade edges have been finely retouched. There remains sufficient blade corner notches to suggest a true 90 degree relationship of stem

ARTIFACT NUMBER	TYPE	LENGTH	MAX BLADE WIDTH	BLADE THICK	STEM LENGTH	STEM BASE WIDTH	STEM SHOULDER WIDTH	STEM THICK	BLADE EDGE 1 LENGHT	BLADE EDGLE 2 LENGTH	MATERIAL	COMMENTS
SUBL-101	SB	44.96	14.52	3.74	9.17	13.75	13.28	3.46	36.82	37.08	Porcelanite	tip missing
SUBL-102	SB	45.22	*20.12	6.14	9.56	17.08	15.86	5.02	35.43	36.08	Porcelanite	broken left corner
SUBL-103	SB	36.54	*20.90	3.72	10.26	14.25	11.76	3.50	*25.18	*19.02	Opal	tip missing/burination
SUBL-104	SB	38.13	20.00	5.58	10.34	14.96	14.16	4.40	27.30	27.86	Green River Chert	complete
SUBL-105	SB	55.04	24.12	5.84	11.08	*11.46	*13.88	5.58	45.10	44.32	Chert	basal portion of base broken
SUBL-106	ED	48.64	17.95	6.14	11.62	*13.50	13.50	4.48	37.14	37.83	Opalitic Chert	basal portion of base broken
SUBL-107	ED	*44.94	20.38	6.96	---.--	---.--	---.--	---.--	*43.10	*44.36	Chert	broken tip/broken base
SUBL-108	BF	*61.90	23.86	6.40	---.--	---.--	---.--	---.--	*61.88	*59.68	Opaque Chert	two broken tips
SUBL-109	PP	*36.66	23.62	3.64	---.--	---.--	---.--	---.--	*34.10	*34.82	Porcelanite	broken tip/broken base
SUBL-110	SB	*44.80	30.42	6.10	11.42	*11.94	17.56	4.84	*31.67	*21.60	Opalitic Chert	tip missing/broken base
SUBL-111	ED	39.96	17.58	5.22	*7.38	---.--	11.16	4.82	32.50	31.70	Mottled Chert	Tip missing/broken base
SUBL-112	SB	*25.10	25.36	3.61	10.06	17.04	15.40	3.40	*13.19	*13.61	Fossiliferous Chert	large portion of tip missing
SUBL-113	SB	*16.05	---.--	---.--	12.72	21.84	19.84	4.10	---.--	---.--	Opaque Chert	stem
SUBL-114	SB	*23.16	21.94	4.44	13.25	11.36	12.90	4.48	*7.68	*5.67	Porcelanite	tip missing
SUBL-115	SB	*29.98	18.76	4.06	---.--	---.--	---.--	---.--	*30.80	*25.20	Opalitic chert	broken tip/broken base
SUBL-116	SB	*22.62	23.43	3.54	4.60	* 10.88	16.50	3.58	*4.00	*9.42	Porcelanite	broken tip/broken base
SUBL-117	SB	*20.06	*16.20	6.00	10.25	16.14	*16.56	4.90	---.--	*9.07	Ignimbrite	tip missing
SUBL-118	SB	17.98	17.12	---.--	13.12	13.38	15.70	6.78	*6.64	*3.80	Fossilized Bone	tip missing
SUBL-119	SB	---.--	---.--	---.--	*12.52	16.13	*15.12	5.06	---.--	---.--	banded chert	stem
SUBL-120	SB	---.--	---.--	---.--	*11.08	20.37	17.74	3.04	---.--	---.--	fossiliferous chert	stem
SUBL-121	SB	---.--	---.--	---.--	14.60	19.30	17.36	3.98	---.--	---.--	mottled chert	stem
SUBL-122	SB	---.--	---.--	---.--	11.50	17.66	16.58	4.54	---.--	---.--	mottled chert	stem
SUBL-123	SB	---.--	---.--	---.--	9.56	16.88	15.56	3.74	---.--	---.--	Meta Quartzite	stem
SUBL-124	SB	---.--	---.--	---.--	10.10	18.90	17.54	4.16	---.--	---.--	Chert	stem
SUBL-125	SB	---.--	---.--	---.--	*13.54	*11.98	---.--	4.42	---.--	---.--	Porcelanite	incomplete stem
SUBL-126	SB	---.--	---.--	---.--	11.56	15.34	14.48	4.04	---.--	---.--	Porcelanite	stem
SUBL-127	SB	---.--	---.--	---.--	9.42	14.72	*13.80	3.78	---.--	---.--	Porcelanite	stem
SUBL-128	UF	*23.84	20.00	5.44	8.56	13.24	16.10	---.--	15.54	---.--	Chert	utilized flake
SUBL-129	SC	56.58	28.14	8.90	---.--	---.--	---.--	---.--	---.--	---.--	Opalitic Chert	scraper
SUBL-130	SC	57.22	32.30	8.08	---.--	---.--	---.--	---.--	---.--	---.--	Green River Chert	scraper
SUBL-131	GR	47.66	36.50	6.38	---.--	---.--	---.--	---.--	---.--	---.--	Phosphoria	graver
SUBL-132	BF	53.14	45.10	7.24	---.--	---.--	---.--	---.--	---.--	---.--	Banded Chert	biface
SUBL-133	UF	27.78	23.84	2.60	---.--	---.--	---.--	---.--	---.--	---.--	Phosphoria	utilized flake
SUBL-134	SC	35.94	23.16	6.00	---.--	---.--	---.--	---.--	---.--	---.--	Orthoquartzite	scraper
SUBL-135	D	33.76	24.16	7.32	---.--	---.--	---.--	---.--	---.--	---.--	Fossiliferous Chert	debitage flake
SUBL-136	UF	39.90	18.26	5.04	---.--	---.--	---.--	---.--	---.--	---.--	Mottled Chert	utilized flake tool
SUBL-137	D	30.40	23.90	4.52	---.--	---.--	---.--	---.--	---.--	---.--	Mottled Chert	debitage flake
SUBL-138	UF	* 20.14	25.04	7.68	---.--	---.--	---.--	---.--	---.--	---.--	Chert	flaked tool

Table 1: Selected measurements and observations, Lookingbill Southern Sublette County Collection

SUBL-139	C	32.72	27.60	12.58	---.--	---.--	---.--	---.--	---.--	Porcelanite	core
SUBL-140	UF	28.58	18.60	5.58	---.--	---.--	---.--	---.--	---.--	Porcelanite	utilized flake tool
SUBL-141	D	27.78	21.40	4.30	---.--	---.--	---.--	---.--	---.--	Mottled Chert	debitage flake
SUBL-142	D	22.36	15.84	2.88	---.--	---.--	---.--	---.--	---.--	Mottled Chert	debitage flake
SUBL-143	D	19.02	17.76	3.50	---.--	---.--	---.--	---.--	---.--	Mottled Chert	debitage flake
SUBL-144	UF	*16.66	18.98	5.00	---.--	---.--	---.--	---.--	---.--	Opalitic Chert	utilized flake

* indicates partial measurement made on incomplete portion.
Type = SB, Scottsbluff artifact; ED, Eden artifact; PP, other projectile-point form; SC, scraper; GR, graver; BF, biface; UF, utilized flake; C, core; D, debitage flake.
All measurements in millimeters.

Table 1: continued.

to blade. This may indicate a square base.

Artifact 112 represents an incomplete Scottsbluff style projectile point. A large portion of the tip and blade is missing because of what appears to be an impact break (Frison and Todd 1987:209:Figrue 6.5e). Artifacts 113 and 114 also represent impact breaks to Scottsbluff projectile pints. The styles vary because of the obvious differences in stem shapes and width. The stem of artifact 113 flares slightly from shoulder to base. The left corner of the blade is still intact. The stem of artifact 114 is straight and narrow. Artifact 115 represents an incomplete projectile point of the Scottsbluff style. Only the central portion of the blade is present. Blade edges are not uniform because of the breakage. There is a large flake scar on the upward facing side of the blade. Artifacts 116 and 117 both represent impact breaks to Scottsbluff style projectile points. The individual styles vary as do material used for construction; for example, artifact 117 is made of ignimbrite.

Artifact 118 (not pictured) also represents an impact break. It is made of silicified wood and is broken cleanly across and just above the corner notches. The entire stem is quite thick. Artifacts 119, 120, and 122-127 are all stem fragments of the Scottsbluff style displaying fine edge retouch (Bradley and Frison 1987:214, Figure 6.9). Artifact 121 represents an impact break to a Scottsbluff projectile point just above the corner notches. The entire stem is intact.

The projectile points and stem fragments represented in the Southern Sublette collection display a wide variety of individual knapping styles within the Scottsbluff and Eden categories of the Cody Complex. Similar to the projectile points found and the Horner site and Larson Cache, artifacts 105, 112, 113, 114, and 116 display the hooked characteristic, "the proximal edge of the shoulder had been flaked so as to produce a slightly overhanging juncture of the blade edge and proximal margin of the shoulder" (Frison and Todd 1987:467).

METRIC COMPARISONS

Maximum blade length for projectile points 101-108 varies from 61.90 mm to 16.05 mm, depending on style and completeness of the artifact. Maximum blade width is relatively uniform, ranging from 30.42 mm to 14.52 mm, with most averaging between 20-23 mm. Blade thickness was uniform, ranging from 6.96 mm to 3.54 mm. Most of the projectile point stems

flared from the shoulder to the base, although with a difference that seemed to depend on individual knapping styles. The shoulder widths ranged from 19.84 mm to 11.16 mm (all stems complete) while the base width ranged from 21.84 to 11.36 mm (again, complete stems). Stem thickness was very uniform and ranged from 6.78 to 3.04 mm with most averaging 4.00 mm.

PRODUCTION SEQUENCE

All projectile points and stem fragments found in the Southern Sublette collection are manufactured from well-thinned biface preforms. After the initial biface shaping, attention was then paid to shaping the stem. The final shape of the artifact resulted from transverse flakes taken off the blade, starting from either the tip or the base. When that stage was complete, some (but not all) were further finished by fine retouching of the edge by pressure flaking.

CONCLUSIONS

The Southern Sublette collection represents an array of characteristics within the Scottsbluff and Eden styles of the Cody Complex. There is also clear evidence of individual knapping styles within the identified cultural styles which can be attributed to the idiosyncratic behavior and technological constraints of the flint knapper and that person's own level of expertise and choice of material. Because of the surface nature of each individual artifact found, lack of geologic context or available stratigraphy (and the lack of related cultural, floral or faunal material for interpretation), there exists the inability to make any geologic or spatial analyses of the collection. Because each artifact was a separate surface find, this leaves room only for descriptive analyses and categorization of morphological traits, as presented here. The most significant observation comes from the wide range of variation represented in the projectile point morphology.

ACKNOWLEDGMENTS

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EDITOR'S NOTE:
Check the following World Wide Web links for information on looting and vandalism of archaeological sites:

http://www.cr.nps.gov/aad/sitewat.htm
http://www.cr.nps.gov/seac/protecting/
http://www.cr.nps.gov/aad/pubs/tch11c.htm
http://www.cr.nps.gov/aad/pubs/tch16a.htm
http://crm.cr.nps.gov/archive/17-6/17-6-8.pdf
http://www.cr.nps.gov/seac/coping/3-elmendorf.htm
http://www.cr.nps.gov/seac/protecting/html/4n-knoll.htm
http://www.cr.nps.gov/seac/protecting/word/5g-mcmanamon.doc
http://lists.nonprofit.net/listproc/archives/fpforum/0002/msg00007.html

SHHH! MUSEUM HAS A SECRET: SECURITY WILL ABOUND WHEN THE AMON CARTER REOPENS

FORT WORTH — It is the deepest, darkest secret of the museum world. No one wants to talk about it. Most will not acknowledge its existence. Inquiries into its workings are usually met with stony silence. The subject is security, a conversational topic as taboo in the nation's cultural institutions as cockpit talk about crashes. Some of the wariness is based on cold, hard reality: Art theft is big business, $4 billion to $6 billion a year worldwide. And some of the hesitancy comes from the "gunslinger theory" that attention invites professional thieves.

But rest assured, no one forgot about security when they designed the expanded Amon Carter Museum, which will reopen this fall after a $39 million makeover. The building will have ceiling-mounted cameras capturing 30 frames a second, guards equipped with Secret Service-style earpieces, door locks that leave computer imprints of who was where and when, and other trappings of 21st century technology.

But security isn't just about preventing a daring heist of valuable art. It's just as much about protecting the art from a tornado tearing through the Cultural District, a burst water main or a fire caused by a faulty electrical wire. "Preservation of the art is one of the primary responsibilities of the museum," said Bob Workman, associate director of the Carter. "This includes not only assuring that all the art is properly housed, but is also always safe."

Security is a matter of layers; in the industry they call it "belts and suspenders." The more belts and suspenders, the better — especially if you're protecting hundreds of millions of dollars worth of art. "Unlike most valuable assets, art is not put in a vault like money in a bank. It's put in plain view of the public, allowing for close accessibility," said Wilbur Faulk, the head of security at the J. Paul Getty Museum in Los Angeles for 15 years. "It takes a different approach to protecting art than protecting diamonds or money in a bank."

Museum thefts are rare, but they attract plenty of attention. Vandalism is far more common, experts say, occurring as many as 60 or 70 times a year in major East Coast museums. Two paintings in the Dallas Museum of Art — a Frederic Edwin Church and an Edward Hopper — were intentionally scratched in 1998. The Carter has had few incidents. Those that have occurred — such as a bent wire on a Remington sculpture and a smudge on an oil painting — have been blamed on unintentional acts or overexcited juveniles.

"It's a balancing act between welcoming the public to experience the art up close and taking the proper measures to protect the art," Workman said. "We don't want to offend people, but many people aren't aware of the casual movements or gestures that can damage the art." Workman and security director Preston Byrd toured other museums to view cutting-edge advances in museum security, some of which came out of the hyper-secure casinos in Las Vegas. About 150 cameras will ring the museum's 107,000 square feet and will be monitored by guards 24 hours a day in the state-of-the-art control room in the basement. Motion detectors and alarms will be placed around the building.

Also, museums have the option of placing security devices on individual pieces of art, alerting guards if they are moved. However, no one will say whether the Carter will use the devices. Computers, the most revolutionary addition in museum security, can tell a guard instantly where an alarm is going off and why — even how to respond. "You're not going to find a guard at any price who will do what a computer does," said Steven R. Keller, a security consultant in Florida who has done work for the National Gallery of Art and the Smithsonian. "Unless you have constant train-

ing and plan for every single possibility in the world, inevitably he is going to fall out of skill because some of these things might happen once every 10 years. A computer doesn't have that problem," Keller said.

In the world of museums, however, damaged art can be repaired, and stolen art can be recovered. Burned art is gone forever, so none of the Carter's new security measures was more fundamental than deciding how to put out a fire. The old Carter museum used halon gas in the vaults, but because it is ozone-depleting, the gas is no longer available. All the museum had in its galleries for years were strategically placed fire extinguishers. The new Carter Museum will use a sprinkler system, but one that is far costlier and more sensitive than what's in the average office building. To trigger water, sensors must detect both smoke and heat. Even then, in areas such as the vaults, each sprinkler head has its own sensor so that not all go off at once. "You want the ability to put out a fire with the least amount of water as possible," Workman said.

Containing water, particularly when photographs and negatives comprise 95 percent of the Carter's collection, was also a major priority of the new museum's design. Most security experts consider water their biggest enemy, whether it comes from a pipe, flood or fire hose. "Whether your area of the country is prone to earthquakes, tornadoes or hurricanes, it doesn't matter, because the results of natural disasters will probably impact us all the same when it comes to water," Faulk said. As precautions, the Carter laid a layer of roofing material over the vaults. The basement was waterproofed. No bathroom is directly over a vault. Photographs and negatives, stored in chilled vaults, will be kept in water-resistant cabinets. The Carter even paid the city to replace an aging 12-inch water main under Camp Bowie Boulevard — just in case.

Even air quality didn't escape attention. A heavy-duty filtration system will purify the air of dust, contaminants and gases, all of which can harm artwork. The building's temperature and humidity must never vary by more than 4 degrees or 4 percent. Because materials — such as plywood, cabinets and carpet — emit gases when they are new, the museum will remain empty of artwork for at least three months after its completion while the air is purified.

In the meantime, the Carter's collection -- the part that isn't on loan to other museums — is tucked away in a high-end storage facility handpicked for its location. Security at the site was upgraded and so was the facility's climate control, paid for by the Carter. Although the Carter's staff is willing to break their silence on some matters of security, no one will say where the collection is stored. "The art is in Texas," said Museum Director Rick Stewart with a smile. "I'll leave it at that."

More than 150 security cameras will ring the museum. The expanded Amon Carter Museum is scheduled to open this fall.

By Chris Vaughn; Star-Telegram Staff Writer; Fort Worth Star-Telegram; Updated: Sunday, Mar. 4, 2001 at 01:50 CST