

# ALL POINTS BULLETIN



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## Colorado Archaeological Society - Denver Chapter

“...in the future, as in the past, the gathering of information will depend to a great extent on cooperation between avocational and professional archaeologists.” (H.M. Wormington, 1978)

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Volume 52, No.3

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### ARTICLE REPORT

#### “THE ADOPTION OF THE BOW AND ARROW: A MODEL BASED ON EXPERIMENTAL PERFORMANCE CHARACTERISTICS”

by Steve A. Tomka

American Antiquity, 78 (3), pp 553-569, July 2013

Reported by Bob Rushforth

Two projectile weapons systems predominated in North America. They were the atlatl dart and the bow and arrow. A recent article in American Antiquity used an experimental archaeological approach to demonstrate the advantages and disadvantages of each and showed the conditions under which each system likely was employed.

A projectile weapon system has two main tasks: (1) Deliver the projectile to the target, and (2) Cause a lethal wound.

In delivering a projectile to the target, the bow and arrow has distinct advantages over the atlatl dart for small (rabbit, turkey) and medium (deer, pronghorn) sized game. The arrow has higher projectile speed (53 meters/second) vs. the atlatl dart (19-27 meters/second). Higher speed allows for greater effective range. Effective range for the bow and arrow is 45 meters vs. 27 meters for the atlatl dart. Higher projectile speed also allows for a flatter trajectory, which improves accuracy. Accuracy is important for small and medium sized game, but is less important for large (elk, moose, bison) game, because the kill zones of prey differ with the size of the animal. (Kill zones: pronghorn = 23 cm. diameter, deer = 30.5 cm. and bison = 71 cm.) A flatter trajectory also provides for a shorter flight time to the target. This is important when hunting small and medium sized game, which are quick and elusive. It gives the game less time to react and take evasive action.

The atlatl dart, however, has its own advantages for large game. The atlatl dart has greater weight (75-155 grams) vs. the arrow (13-33 grams). This is an advantage in delivering a lethal wound to large game. There are two measures describing the ability to deliver a lethal penetration of the target. The first is kinetic energy (KE). The second is momentum (P). An increase in projectile weight and/or speed will increase penetrating power.

$$KE = (1/2)MV^2 \quad P = MV$$

Where: M is mass (weight)

V is velocity (speed)

Other factors influencing penetrating power favoring the atlatl dart are cutting edge length, head width, sharpness, fracture resistance, and shaft diameter.

The bow and arrow, on the other hand, was limited to small and medium game, except when revised hunting strategies were adopted to shorten the distance to the target and/or prevent escape. Examples of revised strategies are game drives, stalking approach, surrounds, impounds, and equestrian approach.

It is important for the bow and arrow to get closer to the target to achieve penetrating power for large game. Arrows lose 1.7 m/s speed over a 15 meters distance. The faster speed of the arrow at close range partially

compensates for the heavier weight of the atlatl dart. The ability to deliver multiple projectiles in a short period of time also was a bow and arrow advantage. A single arrow did not have to be lethal.

What did this mean for the adoption of the bow and arrow? The most important factor was the size of the available game. Atlatl darts would've been retained in areas where large game was available. Bow and arrow would've been adopted quickly in areas where only small and medium sized game was available. Where there was a mix of game, both bow and arrow and atlatl darts would've coexisted. The article gave three examples to demonstrate this theory. In the Southeast, only small and medium game was available. There, the bow and arrow replaced the atlatl dart quickly. In the southern Great Plains, there was a mix of game. The bow and arrow and atlatl dart coexisted at first, but the bow and arrow replaced the atlatl dart when the availability of large game declined. In the northern Great Plains, large game (bison) was available. The bow and arrow replaced the atlatl dart when revised hunting strategies developed.

The article closed with a question. Woodland assemblages (mixed game) include both arrowheads and large, hafted bifaces. Were these bifaces atlatl darts or hafted knives?

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**General Meeting:** Monday, March 10 at 7 PM in Ricketson auditorium at DMNS.

**Speakers:** **Steven R. Holen, Director of Research**  
**Center for American Paleolithic Research and Kathleen Holen MS, MA, Center for American Paleolithic Research**

**Bio:** Steven Holen has more than 40 years of archaeological experience in the Great Plains and has worked on all types of archaeological sites dating from historic to pre-Clovis. Recently, Steve has concentrated his efforts on determining when humans first arrived in North America. He has excavated several mammoth sites with impact-fractured and flaked bone that suggest humans were present on the Great Plains during the Last Glacial Maximum when Canada was covered with glaciers from coast to coast. This evidence indicates that humans must have arrived before the route from Siberia to the Great Plains was closed about 22,000 years ago. Steve also researches Clovis lithic procurement and mobility on the Central Plains. Steve recently retired as Curator of Archaeology at the Denver Museum of Nature & Science. He then joined his wife Kathleen in a new nonprofit organization, the Center for American Paleolithic Research, with the goal of searching for evidence of early humans in the Americas

**Bio:** Kathleen retired as a Geriatric Nurse Practitioner after more than 26 years in practice and more than 10 years of avocational archaeology. In 2009 she received her MA in archaeology from the University of Exeter, Devon, United Kingdom. She is interested in early human dispersals into the Americas from the perspective of human cognition and behavior. She has participated in Steven Holen's research by studying prey animal bones and methods for differentiating human made bone modifications from other causes. She is co-director of the Center for American Paleolithic Research.

**Title: The Mammoth Steppe: An Early Human Pathway to North America**

**Abstract** In this presentation we will introduce the Mammoth Steppe Hypothesis that suggests a human migration into the Americas sometime between 40,000 and 30,000 years ago. This time period was characterized by a relatively mild climate that created a vast contiguous grassland from Siberia to Mexico which was capable of supporting abundant animal life. Humans adapted to this mammoth steppe biome in northern Siberia during this time as demonstrated by material cultural evidence from Yana RHS and other Siberian sites. Ecological data from the Mammoth Steppe supports the assertion that humans could have followed the Mammoth Steppe grassland into the Americas. We suggest that human populations from northern Siberia were able to disperse across Beringia and down the eastern edge of the Rocky Mountains when an interior corridor was open prior to 22,000 radiocarbon years ago. Support for the hypothesis is based on evidence from multiple North American mid-continent archaeological sites dating to this period and the Last Glacial Maximum (LGM), including one in the San Luis Valley of Colorado. Evidence from thirteen sites, five of which contain stone tools, is summarized. We also provide evidence of human presence in the form of bone modification resulting from percussion technology. Hammer stone percussion results in bone modification patterns and distinctively-shaped notches that can be distinguished from carnivore gnawing or trampling. Experimental bone breakage of elephant and cow bones shows how bone breakage patterns found at archaeological sites are produced. The dispersal of small populations

of pre-LGM populations left a sparse archaeological record in North America which warrants ongoing investigation through systematic research in geological deposits greater than 15,000 years old.

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### February 4, 2014 DC-CAS Board Meeting

There was no meeting due to the storm. Members emailed reports; here is a summary of those reports:

**Vice Pres/Speakers (Linda Sand)** reported Neil Hauser and Jon Kent are speaking at the DC-CAS General Meeting February 10, 2014. Dinner will be held at Annie's at 5:15 PM prior to the meeting. Speakers are lined up thru May. Steve and Kathy Holen are scheduled to speak during the March General Meeting, Dean Siatta is set for April and Scott Ortman will be speaking at May's DC-CAS General Meeting.

**Scientific (Neil Hauser)** reported good progress is being made on curation and analysis and plans are being made to continue analysis two nights twice a month through the winter season. Summer survey and excavation projects are in the works including a survey in Ken Caryl and one more season at Blackfoot to focus on the possible paleo-Indian utilization of the site.

**Membership (Rosalie Hewins)** announced two new members joined in January, however 13 were dropped for a total of 170 current members.

**CO-CAS (Teresa Weedin)** next CO-CAS meeting is scheduled in Boulder April 12, 2014

**PAAC (Anne Winslow)** registrations for the upcoming Lithics course scheduled for April are starting to come in. [Edit note: Details on page 4.]

**Treasurer (Preston Nieson)** submitted the January 2014 Financial Report.

**Trips/Events (Teresa Weedin & Jann Dillon)** reports trips and activities are being coordinated for 2014. The Chaco/Salmon/Aztec trip scheduled for mid-May is coming together. The Chilli Cookoff has found a home at Peter and Charlotte Faris's home. A flyer and map to the location will be available at Monday's General Meeting.

**APB/e-APB Newsletter (Kathy Barzen, Bob Rushforth & Ken Andresen)** The February APB has been posted on [www.cas-denver.org](http://www.cas-denver.org).

**DC-CAS Website (Craig Banister)** reported as of January 2014 the DC-CAS APB has been posted on a hidden page for members to access. A link to this hidden site is emailed to all members who have given their email address to the APB team monthly. A few changes were made to the DC-CAS website, 'Events' from the menu was changed to 'Monthly Meeting' to improve its description and a new web page was created named 'Activities' for events/field trips to be posted.

**Old Business:** No old business has been raised at this time. The previous minutes were approved.

**New Business:** A question concerning security for the APB online option will be addressed by Preston at the March DC-CAS Board Meeting.

A question regarding a backup for our current Webmaster will be addressed by Bob Rushforth and Jack Warner. Blackfoot Cave liability waiver option to be reviewed and addressed by Jack Warner.

The West entrance of Denver Museum of Nature & Science will be opened by Bob Rushforth while Rosalie is in Florida for the season

**DC-CAS General Meeting is still on schedule for Monday, February 10, 2014. The next DC-CAS Board Meeting is scheduled for March 4.**

Kendra Elrod, Secretary

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### DC-CAS General Meeting @DMNS Ricketson Auditorium February 10, 2014

Approx 40 people attended.

Jack Warner called the meeting to order 7:03 PM

**Events (Teresa)** announced the Chili cookout is this weekend; a flyer and map to the location of the event is in distribution. On March 15 there will be a field trip to the History Colorado exhibit Living West.

APB Online for February is posted; all members are welcome to access newsletter through the hidden site.

**Scientific (Neil)** will incorporate field work announcements with his talk.

**PAAC (Jack Warner for Anne)** the next course being taught in Denver is Lithics, registration is now open. [Edit note: Details on page 4]

Jack Warner introduced Jon Kent and Neil Hauser as contributors to the lecture and Neil began his talk about the ongoing field work at Blackfoot Cave site in Douglas County, Colorado.

Jack W thanked Neil and Jon for their work as well as all other participants with the ongoing projects.

**Old Business:** Old minutes from December and January were approved.

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**New Business:** BobRushforth announced April 20 is the 100-year anniversary of the Ludlow Massacre. For anyone interested there will be lectures given April 18-20 pertaining to the strike and massacre in Pueblo. More information will be posted on the DC-CAS website.

It was announced the traveling Mayan exhibit opens February 14 at the Denver Museum of Nature and Science.

Jack W adjourned the DC-CAS General Meeting at 8:06 PM.

Kendra Elrod, Secretary

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## BLACKFOOT CAVE

Curation (Repository in Castle Rock)

Analysis (5379 South Flanders Way)

Contact: Neil Hauser [hauserndigger@gmail.com](mailto:hauserndigger@gmail.com)

## LECTURES & COURSES

“Stone of Heaven & Earth: The Symbolism of Jade in Ancient Maya Thought”, by Karl Taube, University of California Riverside. Sunday, March 16, 2:30 pm, Denver Art Museum, Sharp Auditorium, Hamilton Bldg., Meeting of Alianza de las Artes Americanas. Call 720-913-0173 for more information.

“Impact of Sahara Drying on the Development of Egyptian Civilization in the Nile Valley”, by Bob Raynolds, Monday, March 17, 7 pm, Gates Planetarium, Denver Museum of Nature & Science, 2001 Colorado Blvd., Meeting of Egyptian Study Society

“We prefer metal pots:” ethnoarchaeology of ceramic production and consumption in the Banda area (Ghana)., by AIA Denver Chapter President Dr. M Dores Cruz, University of Denver Department of Anthropology. March 30, 2 pm, Sturm Hall, Room 453, University of Denver. Meeting of Denver Society of the Archaeological Institute of America

Abstract: Production of goods, and its correlation with social relations, has been a major component of archaeological research, although direct evidence of production is often scarce. Demand, equated with the concept of consumption, has been less central than production to the research of material culture. Drawing on archaeological and ethnographic research done the Banda Traditional Area (Ghana), I focus on the trajectory from production to consumption, and the distribution of ceramics. Stressing particularly changes that occurred during the 20<sup>th</sup> century, I analyze how ceramic production strategies had to adjust to new consumption preferences, influenced mostly by the integration of Banda into a market economy.

“Upper Paleolithic Human Migration”, by Julien Riel-Salvatore, Tuesdays, April 8-29, 6:30-8:30 pm, Denver Museum of Nature & Science, 2001 Colorado Blvd. Cost: \$75 DMNS Member, \$105 Nonmember.

## EXHIBITS

“Maya-Hidden Worlds Revealed”, through August 24, 2014, Denver Museum of Nature & Science ([www.dmns.org/maya-hidden-worlds-revealed](http://www.dmns.org/maya-hidden-worlds-revealed))

## CAS TRIP

Visit the new History Colorado exhibit “Living West”, March 15. Meet Teresa Weedon at 10:15 am in the lobby. Cost: Non-HC members \$10 if 10 or more attend, (\$12 if less than 10 attend). Sign-up at March General Meeting (Phone 303-366-7843 after March 9). Teresa is working on a “surprise” for attendees. Plan on lunch either at the Rendezvous Café at History Colorado or another place nearby. Due to construction across Broadway there is no on-street parking.

## PAAC COURSE

Denver: “Lithics Description & Analysis”, April 3, 10, 17, May 1, 8, 15, and 22

Register by making out a check for \$12 made payable to “Colorado Historical Society” and sending it to the Denver Chapter PAAC Coordinator, Anne Winslow, at 7077 Robb St., Arvada, CO 80004 (Phone: 303-807-8729, email: [annewinslow52@comcast.net](mailto:annewinslow52@comcast.net))

## PAAC SUMMER TRAINING SURVEY

Pawnee Buttes: June 10-14 & 19-22 Contact: Kevin Black ([Kevin.black@state.co.us](mailto:Kevin.black@state.co.us))

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## CONFERENCES

Colorado Council of Professional Archaeologists, March 20-23, Glenwood Springs, CO

American Research Center in Egypt, April 4-6, Portland, OR ([www.arce.org](http://www.arce.org))

Society for American Archaeology, April 23-27, Austin, TX ([www.saa.org](http://www.saa.org))

### Chili Cookoff Results

by Teresa Weedon

On Saturday, February 15, the Denver Chapter's Chili Cookoff was held at Peter and Charlotte Faris's in Aurora. Nineteen members attended and sampled four chilis, different salsas and Teresa's Black Bean Dip. The chilis were named by their preparer. The awards were: Best Other: "Chili de Camarones" (Shrimp chili) by Peter Faris; Best Red: "Tenderfoot Two-Step" by Terry and Sharon Murphy; Best Name: "Tenderfoot Two-Step" by the Murphys; and Best Overall: "Fingerless Chili" by Bob Tipton and Cecelia Farin. The last chili which didn't win a prize this year was called "Sochi Not So Hot Chili" by Iris Evans. Julie Tipton brought Cherry Cordial Ice Cream. There was also a fruit plate to sample from and Jalapeno/Buttermilk Cornbread (yum!). I know there are other cooks out there who make chili, so why don't you make a batch next year and have a lot of fun!

#### DCAS January, 2014 Financial Report Prepared by Preston Niesen, Treasurer

Lab/Library Space	\$ 4,224.31	\$ 4,224.31
Student Membership	\$ 21.50	\$ 21.50
Speakers Meal Fund	\$ 638.37	\$ 661.37

#### Assets

	December	January
Key Bank checking	\$ 1,565.09	\$ 2,015.09
TD 182 day to 01/02/14 @0.2%	\$ 5,678.15	\$ 5,682.42
TD 182 day to 10/23/13 @0.15%	\$ 4,798.58	\$ 4,798.58
TD 91 day to 12/25/2013 @0.1%	\$ 4,107.51	\$ 4,107.51
TD 1 year to 2/14/14 @ 0.2%	\$ 4,978.98	\$ 4,982.52
<b>Total checking/savings</b>	\$21,128.31	\$21,586.12

<b>Total Liabilities &amp; Funds</b>	\$12,633.00	\$12,690.75
General Fund	\$ 8,495.31	\$ 8,895.37
<b>Total L E F's</b>	\$21,128.31	\$21,586.12

#### Total Assets

\$21,128.31      \$21,586.12

#### Liabilities & Equity

##### Current Liabilities

	December	January
AH Scholarship Fund payable	\$ 75.00	\$ 80.00
State CAS Dues payable		

##### Funds

Scientific Applications	\$ 2,272.45	\$ 2,302.20
Swallow Report Project	\$ 2,556.81	\$ 2,556.81
D Bucknam Memorial Speaker Fund	\$ 1,747.10	\$ 1,747.10
Blackfoot Cave	\$ 130.00	\$ 130.00
Library	\$ 302.45	\$ 302.45
Education	\$ 182.00	\$ 182.00
Field Trips/Social	\$ 483.01	\$ 483.01

**ARE YOU MOVING OR DO YOU HAVE AN ADDRESS CHANGE???** Please update your address for the APB with our Membership Chairperson.

**MEMBERSHIP APPLICATION or RENEWAL**

**Denver Chapter/Colorado Archaeological Society**

Please check the address label on your APB to determine when your membership expires.

\_\_\_ Application or \_\_\_ Renewal

**Membership Type**

\_\_\_ Individual \$30.00 \_\_\_ Individual w/o SW Lore \$22.00

\_\_\_ Family \$45.00 \_\_\_ Family w/o SW Lore \$35.00

\_\_\_ Student (include copy of ID) \$16.00

\_\_\_ Current State CAS Life member or Full member of another chapter \$14.00. Primary chap. \_\_\_\_\_

**Contributions** to these funds:

\$\_\_\_ General \$\_\_\_ Swallow Site

\$\_\_\_ Scholarship fund \$\_\_\_ Contribution Total

TOTAL of membership and contributions \$\_\_\_\_\_

Name(s)\_\_\_\_\_

Address\_\_\_\_\_

City\_\_\_\_\_ State\_\_\_\_\_ Zip\_\_\_\_\_

Phone #\_\_\_\_\_

Email\_\_\_\_\_

\_\_\_ Exclude my/our contact information from printed roster

**Note:** Payment of dues for renewal is considered reaffirmation of your consent to the CAS Code of Ethics.

Make checks payable to: **Denver Chapter/CAS**

Mail to: **Denver Chapter/CAS, P.O. Box 100190**

**Denver, CO 80250-0190**

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