

The Journal

Houston Archeological Society

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Houston Archeological Society

Number 134

2015

Wilson W. Crook, III, Editor

Published

by the

Houston Archeological Society

2015

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ISBN 978-1514146309

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Forward

The *Journal of the Houston Archeological Society* is a publication of the Society. Our Mission is to foster enthusiastic interest and active participation in the discovery, documentation, and preservation of cultural resources (prehistoric and historic properties) of the city of Houston, the Houston metropolitan area, and the Upper Texas Gulf Coast Region.

The Houston Archeological Society holds monthly membership meetings with invited lecturers who speak on various topics of archeology and history. All meetings are free and open to the public.

Membership is easy! As a nonprofit organization, membership in the Houston Archeological Society is open to all persons who are interested in the diverse cultural history of Houston and surrounding areas, as well as the unique cultural heritage of the Upper Texas Gulf Coast Region. To become a member, you must agree with the mission and ethics set forth by the Society, pay annual dues and sign a Code of Ethics agreement and Release and Waiver of Liability Form.

The Membership Form and the Code of Ethics agreement and Release and Waiver of Liability Form are available from the HAS website: <http://www.txhas.org/membership.html>

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Editor's Message

Continuing with our pledge to publish *The Journal* on a more regular basis, I am pleased to present Issue Number 134 which is, hopefully, the first of two issues for calendar year 2015. As you can discern from the cover, this issue is dedicated to some recollections on the 56 year history and achievements of the Houston Archeological Society. In the opening article, HAS President Linda Gorski details those achievements as well as documents many of the past award winners from the society. This type of "corporate memory" is frequently lost in many organizations, so this article alone makes Issue Number 134 something to retain in your library.

Following Linda's paper, we have two short articles on further HAS memories; one from Charter HAS Member Bill Moore on his early recollections of the society and its meetings, and a second paper by Tom Nuckols on his first TAS Field School. This is followed by a short paper in which long-time HAS members Jack Farrell and Dub Crook identify and speculate on the origin and implications of a Puebloan ceramic sherd found in Brazoria County about 15 years ago.

The last part of this issue of *The Journal* is an open section on various papers on Texas archeology and includes a detailed research paper on ground stone tools (mano and metates) from the East Fork of the Trinity River, two short papers on new ceramic tool discoveries from the Hogge Bridge site in Collin County and the Gilkey Hill site in Kaufman County, and a paper on an anomalously early radiocarbon date from the Hickory Creek site near Denton, Texas. The latter is intriguing as both the tools, the extinct Pleistocene mammal fauna, and the age date all closely correspond to a similar unexplained pre-Clovis site in Oklahoma (the Burnham site).

As always, we are very much open to receiving any new submission that deals with an archeological subject within the State of Texas. Do not worry that your paper may not be "perfect;" your editor is more than willing to work with you to create a publishable result. Please send all submissions and inquiries to Dub Crook at the following address:

dubcrook@kingwoodcable.com

Or call me with questions at 281-360-6451 (home) or 281-900-8831 (cell).

Errata

On page 27 of Issue Number 133 of *The Journal*, the reference to Perttula and Brown (1999) should read Perttula (editor) (1999). The full reference is as follows:

Perttula, Timothy K. (editor)

1999 The Hurricane Hill Site (41HP106): The Archeology of a Late Archaic/Early Ceramic and Early Middle Caddoan Settlement in Northeast Texas. *Friends of Northeast Texas Archeology, Special Publication No. 4*, Austin and Pittsburgh.

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As the current president of the Houston Archeological Society I have been asked by our HAS Journal Editor, Dub Crook, to write a brief history of the Society. In writing this paper, I have sent drafts to a number of our long-time members to get their input. This is by no means a complete history of the Society. I hope that as you, our members, read this article, you will send in corrections and additions so that we can compile a truly complete history of this vital organization for future generations of professional and avocational archeologists in the Southeast Texas area. This article will be published in HAS Journal No. 134, but eventually it will also be posted as a separate page on the HAS website at www.txhas.org thus making it a living document to which changes can be made instantly. We look forward to your input.

*Linda C. Gorski
President, Houston Archeological Society, 2015
president@txhas.org*

THE HISTORY OF THE HOUSTON ARCHEOLOGICAL SOCIETY

Linda C. Gorski

The Houston Archeological Society (HAS) was formed in late 1959 as a non-profit organization that serves the professional, student and avocational archeological community of Houston / Southeast Texas area. HAS was modeled after other Texas archeological societies previously in existence such as the Dallas Archeological Society. The stated purpose of the organization was to foster enthusiastic interest and active participation in the discovery, documentation, and preservation of cultural resources (prehistoric and historic) of the city of Houston, the Houston metropolitan area, and the Upper Texas Gulf Coast region. The HAS offers research, historic property site assessments, archeological survey and excavation opportunities, education and outreach programs as well as research publications.

The HAS was formed by a small group of individuals with an interest in archeology, and of the history of the early inhabitants and settlers of Texas, especially those occupying the Upper Texas Gulf Coast and adjoining states. Incorporated on October 10, 1966, the Society sought to bring together persons with similar interests in the science of archeology, thereby creating an atmosphere conducive to the preservation and exchange of historic and prehistoric data of the State of Texas. By supporting research and archeological projects, the Society is able to preserve the mission of HAS and to promote a wider public understanding and appreciation of archeology and related fields of science.

Since 1959, the HAS has organized, directed and participated in multiple archeological projects associated with the salvage efforts of private landowners to minimize the loss of scientific data; mitigation (monitoring) of sites during infrastructure construction to minimize site disturbance; and the excavation of important prehistoric and historic sites as a result of erosion, land development and environmental degradation. We have also formed close working relationships with local CRM (Cultural Resource Management) firms and government agencies including the Texas Department of Transportation (TxDOT), which frequently seek our participation in their projects within the Upper Texas Gulf Coast Region, and the greater Houston metropolitan area. Owing to the vast expansion of the City of Houston, the HAS also assists the

City in conservation and preservation efforts of historic properties (prehistoric and historic) sites, as well as historic buildings and neighborhoods within Houston.

Over the years, the Houston Archeological Society has met in a variety of locations. Currently, the HAS holds monthly meetings on the third Thursday of the month at 7:00 p.m. at MD Anderson Hall, on the campus of the University of St. Thomas. Programs are presented by both local and visiting archeologists on a wide range of historical and archeological topics. The meetings are free of charge and open to the public.

Members of the HAS also meet twice a month in the Archeology Lab in Sewall Hall at Rice University to process artifacts and other excavated materials from Society field projects or material made available for study by private individuals or institutions. Members of the HAS are instructed on proper archeological lab techniques and receive hands-on experience using approved archeological methods. The lab directors also conduct workshops on topics of general interest related to laboratory study of artifact material including lithics, ceramics, glass, munitions and faunal remains.

Finally, we cannot stress enough in any history of the Society the importance of examining and documenting surface collections and registering the sites on which they were recovered. Quoting from Leland Patterson's excellent article in HAS Journal #122, December 1998, pp. 20 - 22, "*Many archeologists seem to put value only on data from excavated sites, ignoring data from surface collections at archeological sites in the same area. In Southeast Texas, a high proportion of archeological data is from surface collections.*"

(See complete article at: <http://www.txhas.org/PDF/journals/1998/HAS%20Journal%20No%20122.pdf>)

This premise was highlighted very recently (late 2014) when an HAS member was walking through a new development in the Kingwood area of Harris County and noted what she thought was a Clovis era artifact in a pile of dirt. She called in one of our lithics experts from the Society who confirmed her finding as a Clovis blade. The land developer was contacted and graciously allowed three members of HAS to conduct a field walking survey of the area before further development took place, resulting in the recovery of an

additional 23 Clovis era artifacts. The Timber Fawn Site (41HR1165) was ultimately registered as an archeological site with the Texas Archeological Research Laboratory in Austin and research on the relationship of the site's artifacts to other Texas Clovis sites is continuing.

Currently, three personal collections that were gathered as a result of surface collecting by private individuals are being examined by HAS members at the lab at Rice University and the information being documented will add immeasurably to the database of Southeast Texas archeology. Again quoting the Patterson article, "*Data from surface collections are especially useful for regional studies. Archeologists have a tendency to do regional studies by using data from key excavated sites. When data from surface collections are also used, however, study results are more conclusive, because a larger data base has been used.*"

If you have a collection of artifacts that you have recovered, please contact us and we will help you identify it. Remember, in the State of Texas, any artifacts collected on private property remain the property of the landowner. HAS merely wants the information that can be gleaned from the artifacts to develop a complete archeological database for Southeast Texas. Contact us at president@txhas.org.

What follows below are some statistics we have compiled on the Society that might interest you.

Date Founded: 1959

Incorporated: October 10, 1966

First meeting: December 6, 1959 (a special meeting to discuss nomenclature of southeastern Texas pottery)

Membership

The membership of HAS has fluctuated significantly over the decades. Beginning with the first year's membership of 36 charter members, HAS has seen its membership totals as high as 174 members in 2014. As of May, 2015, the current membership stands at 171 members and rising, making the HAS one of the largest local archeological societies in the state.

There were 36 Charter Members of the Houston Archeological Society in 1959, including:

- Mrs. H. W. Anderson
- W. L. Atwood
- Gordon F. Bailey
- Charles G. Caldwell
- William P. Caskey
- Mrs. William F. Caskey
- J. J. Diekman
- Alan R. Duke
- Bruce R. Duke

- Gary A. Duke
- Damon C. Dunn
- Charles Fleming
- Mrs. Charles Fleming
- Mike Fleming
- Dr. Art Gallaher
- Charles B. Gallenkamp
- J. D. Harmier
- K. P. Harmier
- John Kalb
- Val Larsen
- Louise Lenz
- Dr. Donald H. Lewis
- Mrs. Donald H. Lewis
- H. Mewhinney
- William E. Moore
- Wayne B. Neyland
- Dwayne Neyland
- John Payne
- Elizabeth Pillaert
- Roseline Pillaert
- E. Raymond Ring
- Mrs. E. Raymond Ring
- Donald G. Siever
- R. W. Stevenson
- Norvill Wilson
- R. B. Worthington

In the 56 years HAS has been in existence, there have been 39 presidents of the Society, some serving multiple terms. The list of Presidents is as follows:

- Linda Gorski (2012 – Present)
- Karen Belvin (2011-2012)
- Charles Gordy (2009-2011)
- Diane Baird (2008-2009)
- Linda Swift (2005-2008)
- Beth Aucoin (2003-2004)
- Bev Mendenhall (2001-2003)
- Robert Shelby (1999-2001)
- Joe Hudgins (1997-1999)
- Tom Nuckols (1996-1997)
- Karen Acker (1993-1995)
- Sheldon Kindall (1991-1993)
- Elisa Phelps (1989-1991)
- Roger Moore (1988-1989)
- Joan Few (1986-1988)
- Margie Elliott (1985-1986)
- Mike Kremheller (1983-1984)
- Pam Wheat (1982-1983)
- Texas Anderson (1980-1981)
- Richard Gregg (1977-1979)
- Margie Fullen (1976-1977)
- Leland Patterson (1975-1976)
- Joe Herbert (1974-1975)
- Alexander McNabb (1973-1974)

- David Salazar (1972-1973)
- William McClure (1971-1972)
- Jay Sharp (1970-1971)
- Charles Chandler (1967-1969)
- Lawrence Aten (1966-1967)
- William Fullen (1965-1966)
- Dr. Donald Lewis (1963-1965)
- Alan R. Duke (1961-1963)
- Wayne Neyland (1959-1961)

HAS Awards

The Houston Archeological Society established four honorary awards in 1988 that have been presented to deserving members over the years.

The highest award bestowed by the Society is the HAS Life Membership (Fellow) award and is given for lifetime archeological achievements and contributions to HAS. Nine HAS members have received that award, including:

- Wilson “Dub” Crook – 2014
- Richie Ebersole – 2004
- Richard “Dick” Gregg – 2003
- Joe D. Hudgins – date unknown
- Leland Patterson – 1993
- Pam Wheat – 1992
- Evelyn Lewis – 1991
- Don Lewis – 1989
- Alan Duke – 1988

The Southeast Texas Archeological Research Award (“STAR”) is presented to Society members who have shown outstanding sharing of special knowledge to the membership. Through 2014, fourteen STAR awards have been presented to HAS members, including:

- Tom Nuckols – 2014
- Bob Shelby – 2007
- Etta Palmer – date unknown
- Richard Gregg – date unknown
- Dee Ann Story – date unknown
- Richey Ebersole – 1997
- Sheldon Kindall – 1996
- Harry Shafer – 1995
- Grant Hall – 1994
- Leland Patterson – 1993
- Alan Duke – 1992
- Lawrence Aten – 1991
- Joe Hudgins – 1990
- Bill McClure -- 1989

The HAS Merit Award is given for outstanding contributions to the Society and to date has been presented to 28 members including:

- Linda Swift – 2014
- Leland Patterson 2009
- Sara Guillote - 2008
- Johnney Pollan - 2008
- Sandra Pollan - 2008
- Pat Aucoin - 2007
- Wanda Carter - 2007
- Father Edward Bader - 2006
- Wanda Carter – 2005
- Richard Carter - 2005
- Beth Aucoin - 2005
- Mary Barbara Gold – date unknown
- David Pettus – date unknown
- Robert Shelby – date unknown
- Tom Nuckols – date unknown
- Muriel Walker – date unknown
- Linda Swift – date unknown
- Don McReynolds – date unknown
- Etta Palmer – date unknown
- Jim Werlls – 1997
- Jeanette Siciliano – 1996
- William Haskell – 1995
- Karen Acker – 1994
- Bernard Naman – 1993
- Richard Gregg – 1992
- Bob Etheridge – 1991
- Sheldon Kindall – 1990
- Pam Wheat – 1989

The last HAS award is the Special Journal Editor Award which has been presented to only one HAS member:

- Alan Duke – 1988

In addition to presenting awards, the Houston Archeological Society has been privileged to receive several awards including:

- The Heritage Society, Houston, Texas Certificate of Appreciation for Dedication and Commitment through work at the Kellum Noble House Salvage Archeology Project April, 2015
- Texas Historical Commission Award of Merit for Outstanding Volunteer Service for the Dimond Knoll Screening Project, February, 2014
- Council of Texas Archeologists - E. Mott Davis Award for Excellence in Public Outreach for work on the Dimond Knoll Screening Project, April 2014

Field Work

The Houston Archeological Society has a statewide reputation for excellent work in the field supporting CRM firms, state agencies including TxDOT, the Texas Historical Commission, the Texas Archeological Society, and other entities. Over the years the membership has participated in numerous small and large archeological projects; some of the more notable projects include the following:

- Levi Jordan Plantation, Brazoria County, shovel testing with William Self Associates - May 2015
- San Jacinto Townsite - Major exhibit of artifacts recovered from mudflats of San Jacinto Townsite (1820s - 1900) by the Larry Golden family of Pasadena, TX in the 1960s was assembled by HAS members and displayed for annual San Jacinto Symposium April 2015
- TAS Archeology 101 Academy - excavations at Tait House, Columbus, Texas March 2015
- Kellum Noble House (41HR425) Emergency Salvage Archeology Project, Heritage Society, Houston (December 2014 – March 2015)
- Timber Fawn Clovis Site (41HR1165) – collection and study of 24 Clovis age artifacts from a new housing development in the Kingwood area of Harris County
- San Jacinto Battleground Conservancy – screening dirt from Monument Inn and site of Runaway Scrape 2014 – 2015 to recover period artifacts from 1820s – 1900.
- Preliminary Work for and participation in TAS Field School (Tait-Huffmeyer Ranch, Columbus, Texas, 2014 & 2015)
- Fannin Battleground Survey with William Self Associates (August 2014)
- San Felipe de Austin State Historic Site with THC - excavations of 1830s Farmers Hotel foundations (June 2014 & June 2015)
- Dimond Knoll (41HR796) Screening Project with TxDOT (2012-2013)
- Galveston island State Park (41GV170) (August 2013)
- San Jacinto Battlefield Survey - with HRA Gray & Pape (April, 2013)
- Huntsville State Park survey following prescribed burn with TPWD (2014)
- San Felipe de Austin Metal Detecting Survey with THC (January, 2013)
- Survey and Shovel Tests to locate the French Fort Champs d'Asile in Liberty, Texas (ongoing)
- Bernardo Plantation (2010 - 2011)
- Elizabeth Powell Site (41FB269) (1998 – 2000; 2004 – 2005)
- TAS Archeology 101 Field Work at San Felipe 2008
- Excavations at 41FB3 – The Bowser Site – (1993 & 1998)
- Sycamore Grove (1990)
- Post West Bernard (1984-85)
- Sam Houston Park
- 200 Main Street, Houston, TX
- Peikert Site (1979-80)
- Clear Lake City Salvage Project
- Boys School Site, Clear Lake, Harris County
- Site 41MQ14 (Conroe)
- Wallisville Reservoir Survey (1965-66 and later)
- Livingstone Reservoir Survey (1963-68 and later)

HAS Publications

HAS publications document the numerous field activities in which Society members participated. From the Society's very beginning, HAS members have played a major role in the excavation and documentation of archeological sites of the Houston area. The body of published works by the HAS and its members can be seen in the publications listed below. In total, they represent a consistent endeavor over more than five decades to document and explain the archeol-

ogy of the Upper Texas Gulf Coast. HAS publications include:

- The **HAS Newsletter** (“**The Profile**”) that has been published since January, 1986. The newsletter and The Journal (see below) were a single combined publication from 1959 through 1985. Beginning in January, 1986 a separate newsletter of the HAS, “**the Profile**”, has been published monthly.
- The **HAS Journal** (“**The Journal**”) includes articles on archeological topics from the State of Texas with a focus on Southeast Texas Archeology. To date, there have been 134 issues of The Journal dating from 1959 to the present (2015).
- **Houston Archeological Society Reports** - HAS has published 27 special reports on major excavation projects. The complete list of these reports includes:
 - Excavations at the Jamison Site, 41LB2, Liberty County, Texas
Aten, Lawrence E.
HAS Report #1, 1967
 - Archeological Investigations Along Armand Bayou, Harris County, Texas
Hole, Frank
HAS Report #2, 1974
 - The Owen Site: 41HR315: A Long Occupation Sequence in Harris County, Texas
Patterson, Leland
HAS Report #3, 1980
 - Excavations At Site 41WH19, Wharton County, Texas
Patterson, Leland, Hudgins, J.D., Gregg, R.L., McClure, W. L.
HAS Report #4, 1987
 - A Collection of Papers Reviewing the Archeology of Southeast Texas
Wheat, Patricia and Gregg, Richard L.
HAS Report #5, 1988
 - A Data Base For Inland Southeast Texas Archeology – HAS Report #6
Patterson, Leland
HAS Report #6, 1989
- An Archeological Data Base For The Southeastern Texas Coastal Margin
Patterson, Leland
HAS Report #7 1989
- A Study of Decorative Designs on Goose Creek and San Jacinto Pottery of Southeast Texas
Black, Marshall W.
HAS Report #8, 1989
- Excavations At The Bowser Site, 41FB3, Fort Bend County, Texas.
Patterson, Leland, Black, W. Marshall, McClure, William L., Storey, Rebecca; Patrick, Suzanne
HAS Report #9 1993
- Excavations At The Ferguson Site, 41FB42, Fort Bend County, Texas.
Patterson, Leland, Hudgins, Joe D., Gregg, Richard L., Kindall, Sheldon, M. McClure, William, L. Neck, Raymond W.
HAS Report #10 1993
- Excavations At The Joe Davis Site, 41FB223, Fort Bend County, Texas.
Patterson, Leland, Hudgins, Joe D., McClure, William L., Kindalls, Sheldon M., Gregg, Richard L.
HAS Report #11 1994
- Southeast Texas Archeology
Patterson, Leland
HAS Report #12 1996
- A Campsite Of The Retreating Mexican Army, April 1836, 41WH91, Wharton County, Texas.
Hudgins, Joe D. and Dimmick, Gregg
HAS Report #13 1998
- Bibliography Of The Prehistory Of The Upper Texas Coast.
Patterson, Leland
HAS Bibliography #13 2006
(Note – Leland put this one out on his own so there is a duplication of numbers here)
- Additional Excavations At The Bowser Site, 41FB3, Fort Bend County, Texas; Part 1, Archeology.
Patterson, Leland, Hudgins, Joe D., Kindall, Sheldon M., McClure, William L, Marek, Marianne, Nuckols, Tom, Gregg, Richard L.
HAS Report #14 1999

- The Whitehead Collection, Chambers County, Texas.
Patterson, Leland, Gregg, Richard L., Kindall, Sheldon M., Marubio, Gloria
HAS Report #15 1999
- Tracking The Mexican Army Through The Mar de Lodo (Sea Of Mud), April 29-May 9, 1836.
Hudgins, Joe; Kieler, Terry, Dimmick, Gregg
HAS Report #16 2000
- Excavations At Site 41FB28, Fort Bend County, Texas.
Patterson, Leland, Hudgins, Joe D., McClure, William M.
HAS Report #17 2000
- Additional Investigations At 41GV53, Galveston County, Texas.
Patterson, Leland, Kindall, Sheldon M., McClure, William L., Aucoin, Elizabeth K.
HAS Report #18 2001
- Investigations of Site 41HR72, Harris County, Texas.
Patterson, Leland, Aucoin, Elizabeth K., Gregg, Richard L.
HAS Report #19 2002
- Excavations at 41WL25 and 41WL26, Waller County, Tx.
Patterson, Leland, Hudgins, Joe D., Palmer, Etta, Palmer, Tom
HAS Report #20 2003
- Excavations at 41FB290A and 41FB290B, Fort Bend County, Tx.
Patterson, Leland, Hudgins, Joe D., Palmer, Etta, Palmer, Tom
HAS Report #21 2003
- Excavations at the Goloby Site 41WL3, Waller County, Tx.
Patterson, Leland, Hudgins, Joe D., Palmer, Etta, Palmer, Tom
HAS Report #22 2003
- The Kinghorn Site, 41AU88, Austin County, Tx.
Patterson, Leland
HAS Report #23, 2005
- Cultural Sequence on the Coastal Margin of Southeast Texas
Patterson, Leland
HAS Report #24 2006
- The Elizabeth Powell Site (41FB269) Fort Bend County, Texas. Part 1.
Aucoin, Elizabeth K. and Swift, Linda L., eds. Aucoin, Elizabeth K., Castro, Pablo R., Kindall, Sheldon M., Shelby, Robert T., authors.
HAS Report #25, Part 1, April, 2007.
- The Elizabeth Powell Site (41FB269), Fort Bend County, Texas. Part 2.
Aucoin, Elizabeth K. and Swift, Linda L., eds. Gregg, Richard L., May, Melissa, Pollan, Johnney, Pollan, Sandra D., Shelby, Robert T., authors.
HAS Report #25, Part 2, December, 2007.
- The Elizabeth Powell Site (41FB269), Fort Bend County, Texas. Part 3.
Aucoin, Elizabeth K., and Swift, Linda L., eds. Aucoin, Elizabeth K., Gregg, Richard L., Nuckols, Thomas L., Shelby, Robert T. authors.
HAS Report #25, Part 3, September, 2014.

HAS MEMORIES

William E. Moore

My family first visited Garner State Park sometime during the 1950's when I was still in elementary school. In those days, campers selected a site and just moved in. The Sheriff drove through the campground each morning and collected \$1.00 for each vehicle per site. The park was much smaller then with most of the campsites along the most scenic part of the river and against the base of the cliff (aka "Old Baldy"). The park did get crowded during peak seasons but reservations were not required unless one wanted to rent one of the rustic cabins. This park was constructed in the 1930's by workers under the Civilian Conservation Corps (CCC) program designed to provide jobs during the depression.

The focal point in the evening was the dance under the stars. There was a jukebox that played mainly country and western songs and most of the park visitors congregated there to listen to the music and watch the teenagers dance. Just inside the massive wooden front doors was a small gift shop where tourists could buy various trinkets such as jewelry boxes made of cedar. The gentleman who was in charge of the gift store was a collector of Indian artifacts and he dug in many of the burned rock mounds and middens along the Frio River. I had always been attracted to anything "Indian" and when I found out that he knew about such things, I spent a lot of time talking to him and asking where I could find some "arrowheads." Finally, he told me of a site in the park where he had found some of his best specimens. I went there and saw a very disturbed area that had obviously been dug in over a long period of time. He had left his screen and shovel there and said I could use them. I was very excited and went there with my cousin Ruthy Crabbe. We dug around and finally I was rewarded with a distal tip of a probable arrow point. To me, this was very exciting and I could not wait to show it to him that evening. I'm sure he realized that I had not found anything special but he took the time to tell me that I possessed something very old. Of course, that made me want to continue to look there and at other sites. Many years later, I recorded all of these sites with the Texas Archeological Research Laboratory (TARL) in Austin plus others I had found on my own.

My interest in finding and learning about Indian artifacts was fueled by several things. The first was exposure to this man's collection in the dining room where my parents would take me once each visit to the park and let me get a hamburger and french fries. It was a beautiful room with a rock fireplace and best of all it had several frames of his best arrowheads on the wall. I would stare at the frames and wish that I could find specimens like that. Eventually, he showed me a copy of the 1954 Texas Archeological Society (TAS) Bulletin (Volume 25) by Dee Ann Suhm (Story), Alex D. Krieger, and Edward B. Jelks and I would sit outside the gift shop for hours looking at the photos and trying to understand what I was reading. Sometimes, he would have broken arrowheads for sale and I bought two coffee cans full for \$1.00 each. Once I persuaded my parents to splurge and buy me some mounted on a frame for \$8.00. That was a lot of money back then but the frame had some complete specimens. I would spend hours looking at "my collection" and comparing each one to those illustrated in the TAS Bulletin.

A turning point for me was when I noticed that the Active Vice-President of the Texas Archeological Society was Richard B. Worthington who lived in Houston. As soon as we returned home from the park that summer I looked him up in the phone book and called him to say that I wanted to know more about archaeology. He was very friendly and told me that they were starting a new local society in Houston and that I should come to the meetings.

The first Houston Archeological Society (HAS) meetings were held on Friday evenings in the Ezekiel B. Cullen Building on the University of Houston campus. The officers for the inaugural year (1959-1960) consisted of Wayne B. Neyland (Chairman), Alan R. Duke (Secretary-Treasurer), Hubert Mewhinney (Editor), R. B. Worthington, Damon C. Dunn, and John J. Dieckman (directors). Mr. Dieckman also served as Assistant Editor. There were five committees:

Artifacts Display - J. P. Harmier and K. P. Harmier
 Program - Damon C. Dunn
 Records - R. B. Worthington
 Society "Dig" - Charles G. Caldwell, R. W. Stevenson, and Gordon Bailey

Study Group - R. W. Stevenson

I don't remember if I was at the very first meeting in December of 1959 but I am listed as one of the charter members (all the charter members of the HAS are listed below). I know I was in attendance on a regular basis during the inaugural year and continued through 1962. At that time, I was in Junior High School and I never gave much thought to the order in which the meetings were conducted. I usually arrived early and there was always some discussion of sites and occasionally a member would bring artifacts to show to everyone. The meeting consisted of a presentation and when it adjourned some of the members would hang around and visit. During the meetings I would always sit quietly and try to absorb the information being presented. I did not understand much of the terminology being used but I was very interested. My parents drove me to my first meeting meetings and picked me up when it was over. Once I got to know some of the members I was able to get a ride home, usually with Wayne B. Neyland. Neyland always called me "Billy Moore" and that is how I am referred to in the minutes and other documents.

Hubert Mewhinney (1904-1973) was a newspaper reporter and columnist for the *Houston Post* who wrote a daily column for many years entitled "Meeting All Comers." He loved the outdoors and was very knowledgeable about plants and animals. Mewhinney was a good flintknapper and I remember one time when he came to a meeting with some pretty nice "arrowheads" that he said he had found recently. As he passed them around, the members were very impressed and asked him where he found them. Later, he confessed that he had made them and he got a good laugh at our expense.

Mewhinney wrote a book titled, *A Manual for Neanderthals*, which was critically acclaimed as an excellent book at the time on the art of making stone tools (currently available at Amazon Books). I was fortunate to get an autographed copy but it was destroyed when some of my books were left in a room with too much moisture and bugs.

Mewhinney worked as a newsman for twenty-six years for nine different papers and his column for the *Houston Post* was very popular. He was very literate and in his spare time he read Latin and played the piano. The one time I was at his apartment he had pencil drawings on the wall and I thought that they were very good. I pestered him a lot about going camping and he finally agreed to let me come along. He and another man took me to a place on the Colorado River where we spent one night. There was a creek for swimming and his friend was the cook. Mewhinney showed me some animal tracks and identified some of the plants. Other than that he pretty much was a loner. At night he would sleep on his blanket with his rifle

away from everyone else. He discussed this trip in one of his columns where he describes me as "an extremely inexperienced 18-year old boy named Bill" (this article is appended to the text).

After the HAS meetings, some of the members would stop at a café for coffee and talk about archaeology. I remember hearing the jukebox playing "Kansas City" by Wilbert Harrison. When I told the members that I wanted to be an archaeologist, they advised me not to consider it because there was no money in archaeology. They were partly correct in that the world of contract and Cultural Resource Management archaeology was in its infancy and the only good jobs were at universities or with the government. That had a lot to do with my decision to select another major when I entered college.

Being at the HAS meetings and listening to stories about Indian sites in Houston and seeing actual artifacts found by some of the members created a strong desire for me to find a site of my own. I lived on Lynn Street in Park Place not far from Hobby Airport. At the end of my street was Charlton Park and Sims Bayou. One day, I was looking for artifacts in the park with a friend, Bobby Marek. There were some high hills with small rocks and pebbles on the surface. I was convinced that I had found a site and I ran home and called Mr. Neyland and he came over right away only to tell me that my "artifacts" were natural pebbles. He could probably tell that I was disappointed and he invited me to come to his house and see his collection and go with him to look for sites. We never found any on the trips that I went on but I enjoyed being in the company of a real archaeologist. Once at his house he showed me a cast that he had made of a special arrowhead that he had found. This was the first time I had seen that technique. He lived across town from me and I did not have the opportunity to visit as much as I wanted.

The Society conducted its first field project in 1960 at the Jamison site (41LB2) in Liberty County. I was able to get a ride to the site and actually dig in a real archeological site. The area where I worked did not produce much in the way of artifacts but I found my first piece of pottery and that was exciting. Mewhinney was there to guard the site. As usual, he slept on a blanket with his rifle away from the rest of the campers. Gordon Bailey discusses this project in *The Houston Archeologist* 3:1. I am acknowledged as a member of the crew and still referred to as Billy Moore. I was told that there were lots of sites on Peggy Lake and I spent several summers digging in a very dense shell midden. I found lots of pottery and bone but no stone tools. Later, I wrote an article describing my work on Peggy Lake (Moore 1985). Later, Prewitt & Associates, Inc. were working on a project that included my site (41HR133) and I had the opportunity to meet the Principal Investigator, Margaret Howard, at the site

and recount to her what I had previously done and show her what I had collected.

HAS CHARTER MEMBERS

Mrs. H. W. Anderson
W. L. Atwood
Gordon F. Bailey
Charles G. Caldwell, Sr.
Mrs. Wm. P. Caskey
John J. Dieckman
Alan R. Duke
Bruce R. Duke
Gary A. Duke
Damon C. Dunn
Charles Fleming
Mrs. Charles (Vivian) Fleming
Mike Fleming
Dr. Art Gallaher
Charles B. Gallenkamp
J. D. Harmier
K. P. Harmier
John Kalb
Val Larsen
Lewis Lenz
Dr. Donald R. Lewis
Mrs. Donald R. Lewis
Hubert Mewhinney
Billy (William E.) Moore
Wayne B. Neyland
Dwayne Neyland
John Payne
Elizabeth Pillaert
Roseline Pillaert
Mrs. E. Raymond Ring
Donald G. Siever
R. W. Stevenson
Norvill Wilson
Richard B. Worthington

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MY FIRST TEXAS ARCHEOLOGICAL SOCIETY FIELD SCHOOL

Thomas L. Nuckols

I joined the Texas Archaeological Society (TAS) in the latter half of 1976. The first newsletter I received from the TAS included an advertisement for the upcoming El Paso Field School to be held in June of 1977. Immediately after reading the advertisement, I came up with this idea: attend the Field School and ride the bike to El Paso!

The “bike” was my motorcycle; a circa 1971, green over white, Honda CB350. It had a two cylinder engine, displacing 325 cubic centimeters (cc). Up to that time, the furthest that I had ever been on the bike was a weekend trip to the Texas Hill Country. On that trip, I was accompanied by a friend who rode a BMW (Bavarian Motor Works) motorcycle. I think that the BMW was a model R90S, displacing 898 cc. I had enjoyed the Hill Country trip, but had trouble keeping up with my friend. My little Honda cranked out about half the horsepower as his BMW.

If I was going to ride a motorcycle to El Paso, maybe it was time to get a bigger bike. For a while, I had been coveting two motorcycle models, the Yamaha XS-1, (653 cc, two cylinders), and a Honda CB750 Four, (736 cc, four cylinders). I liked the XS-1 model Yamaha for its similarity over that of a British Triumph motorcycle. I found the Triumph aesthetically pleasing, especially the engine. Why not opt for a Triumph; because, I was well aware of the British motorcycle industry’s decline and the unreliability of its products. So, with the Yamaha, I could get a Triumph look alike with the dependability of a Japanese motorcycle.

Why did I like the Honda CB750 Four? It’s hard to explain, so let me quote Doug Mitchel from the Ultimate Guide to Honda Motorcycles (2005: 31):

The CB750 Four model was released on June 6, 1969 and embodied the best of everything Honda had to offer while it surpassed anything else on the market. Displacing 736 cc, and breathing through a set of four carburetors, the spent gasses departed through a four-into-four exhaust. Honda claimed the bike produced 68 hp and could run up to 125 mph. The new CB750 had only one overhead cam. Both electric start and a kick-start pedal were avail-

able. A four into four throttle cable system was used to control the bank of carbs. With the power on tap, Honda offered a single hydraulic disc up front that was joined with an internally expanding rear drum brake on the rear wheel. A double loop steel tube frame held everything in place and both ends were fully suspended!

The only problem with getting a bigger bike was that I couldn’t afford a new one. I already had a car loan, apartment rent and junior college night school tuition. I talked to my brother, and he agreed to loan me the money for a used bike in whatever I could afford installments.

I began perusing the newspaper want ads for used bikes and immediately found what I was looking for. I found an ad for a used Yamaha XS-1 so I went to see the bike. I can’t remember its age or how much the guy wanted for it, but it was junk. The seller lived in an apartment and kept the bike outdoors, exposed to the elements, hence it was rusty. The rear tire was bald, an indication that the seller had probably been “burning rubber” (to run an engine so fast that one spins the tire so that rubber is left on the street). Moreover, the seller was really trying to force a sale, all the while explaining what great shape the bike was in. I told the seller that I would think about it and left.

The next ad I found was for a circa 1970 Honda CB750 Four for \$1,000. I went and looked at the bike and it was love at first site. The guy selling the bike explained that it had been garage kept, and it showed. However, the brown factory paint job was beginning to fade and the rear tire and drive chain needed replacing. Not bad, considering that the bike was approximately seven years old. Besides, if I bought the bike, I had several months to deal with these issues before the TAS Field School. With borrowed money from my brother, I bought the bike the next day.

At the first opportunity, I changed the engine oil and polished every accessible exposed surface area on the bike. I had the rear tire and drive chain replaced at Bruce Bristol’s Honda dealership located at 4615 Gulf Freeway. The dealership was established in 1947, and its big advertising billboard, at a right angle to the Gulf Freeway, had a single cylinder Honda motorcycle af-

fixed to the top. I imagine that if that little Honda was retained after the billboard was demolished when the dealership went out of business, it would be worth a fortune as an iconic representation of Houston's history. That is, if the Gulf Coast climate hadn't destroyed it by that time.

I remember another billboard in close proximity to Bristol's. It had an illuminated display of the current population of Houston. I actually witnessed the signs population number increase by a single digit a few times while traveling north or south on the Gulf Freeway. The population then was under a million and I often wondered if Houston's population would ever reach the 1 million mark.

In the early spring of 1977, I had the opportunity of working some overtime. With the extra money earned, I had the Honda repainted black at a used motorcycle shop located on I-45 North. The shop owner suggested that I replace the plastic headlight nacelle (support) with a chrome plated one he had lying around. He let me have it cheap and installed it without additional cost. I picked up the bike about a week later and it was beautiful.

About a month before the Field School, I began accumulating supplies, i.e., things that wouldn't tax the carrying capacity of the motorcycle, but would allow me to live in the desert for a week. Most of the stuff I already had; I do however, remember buying a pup tent. I also bought a green tinted face shield for my motorcycle helmet as I assumed wearing a pair of sunglasses was not going to offer much facial protection on the approximately 800 mile trip to El Paso. My helmet was politically incorrect; the whole outer surface depicted a Confederate flag painted with metal flake colors.

On a Thursday night, two days prior to the start of the Field School, I lashed all my equipment down on the Honda with bungee cords. I drove the Honda to work¹ the next day. I had planned on heading to El Paso at the end of the day. However, shortly after lunch, I started getting antsy, so my boss let me take off early. I made it all the way to Comfort, Texas that day and checked into a motel room. I parked the Honda in a space directly in front of the door. I kept the door open all night as a precaution against theft.

The next day, Saturday, I left the motel and stopped at a truck stop along I-10, and got a cup of coffee. Due to the anticipation of what the day would bring, I had that "butterflies in the stomach" feeling, hence, no appetite for breakfast. I don't know that I ever stopped for lunch. The ride from Comfort to El Paso was uneventful. The combined heat radiating from the Honda's engine and the highway and the heavy truck traffic were the only discomforts. Entertainment was provided by Mother Nature in the form of dust devils dancing around on the desert floor on either side of the

highway. Somewhere around Fort Stockton, I stopped at a rest stop and a husband and wife "biker" team stopped and visited. They used my camera to take a picture of me standing next to my Honda. Unfortunately, I lost that picture years ago.

How do you think I reacted on seeing the El Paso City limits sign later that day? Relief? Satisfaction? No, it was at that moment that I realized, and with sheer terror, that I had no idea where to go from there. I forgot to bring a map on how to get to the Field School camp site! Imagine yelling expletives at yourself while wearing a motorcycle helmet with a face shield! Details are fuzzy now; however, I seem to recall finding a pay phone and calling home to obtain directions or something to that effect. Anyway, I eventually found the campsite.

Once there, I located and area where members of the Houston Archeological Society (HAS) were camping and unloaded the bike and set up my pup tent. It was about that time that I developed an unslakable thirst. I must have gotten dehydrated out on the highway. Fortunately, the powers that be had provided drinking water. Plus, a soft drink machine had been installed in a central location in the camp. I spent quite a bit of money at that machine. Yeah, I know now, but didn't know it then, that consuming soft drinks are the last thing a person should do to cure dehydration. By Saturday night, I was beginning to recover. However, it took several days before I became acclimated to the El Paso desert.

That first night at Field School, high winds blew my pup tent down. The tents short support pegs couldn't get enough purchase in the soft desert sand. I moved in with HAS member Dick Gregg. His large tent became my permanent abode for the rest of the Field School as the high winds were a nightly occurrence.

There were numerous activities available to Field School participants; I signed up to excavate at a prehistoric site at Sabina Mountain. Sunday morning, I hitched a ride to the site. It was several miles from the camp out in the desert. When we arrived at the site, there were numerous tarantulas walking around on the desert floor. They were huge! A lot bigger than the "little" tarantulas I was used to seeing in South Texas. Amazingly, some of the excavation team members would walk up behind one, slide their open hand underneath and pick the tarantula up! As long as you didn't approach a tarantula from the front, they remained docile. Apparently, the tarantulas patrolled the desert floor at night looking for prey, and then retreated to their place of abode during the day.

The goal of the prehistoric excavations was to uncover the remains of prehistoric adobe walls at the Sabina Mountain No. 2 site (41EP4). From the very beginning, this endeavor proved successful, and we

began uncovering a lot of walls. If memory serves, the wall remnants were encountered just below grade and were approximately one foot wide. One day, a dust devil went across an area of the site where the field notes were loosely kept. The resulting updraft carried the field notes hundreds of feet into the air. It was unfortunate, but also funny, seeing all those 8.5" X 11" white paper "UFOs" reflecting the sunlight. After a couple of days of excavation, it became apparent that the "adobe walls" we were uncovering were actually compressed earth caused by the weight of military tank treads! It turned out that the area where we were excavating had at one time been the training location for tanks crews stationed at Fort Bliss.

The next day, I transferred to the field survey crew. I don't remember recording any sites, however, I do recall seeing a little bone or shell bead lying on the desert floor. I also worked in the lab being conducted at the camp site, however, I can't recall the duration of my time spent there.

During the TAS Field School, field trips were offered to TAS members. One afternoon, a group of us went to Hueco Tanks State Park. What is prominent in my mind about visiting Hueco Tanks was the prehistoric mortar holes filled with modern trash, and the graffiti, both etched into and spray painted on the rocks. I distinctly remember this event; one of the guys accompanying us raised his camera to take a photograph of one of the mortar holes full of trash. Someone reached down and began to remove the trash, and the guy preparing to take the photo yelled out "Stop! I want it left the way it is!"

One evening, a group of HAS members and I car-pooled to El Paso. We parked and walked over to Mexico's Ciudad Juarez. One of the HAS members knew of a good Mexican food restaurant within the city. As the restaurant was quite a ways distant, we had a long hike. I enjoyed it, seeing the sights and visiting a big produce market. When we left the Mexican food restaurant, it was dark. On the walk back to El Paso, I was amazed at all the children (homeless?) sleeping on the sidewalks. Some were lying on flattened cardboard boxes.

I left for home on the following Saturday morning and arrived Sunday afternoon. The trip back home was uneventful.

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A PUEBLOAN CERAMIC SHERD FROM BRAZORIA COUNTY, TEXAS

Wilson W. Crook, III and Jack Farrell

Introduction

About 15 years ago, a friend of the second author (JF) was exploring so-called “pimple mounds” throughout Brazoria County, Texas in search of archeological sites. Pimple Mounds are widespread features along the Gulf Coast. They are small circular knolls, generally between one and two meters in height, and less than 60 meters in diameter. Soils formed in these mounds have a sandy-loam “A” horizon, typical of soils of the Edna, Katy, Aris, Claudine and Wockley series (Wheeler 1976). Many of the aboriginal inhabitants of the Late Prehistoric period across the Gulf Coast and along major stream drainages occupied such topographic highs as it kept their sites dry during times of periodic flooding. This is especially true of Late Prehistoric sites along the Upper Trinity watershed (Crook and Hughston 2015).

On one such excursion, Jack Farrell’s friend discovered a unique ceramic sherd. When he later moved away from the Houston area, he gave the sherd to Farrell in hopes that it could later be identified. Farrell has collaborated with the senior author and the sherd has now been unambiguously identified as the Puebloan ceramic type Corona Corrugated. Given the rarity of Puebloan ceramics across Texas, especially along the Gulf Coastal Plain, this paper serves to record the artifact and describe its characteristics.

The Corona Corrugated Sherd

The artifact is an elongated body sherd, 30.5 mm in height by 57.5 mm in width. Thickness varies slightly but averages about 7.4 mm across the sherd. Color is reddish-brown (2.5YR 5/3-4/3 to 5Y 5/3) to reddish-gray (5Y 5/2) and there is smudging on the interior of the sherd. The paste is crumbly and ranges in color from brown to reddish-brown to gray-black. Temper is medium to coarse-grained rock, which under a binocular microscope can be seen as a mixture of angular quartz grains and light colored mica (muscovite). In the sunlight, the quartz grains and mica give the sherd a sparkling appearance.

The exterior of the sherd is characterized by narrow indented corrugations. Six coils are present which vary

in thickness from 3.0 to 5.5 mm. The outer surfaces of the corrugations have been rubbed when they were still wet; the interior of the sherd has been smoothed and polished. As mentioned above, the interior of the sherd has some faint smudging, likely from cooking use.

Table 1 lists the physical characteristics of the Brazoria County sherd in comparison to those of Corona Corrugated (after Kelly 1984). As can be seen on the table, all the main features including color, paste, temper, size of corrugations, etc. match type Corona Corrugated very closely. As such, it is our belief that the sherd is Puebloan in origin and of type Corona Corrugated as originally described by Wiseman (1982) and Kelly (1984). Corona Corrugated vessels were exclusively wide-mouthed jars that were used for cooking and frequently show smudging from use over slow cooking fires (Warren 1981; Wiseman 1982).

Photographs of both the obverse and reverse sides of the artifact are shown in Figures 1 and 2.



Figure 1. Exterior surface of Corona Corrugated sherd from Brazoria County, Texas.

Table 1. Comparison of Brazoria County Sherd to Corona Corrugated

Characteristic	Brazoria County Sherd	Corona Corrugated (Kelly, 1984)
Color	Reddish-Brown (2.5YR 5/3-4/3) to Reddish-Gray (5Y 5/2)	Brown, Gray to Black Surfaces commonly Gray to Black due to smudging
Paste / Color	Crumbly; color ranges from Brown to Reddish-Brown to Gray-Black	Crumbly; color ranging from Tan, Buff to Reddish-Brown
Temper	Medium to coarse-grained quartz-mica	Medium to coarse-grained rock; 57% sherds utilize quartz-mica schist, 25% angular quartz-white feldspar; 10% biotite felsite
Corrugations	Narrow indented corrugations	Simple unindented bands to narrow indented corrugations
Coil Width	Six coils present on sherd; 3-5.5 mm in width	Coils of uneven width ranging from 3-11 mm; average 5.5 mm
Interior Surface	Smoothed and polished; smudging from cooking use	Smoothed and polished and commonly smudged from use over slow cooking fires
Vessel Type	Body sherd (30.5 x 57.5 x 7.4 mm); Vessel shape not determined	Exclusively wide mouthed jars with short everted rims with rounded lips

Conclusions

Corona Corrugated is a typical utilitarian ware of the Jornada Mogollon areas of south central and southeastern New Mexico. This area includes the slopes and drainages of the Sierra Blanca and Sacramento mountains in central New Mexico as well as the plains to the south and southeast (Kelly 1984). The range seems to be centered in and around Gran Quivira but the precise boundaries of Corona Corrugated are unknown (Wiseman 1982). In both the Sierra Blanca and Gran Quivira regions, Corona Corrugated makes its appearance in the early 12th Century and then completely replaces Jornada Brown plain ware after about A.D. 1300 (Hayes et al. 1981; Kelly 1984). Associated white wares include both Chupadero Black-on-White and Tabira Black-on-White (Wiseman 1982). Corona Corrugated remains the predominant utility ware in the region until it is replaced by plain brown wares in the 15th Century. Based on excavations from Mound 7 at Gran Quivira, estimated dates for Corona Corrugated ware are ca. A.D. 1125-1460 with the major period of use being between ca. A.D. 1300-1460 (Warren 1981; Wiseman 1982; Kelly 1984)

Study of the Corona Corrugated sherds from Gran Quivira indicate several tempers were used. One-quar-



Figure 2. Interior surface of Corona Corrugated sherd from Brazoria County, Texas.

ter of the sherds studied used an angular quartz and white feldspar temper; 10 percent used a local biotite-rich felsite; but the predominant temper used in Corona Corrugated vessels (57 percent of all studied sherds) was an angular quartz-mica schist (Warren 1981). The origin of the schist used in this temper has not been determined but is thought to be in the general Gran Quivira area (Warren 1981).

In their excavations of the Henderson site and Bloom Mound in Chaves County, New Mexico, Speth and Newlander (2012) found that a large percentage of the lithic artifacts, especially the sites' triangular shaped arrow points, were constructed of Texas sourced lithic material including Alibates dolomite, Tecovas quartzite and Edwards chert. As such, their conclusion was that the aboriginal inhabitants of the two sites regularly participated in hunting forays into Texas, probably for bison. These forays brought them into contact with the Late Prehistoric peoples of Central Texas (Toya phase) and likely spawned some degree of interregional trade (Speth and Newlander 2012). Of note, the ceramic assemblage at both Henderson and Bloom Mound consisted principally of El Paso Polychrome, Lincoln Black-on-Red, Chupadero Black-on-White, and Corona Corrugated (Wiseman 2004).

Chupadero Black-on-White is well known as a Puebloan exchange item in Texas sites (Creel et al. 2002; Wiseman 1986). As Corona Corrugated is an established contemporary with Chupadero Black-on-White, transportation of such a vessel along with a hunting party would not be unreasonable. Lohse et al. (2014) have shown that there was a resurgence of bison in the Southern Great Plains of Texas during the window of ca. A.D. 1300-1420. This matches well with the apex of Corona Corrugated manufacture which was between ca. A.D. 1300-1460 (Warren 1981; Wiseman 1982). It is doubtful that a plain corrugated utilitarian vessel would have been a high value exchange item, but it is possible that such a vessel became the property of a Toyah phase group who then subsequently exchanged or lost the vessel during a foraging trip to the Gulf Coast.

Interestingly, a similar Mogollon plain brown-ware sherd was reported from East Texas (Henderson County) by Hayner (1955). The occurrence was a single body sherd in association with other Late Prehistoric Caddo materials on a small pimple mound 150 meters from the south shore of Caddo Lake – an almost identical occurrence to that described herein.

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MANO A MANO: EAST FORK GRINDING STONES

Wilson W. Crook, III and Mark D. Hughston

Introduction

Manos and metates were the basic food grinding tools used by aboriginal Americans until the early 1900's when mechanical mills and pre-milled flour became readily available. Their presence in archeological sites has traditionally been associated with the processing of plant materials for food. Manos and metates were the technological solution to the problem of reducing grain to flour. In this regard, manos and metates have been typically linked with Late Prehistoric occupations where use and dependence on maize and other grains gradually increased. However, manos and netherstones (not true metates) are also found in Archaic and even Paleoindian contexts, suggesting their use in a wider range of activities (Ray 1940). Ethnographic studies have shown that grinding tools were also used in pulverizing salt, clay and temper for pottery, in pigment production, and even for hide processing (Adams 1988).

Traditionally, grinding implements are often considered a simple and unchanged tool type and therefore of little use in chrono-typological studies (Adams 1993). However, studies on manos and metates from the American Southwest and other regions have shown that both their size and shape changed over time commensurate with the purpose of their usage (Horsfall 1983, 1987; Wright 1990, 1993; Mauldin 1993; Adams 1999; Duffy 2011). Through measurements of grinding surface area on manos, assumptions can be made regarding the site occupant's dependence on cultigens (Delgado-Raack and Risch 2009; Mauldin 1993; Wright 1993). Grinding stones therefore represent primary evidence about the volume of subsistence production in archeological sites.

Detailed descriptions of manos and metates are often lacking in the literature. In this regard, the Late Prehistoric of the East Fork is no exception. While manos and metates were one of the site traits that was used to initially characterize the Late Prehistoric period of the East Fork (Stephenson 1949, 1952; Crook and Hughston 2008), few reports include the number the grinding tools present. Fewer still include any details as to tool dimensions, lithic composition or use-wear. The authors are in the process of completing

a 40+ year re-evaluation of the Late Prehistoric occupation on the East Fork. As part of this study, we have observed all the extant collections from previous excavations in the area plus those of most local avocational collectors. To date, this comprises nearly 32,000 total artifacts of which only 145 are manos and metates (0.4 percent). Moreover, these artifacts are concentrated in only a few of the largest sites. Of all the Late Prehistoric sites along the East Fork of the Trinity River, of all sizes from major sites to small ephemeral campsites, only 21 have manos and/or metates associated with them. These include 17 of the known 20 "large" sites as well as the 4 largest of the minor sites (for the purpose of classification, we have identified sites with more than 100 artifacts as "major" or "large" and those with less than 100 as "minor"). This paper serves to record the grinding stone implements from the East Fork, including their composition, size and use-wear. Based on this study, conclusions regarding their use and the aboriginal inhabitants of the East Fork's dependence on cultigens for subsistence are made.

East Fork Manos and Metates

Manos and metates are classified as "macro lithic artifacts"; large stone tools that are not produced solely by flaking technologies (Adams 2014). In reality, the mano and metate is essentially one implement made up of two parts, wherein the metate forms an anvil upon which the smaller mano is moved so as to produce pulverizing and grinding (Eddy 1979). Huckell (1986) observed that grinding tools undergo a 5-step manufacture-use process including (1) lithic procurement, (2) manufacture, (3) use, (4) maintenance and (5) ultimately discard. In the American Southwest, specific quarries for ground stone tools have been found. Ethnographic and experimental studies have shown that manos could be constructed in anywhere from several hours to over a hundred hours, depending on size of the stone and the composition of the lithic material; metate construction could take "over a month" from initial preform construction to final completion (Simms 1983). Historical accounts from the Great Basin showed that due to the construction time involved, tribes such as the Utes only made a new mano or a

metate if they could not secure an ancient one first (Simms 1983). Moreover, due to their size and weight, manos and metates were considered “site furniture” with tools “curated” at sites for future use (Binford 1979).

Handstones (manos) have a similar active surface as a metate but with a smaller grinding surface area. Metates are relatively thick, oval to rectangular stones with a single abrasive surface on the dorsal face. The first technical condition for the grinding process is a perfect adjustment between the handstone and the grinding slab that allows for the crushing and pulverizing of the material being processed. Thus there must be a morphological interdependence between the “active” or grinding surface of both tools. Manos produce a concave to flat surface on the larger grinding slab (depending on the grinding motion) and a typically convex one on the handstone.

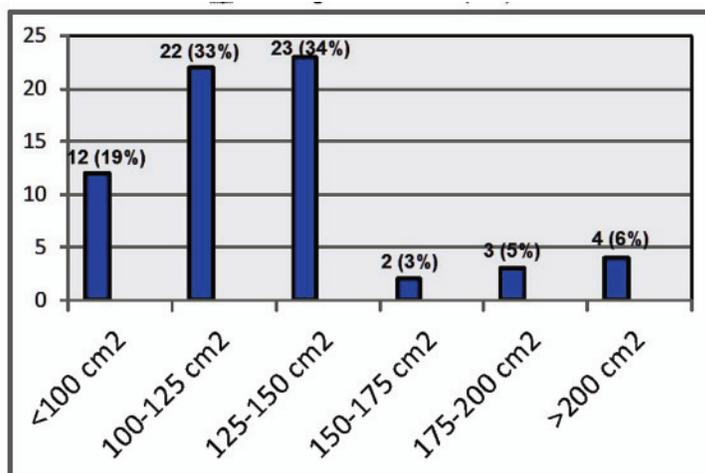
Manos are classified as either “one-handed” or “two-handed” based on general size, with two handed stones generally being larger in size and thus the need for using two hands. Hard et al. (1996) classifies “small” or one-handed manos as oblate spheroids that have a grinding surface area of <150 cm²; two-handed stones have grinding surface areas >150 cm², often well in excess of 200 cm² (Horsfal 1987; Schlanger 1991; Hard et al. 1996). Wear on manos comes from grinding and pounding while in use and from being pecking during artifact maintenance and reshaping. Experimental evidence shows that maintenance on one hand manos was slight; maintenance was much more intensive on larger two-handed manos depending on the amount of usage (Schlanger 1991; Wright 1993). In the case of heavy use on two-handed manos, refurbishment could be needed as frequently as every five days (Schlanger 1991). Wright (1993) found that ma-

nos wear out as much as eight times faster than metates. Eventually the manos become so thin that the user’s fingers are subject to grinding and thus the mano is deemed as “worn out” and discarded. As a result, handstones should significantly outnumber grinding slabs in the archeological record.

The 145 manos and metates reported from Late Prehistoric sites along the East Fork of the Trinity are listed in Table 1. Of the 123 manos we have studied, the overwhelming majority are constructed of sandstone (111 – 90 percent), with only four specimens made from quartzite and eight from limestone. With regards to the latter, the material used was a very sandy limestone and not the typical soft chalk or marl that crops out in the region. It should also be noted that one small handstone from the Branch site is listed in Table 1 as constructed from “quartzite.” The lithic material used is actually a metamorphosed granitic rock that in terms of hardness and grinding character, mimics quartzite. Like the manos, 20 of the 22 known metates (91 percent) were constructed of sandstone with the other two made from sandy limestone.

Of the 123 manos studied, 66 were complete specimens from which grinding surface area measurements could be taken. Likewise, complete measurements could be made on 13 of the 22 metates. Average grinding surface area of the East Fork manos is approximately 125 cm², with 57 of the 66 (86 percent) handstones having a grinding area <150 cm² (Figure 1). Based on the classification system developed by Hard et al. (1996), Horsfal (1987), Schlanger (1991), Wright (1993) and others, these would all be classified as “small” or one-handed manos. Studies on subsistence dependence on cultigens, primarily maize, have consistently shown that sites that predominantly have small, one-handed manos have a low to zero use of

Figure 1. Distribution of East Fork Manos by Grinding Surface Area (cm²).



**Table 1. East Fork Manos and Metates
(by Site and Composition)**

Site	Mano (Sandstone)	Mano (Quartzite)	Mano (Limestone)	Metate (Sandstone)	Metate (Limestone)	Total
Hogge Bridge	4	-	-	1	-	5
Butler Hole	1	-	-	-	-	1
Thompson Lake	6	-	-	-	-	6
Mouth of Pilot	2	-	-	-	-	2
Branch	18	1*	1	3	-	23
Campbell Hole	3	-	-	-	-	3
Upper Farmersville	14	-	2	3	1	20
Sister Grove Creek	9	-	5	-	-	14
Enloe	1	-	-	-	-	1
380 Bridge	5	-	-	-	-	5
Lower Rockwall	7	-	-	1	-	8
Upper Rockwall	23	3	-	7	1	34
Glen Hill	7	-	-	4	-	11
Shortney	-	-	-	1	-	1
Barnes Bridge	1	-	-	-	-	1
Raglan	3	-	-	-	-	3
Gilkey Hill	1	-	-	-	-	1
Small Sites						
- Lower Farmersville	2	-	-	-	-	2
- Enloe Road	1	-	-	-	-	1
- Rowlett Creek	2	-	-	-	-	2
- Rose Hill	1	-	-	-	-	1
Total	111 (90%)	4 (3%)	8 (7%)	20 (91%)	2 (9%)	145

* "Quartzite" mano from the Branch site is a metamorphosed granitic rock that has similar hardness characteristics to a quartzite.

maize (Mauldin and Tomka 1989; Mauldin 1993; Nelson and Lippmeier 1993).

Adams (1991) found in a study of over 2,100 manos from the Hopi area of Arizona and New Mexico that manos present in intensive use sites show wear on more than one surface as the grinder will rotate the mano to counteract wear on one side after prolonged use. This practice of wear management to prolong tool use appears to be characteristic mainly of two-handed manos used exclusively for maize grinding (Adams 1991; Mauldin 1993). Only 11 (17 percent) of the East Fork manos studied herein had wear on more than one surface, again indicating that subsistence dependence on grains was probably relatively low. Examples of typical East Fork manos are shown in figures 2-7.

A total of 22 metates have been reported from Late Prehistoric sites along the East Fork. Twenty (91 percent) were constructed of sandstone and two (9 percent) from sandy limestone. While of varied shape and construction, the metates are generally oval to sub-rectangular in plan view with only the dorsal surface having been used. None of the metates from the region have wear on more than a single surface. Wear patterns are predominantly a single circular depression, with a worn depth of just a few millimeters to as much as 30 millimeters. Only two metates were seen as having a flat surface produced by push-pull grinding and not a circular motion. Experimental and ethnographic evidence has shown that even for small, one-handed manos, a minimum metate grinding surface of 175 cm² is required, with best results obtained with grinding slabs in excess of 400 cm² (Lancaster 1983; Mauldin and Tomka 1989; Wright 1993; Hard et al. 1996). Of the 22 reported metates, 13 were considered complete enough to be able to obtain grinding surface measurements. The grinding surface area of the metates from

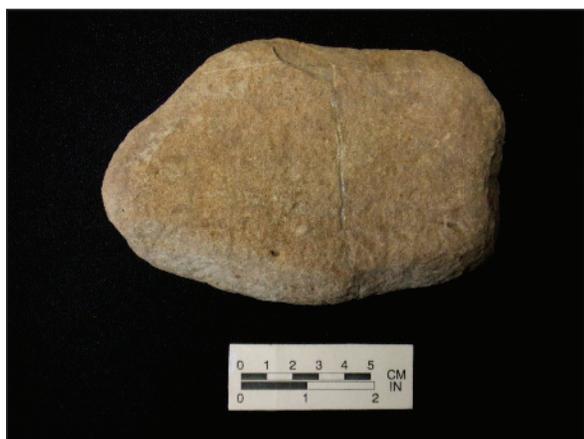


Figure 2. Well-worn one-hand sandstone mano from the Campbell Hole site (41COL10), Collin County, Texas.



Figure 3. Two one-hand manos from the Upper Farmersville site (41COL34), Collin County, Texas. The mano on the left is made from sandy limestone; the mano on the right from sandstone.

the East Fork varies from a low of 177 cm² to a high of 1,135 cm², with the average being 567 cm². While the depression-shaped metate is not optimum for the grinding of maize, it is well designed to confine light weight seeds and prevent them from flying off the milling area. Moreover, many wild grass seeds have hard husks that require considerable pounding to break them down into a usable meal (Carter 1977; Eddy 1979). Similarly, pigments such as red, yellow and black or purple ochre require some pounding to reduce the raw mineral to a size and consistency suitable for grinding (Logan and Fratt 1993). The basin-shaped metate is well-suited for containing ochre fragments during the pre-grinding pulverization process.

The main disadvantages of the basin metate is the difficulty that lies in removing the ground contents



Figure 4. Small, circular one-hand sandstone mano from the Sister Grove Creek site (41COL36), Collin County, Texas.



Figure 5. Rectangular one-hand sandy limestone mano from the Sister Grove Creek site (41COL36), Collin County, Texas.

from the depression and in the tiring nature of the rotary grinding motion as compared to the push-pull motion of two-handed manos on slab or trough metates. Data on the 13 metates measured from the East Fork is presented in Table 2. Examples of typical East Fork metates are shown in Figures 8 - 10.

Microscopic and X-Ray Fluorescence Analysis of East Fork Manos

Ethnographic accounts from the American Southwest, Mesoamerica and Bolivia show that one-handed manos were often used for non-grain grinding activities, including grinding salt, pigments, and even processing hides (Mauldin and Tomka 1989; Adams 1988, 1993). The Utes and the Hopi in particular used smaller manos for hide softening, coloration and/or whitening of hides for clothing, particularly in the



Figure 6. Small, circular one-hand sandstone mano from the Upper Rockwall site (41RW2), Rockwall County, Texas.



Figure 7. Wedge-shaped sandstone mano from the Branch site (41COL9), Collin County, Texas.

manufacture of moccasins (Adams 1988). During her study of Hopi mano wear patterns, Adams (1988, 2014) observed that handstones in particular were subject to four different wear processes, including: (1) abrasion, (2) adhesion, (3) fatigue, and (4) tribochemical wear. Abrasive wear, especially on sandstone manos, results in frosted grains (due to micro-scratches), scratches and grooves. Wear due to adhesion results in significant pitting of the mano surface with some sand grains missing. Fatigue is represented in manos by cracks, pits and loose grain particles. Lastly, tribochemical wear is due to the build-up of material resulting from chemical interactions between the mano and the substance being ground, enhanced by friction from the grinding/pounding process. The latter is typical of handstones used for hide softening where the manos are dampened each time before rubbing the hide. Such stones have a macroscopically shinier luster on the work surface and microscopically, have a distinctive terrain of high relief grains (asperites) with the surrounding interstices free of debris (Adams 1988, 2014).

One-hand manos are also known to have been used extensively in the grinding of pigments, in particular red and yellow ochre (Logan and Fratt 1993). Experimental evidence has shown that grinding dry ochre leaves parallel streaks on the mano that reflects the direction of the grinding motion. In particular, the pigment typically adheres only to the tops of sand grains (in sandstones and quartzites) and not on their sides. There is little accumulation of pigment in intergranular interstices or where grains have been removed by wear (Logan and Fratt 1993; Adams 2014). In contrast, grinding of pigments wetted with water results in a stain that is both uniform in color and distribution and lacks the characteristic streaking present in dry pigment grinding (Logan and Fratt 1993).

Table 2. East Fork Metate Measurements

Site	Artifact	Length	Width	Thickness	Material	Use
Hogge Bridge	TARL-1	287	217	56.5	Sandstone	One Side; Circular Depression
Branch	WWC-1	292.2	159.3	60.4	Sandstone	One Side; Flat Surface
Branch	MDH-1	203.2	127	63.5	Sandstone	One Side; Circular Depression
Upper Farmersville	Harris Coll. (Smithsonian)	268.5	179.3	58.4	Sandstone	One Side; Circular Depression
Upper Farmersville	MDH-1 (Vance coll.)	406.4	165.1	38.1	Sandstone	One Side; Circular Depression
Upper Farmersville	Heard Museum Coll.	369.7	257.1	68.5	Limestone	One Side; Circular Depression
Lower Rockwall	SMU-1	136	130	41	Sandstone	One Side; Flat Surface
Upper Rockwall	TARL-1 (Ross)	254.6	189.6	68	Sandstone	Once Side; Circular Depression
Glen Hill	TARL-1 (Ross)	220	180	50	Sandstone	One Side; Circular Depression
Glen Hill	TARL-2 (Ross)	260	220	55	Sandstone	One Side; Circular Depression
Glen Hill	TARL-3 (Ross)	250	220	35	Sandstone	One Side; Circular Depression
Glen Hill	Vance Coll.	406.4	279.4	63.5	Sandstone	One Side; Circular Depression
Shortney	MDH-1 (Vance Coll.)	374.6	190.5	38.1	Sandstone	One Side; Circular Depression
7 Sites	13 Specimens	286.9 (Ave.)	193.4 (Ave.)	53.6 (Ave.)	12 Sandstone (92%); 1 Limestone (8%)	13 One Side – 11 with Circular Depression, 2 Flat

Average grinding surface area = 566.8 cm² (Range 177-1,133 cm²)



Figure 8. Sandstone metate from the Upper Rockwall site (41RW2), Rockwall County, Texas. Note the small circular depression worn in the center of the artifact.



Figure 9. Sandstone metate from the Glen Hill site (41RW4), Rockwall County, Texas. Note the prominent circular depression.
(Photo by Bobby Vance)

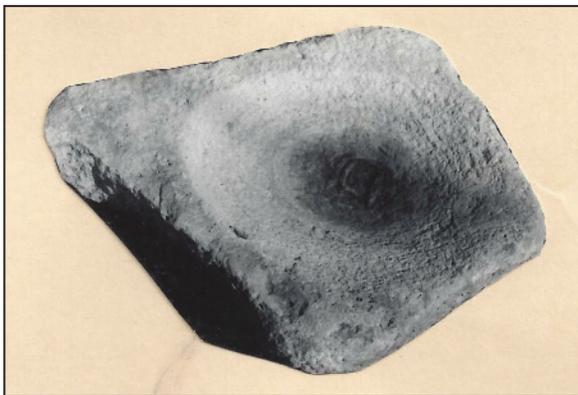


Figure 10. Sandstone metate from the Hogge Bridge site (41COL1), Collin County, Texas. Note the prominent circular depression.
(Photo by Bobby Vance)

In order to try and ascertain the use of East Fork grinding stones, a representative selection of 66 manos (complete and fragments) and 11 metates were viewed under a binocular microscope at 20-60x. Of the 66 manos, 60 (91 percent) showed evidence of circular abrasive wear with only six (9 percent) showing linear scratches. All had frosting and scratches on the sand grains that further indicate wear due to abrasion. A few of the smaller manos had a macroscopically visible sheen or luster on their work surface. Tool fatigue is evident as 33 of the manos (50 percent) had significant surface pitting and 26 (39 percent) had cracks or fractures. Lastly, nine of the manos (14 percent) showed evidence of tribochemical build-up on the surface, typically as a black, red or yellow-colored stain. The stains on the surface of these manos were uniformly spread across the grinding surface and in a rotary pattern suggesting grinding was done in a circular motion with a dampened mano.

In order to further test for potential use, a selection of 10 manos and 1 metate were subjected to a trace element geochemical analysis using a portable X-Ray Fluorescence spectrometer (pXRF). The analysis was conducted using a Bruker Tracer III-SD handheld energy-dispersive X-Ray Fluorescence spectrometer equipped with a rhodium target X-Ray tube and a silicon drift detector with a resolution of ca. 145 eV FWHM (Full Width at Half Maximum) at 100,000 cps over an area of 10 mm². Data was collected using a suite of Bruker pXRF software and processed running Bruker's empirical calibration software add-on. Analyses were conducted in December of 2014 at the laboratory of the Gault School of Archeological Research located at Texas State University in San Marcos.

The manos and metates were measured at 15kV, 23μA, with no filter in the X-Ray path, and a 300 second live-count time. For the samples, peak intensities for K α peaks of manganese (Mn), iron (Fe), lead (Pb) and copper (Cu) were specifically analyzed for and calculated as ratios to the Compton peak of rhodium and converted to parts-per-million (ppm).

Two of the manos from the Sister Grove Creek site and one from Upper Farmersville showed unusually high concentrations of manganese (81,628 ppm, 630,327 ppm, and 12,553 ppm, respectively) and were probably used to grind black or purple ochre for use as a pigment. These amounts range from 15-702 times background. Figure 11 shows one of these manganese-stained manos from the Sister Grove Creek site. One mano from the Branch site had relict red staining on its work surface that was found to be the result of iron oxide (red ochre) (Figure 12). A similar handstone from the Upper Farmersville site also tested for the presence of iron and based on its overall yellow coloration had probably been used for grinding yellow ochre. Iron concentrations were measured at 71,603

ppm and 64,313 ppm, respectively. These amounts equate to 6-15 times background for iron. All five of these mineral pigment-stained stones were small (<110 mm in length), generally more circular than oval in shape, and relatively thick.

The remaining five manos as well as the one metate showed no evidence of any unusual trace element concentrations other than those inherent in the sandstone or sandy limestone material from which they were constructed. Thus they had either been used to grind plant materials or any original pigment once present has eroded away.

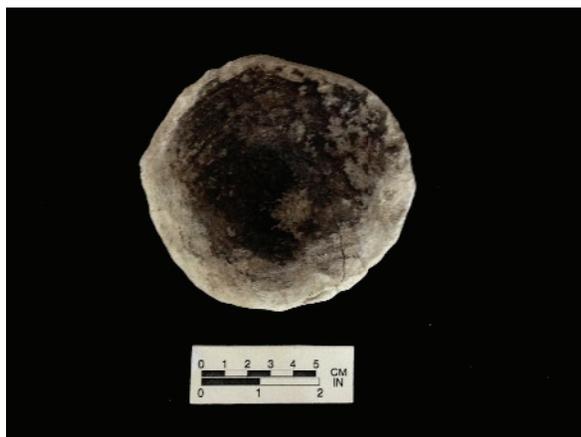


Figure 11. Small, circular one-hand sandstone mano from the Sister Grove Creek site (41COL36), Collin County, Texas showing prominent black staining on the grinding surface. XRF analysis indicates the black material is manganese oxide (81,628 ppm Mn).



Figure 12. Small, circular one-hand mano from the Branch site (41COL9), Collin County, Texas showing prominent red staining on the grinding surface. XRF analysis indicates the red material is iron oxide (red ochre), (71,603 ppm Fe).

Discussion and Conclusions

As noted above, ground stone artifacts are a consistent but minor component of the largest Late Prehistoric sites along the East Fork and its tributaries. Manos have been found at a total of 20 sites; metates at only seven sites. With one exception (Shortney site – 41RW6), the metates and the biggest concentrations of manos are found only at the very largest sites including Hogge Bridge, Branch, and Upper Farmersville in Collin County, and Upper Rockwall, Lower Rockwall and Glen Hill in Rockwall County (see Table 1). In addition, the Sister Grove Creek site (41COL36) has recently produced a large number of well-made manos (n=14).

During the early 1970s, Mark Lynott (1975a, 1975b) led a major excavation of the rim-and-pit structure at the Sister Grove Creek site. One of his major conclusions was due to the lack of evidence of maize from flotation analyses and the lack of any mano or metates found at the site, the aboriginal inhabitants of Sister Grove Creek had a negligible subsistence on cultigens (Lynott 1975a). Following completion of his work at the site, an expansion of Lake Lavon inundated the site. The site has remained under the lake until recently. The extended drought over the last several years has significantly affected the lakes along the East Fork of the Trinity River with both Lake Lavon (Collin County) and Lake Ray Hubbard (Rockwall and Dallas Counties) now being well below conservation levels (National Weather Service 2014). As a result, many archeological sites that had been inundated by the lakes back in the 1960's and 1970's have been re-exposed. Two of these are the Sister Grove Creek and Branch sites. Recent visits to these two sites by the authors has shown that 35-40+ years of wave action has severely deflated the stratigraphy, leaving a large number of artifacts, notably large ground stone artifacts, exposed on the surface. As a result, a significant number of manos and metates have been added to region's total.

Ninety percent of the grinding stone tools found in the East Fork region are made from a well-cemented sandstone. Sandstone is not common in Collin County, the bedrock being either Austin Chalk (limestone) or the Taylor Marl (Ozan Formation) of Upper Cretaceous age. However, in central Rockwall County, prominent NNE-SSW trending dikes of sandstone are exposed in a number of locations (Paige 1909; Martin and Denton 1932). A similar but lesser known occurrence is in southern Collin County southeast of Lake Lavon dam near Camp Creek (Bobby Vance, personal communication, 1974). This sandstone is believed to be an upper member of the Cretaceous Wolfe City Formation that was either squeezed into and/or otherwise filled narrow fissures within the underlying Cretaceous marls (Martin and Denton 1932). While most

exposures are now covered by human development, original descriptions of the dikes indicate the sandstone was tabular in nature with regular fracturing. As a result, flat, tabular blocks for use in making grinding stones could have been easily procured.

Ethnographic studies have shown that mano and metate production was done by specialists (Huckell 1986). Amongst the Hopi and the Zuni, women procured the raw material for all ground stone tools and constructed their basic preforms at a quarry and then finished the tools later back at their camp sites (Hough 1897; Cushing 1920). Underhill (1946) noted that the same general division of labor held for Pueblo women. The one exception was at Santa Clara Pueblo where it was noted that the men helped with the heavy lifting and formation of metate blanks (Hill 1982). Ethnographic information indicates it could take as much as 5-6 days' work at a quarry to produce one metate and several mano blanks; the blanks would then be taken back to the campsite and finished in about a month's time through extensive pecking (Huckell 1986).

In the archeological record, the presence of manos and metates in Late Prehistoric sites has traditionally been used to show a change in subsistence strategies from one based on hunting and gathering to one more dependent on cultigens. Such a shift in economy would have had a profound influence on a number of cultural factors including the form and scale of land use, aspects of labor and social organization, and population growth (Nelson and Lippmeier 1993; Mauldin 1993; Delgado-Raack and Risch 2009). Experimental evidence has shown that drying of fresh maize cobs transforms the kernel disaccharides into polysaccharides, or about 74.5 percent starch. Grinding the dried kernels and cooking the resultant flour breaks down the starch molecules into simpler more digestive forms for human intake (Delgado-Raack 2009).

Adams (1993, 2014) and others have demonstrated a strong correlation between mano size and societal dependence on corn. Ethnographic evidence from the American Southwest, Mesoamerica and Bolivia show grinding maize was a labor intensive task often requiring two to five hours per day (Mauldin and Tomka 1989). As dependence on grain increases so does time needed to process food. One way to reduce the task is to increase mano grinding surface area (size) and move from basin to flat/trough metates in order to produce more flour (Hard et al. 1996; Mauldin 1993). Therefore in high corn subsistence societies, metates have been found to either be large slabs or trough-shaped; manos on the other hand are almost exclusively large two-handed tools.

As has been shown in this study, 86 percent of the complete manos made available to the authors for study have a surface grinding area of less than 150 cm²,

with the average being only about 125 cm². Only nine had a surface grinding area greater than 150 cm², with just four being classified as truly "large" manos (>200 cm²). Microscopic examination of 66 complete and fragmentary manos shows the overwhelming majority (91 percent) have wear consistent with abrasion from rotary grinding. Only six manos showed linear striations produced by push-pull motions, and three of those also had circular abrasion as well. Of the 13 metates studied, 11 have weak to prominent circular depressions on the dorsal surface. The two that have flat surfaces have abrasive wear patterns that are also consistent with rotary grinding; linear grinding could have been done on these metates, but if present, evidence of it has been obscured by more recent rotary motion.

Subsistence studies have shown that archeological sites that predominantly have small, one-handed manos have a low dependence on maize (Mauldin and Tomka 1989; Mauldin 1993). Grinding stones in these sites were either used on plant materials (grass seeds, roots, tubers, nuts, etc.) or on inorganic substances such as salt, clay and pigments (Adams 1993, 1999). In his initial work on defining the Late Prehistoric of the East Fork, Stephenson (1952) stated that the indigenous inhabitants had relied on maize as a staple part of their diet. This was based on a reported discovery of burned maize kernels at the Hogge Bridge (41COL1), Branch (41COL9) and Campbell Hole (41COL10) sites. In discussions with the senior author on this subject, R.K. Harris confided that a single burned kernel of maize had indeed been found at Hogge Bridge, but to his knowledge, no maize had been found at any other East Fork site (R. K. Harris, personal communication, 1974). An examination of all of Stephenson's excavation materials that are curated at the Texas Archeological Research Laboratory (TARL) in Austin failed to show any maize among the preserved carbonaceous materials from Hogge Bridge.

Two flotation studies have been conducted on other East Fork Late Prehistoric sites for the purpose of identifying floral materials; the first a detailed experiment carried out by Lynott as part of his excavation of the Sister Grove Creek site (Lynott 1975a), and a second much more limited study carried out by the authors on the Upper Farmersville site with the help of the late Dr. Harold Laughlin, then Director of the Heard Natural Science Museum and a noted biologist. Among seeds and bulbs, Lynott found charred remains of hackberry, balloon vine and white dog's tooth violet. Burned hackberry and pecan were also found at Upper Farmersville. In terms of pollen remains, Lynott recovered evidence of chenopods, sunflower, Mormon tea, bur-reed, yucca, cactus, willowherb (Evening Primrose) and various grasses from Sister Grove Creek

(Lynott 1975a). No pollen analysis was conducted on Upper Farmersville material. In both cases, evidence of maize use was actively searched for and not found. As a result, Lynott concluded that the use of maize along the East Fork, if present, was extremely limited. The results of this study on the East Fork's ground stone tools support Lynott's conclusion. However, that does not mean the indigenous inhabitants of the East Fork did not use manos to grind plant material as evidenced by the presence of chenopods, sunflower, dog's tooth violet, grass seeds and nuts. Maize may also have been present but it was not a major factor in the aboriginal inhabitant's diet.

In addition to the use of grinding stones for pulverizing seeds, bulbs and nuts, the results of this study show that the East Fork inhabitants also used manos and metates for the production of pigments, primarily red and yellow ochre as well as a manganese-based pigment (black or purple ochre). While pieces of both red and yellow ochre may be found locally in the East Fork and its tributaries, large pieces of manganese are absent. Manganese staining can be found in all the area streams but this is as a very thin coating on the surfaces of rocks. It is doubtful that enough rocks could be collected to produce significant quantities of manganese ochre.

Minable quantities of manganese do occur in the Central Mineral Region of Llano and Burnet Counties as veins within the Valley Spring Gneiss (Sellards and Baker 1934). However, closer deposits are located 150 km to the north near Bromide and Viola, Oklahoma. Here extensive deposits of hausmannite ($Mn^{+2}Mn^{+3}_2O_4$), psilomelane ($Ba(Mn^{+2})(Mn^{+4})_8O_{16}(OH)_4$) and other manganese minerals occur on the eastern edge of the Arbuckle Mountains (Hewitt 1921; Merritt 1941). It is unknown if these deposits were accessed by prehistoric peoples, but as they occur along fault lines exposed at the surface it is certainly possible.

Lastly, the lustrous sheen seen on several of the smallest manos could be the result of their use on hide processing. While microscopic examination of their work surfaces did not reveal all the characteristics noted by Adams (1988, 2014), use of some manos for such work cannot be ruled out.

Acknowledgements

We are indebted to the many previous researchers in the area who openly shared their knowledge about the Late Prehistoric occupations of the region. Foremost among these were R. L. Stephenson and the late R. K. "King" Harris, Rex Housewright, Lester Wilson and Bobby Vance of the Dallas Archeological Society. We also thank Mr. John McCraw of McKinney, Texas

who opened his extensive collection from the region to us for study. We are further grateful to Dr. James Krakker of the Smithsonian Institution (Museum Support Center) for allowing us access to the R. K. Harris collection, and to Ms. Laura Nightengale who offered us unlimited access to the East Fork collections present at the Texas Archeological Research Laboratory (TARL) in Austin. Of particular note are the many wonderful photographs of East Fork artifacts that Laura took to aid us in our research, several of which appear in this paper. Special thanks are given to Dr. Thomas J. Williams of the Gault School of Archeological Research for assisting the senior author (WWC) in the XRF analysis of selected manos and metates. Lastly, we would like to specifically thank the Heard Natural Science Museum (McKinney, Texas) and the Collin County Historical Society who sponsored original portions of this research and to the late Dr. Harold Laughlin who assisted in the macroscopic analysis of the vegetable remains collected from the Upper Farmersville site.

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A SECOND SPINDLE WHORL FROM THE EAST FORK

Wilson W. Crook, III and Mark D. Hughston

Introduction

Recently the authors submitted a paper for publication on the ceramics of the Late Prehistoric of the East Fork of the Trinity. As a part of the review process, one reviewer asked a question regarding the addition of sand to the paste in the district's grit-tempered ceramics. In response to the question, the senior author conducted a petrographic study of 504 grit- and grog-tempered sherds from 13 of the largest sites along the East Fork. During this study, a sherd of Williams Plain pottery from the Hogge Bridge site (41COL1) was seen to have been crudely shaped on one edge to form a semi-circle. Microscopic examination of the straight edge of the sherd showed it to be a break through the remains of a single perforation. As such, the artifact was recognized as a broken spindle whorl, the second such artifact to be recorded from the East Fork. This paper serves to describe the artifact and compare it to a similar ceramic spindle whorl recently found at the Sister Grove Creek site (41COL36) (Crook 2014).

The Hogge Bridge Site (41COL1)

The Hogge Bridge site is located in south-central Collin County about 9 km (5.5 miles) northeast of Wylie (Figure 1, Station 8). The site lies on the north side of the East Fork of the Trinity and covers about 1.6 Ha. A large, circular rim-and-pit structure, 27 meters in diameter, was located near the center of the site. The site was explored by members of the Dallas Archeological Society in the 1940's (Wilson 1946) and recommended by the original basin survey of the then proposed Lavon reservoir for detailed excavation (Stephenson 1949a, 1949b). This excavation was undertaken by Robert Stephenson in 1949 and resulted in the establishment of a new Late Prehistoric culture called the "Wylie Focus" (Stephenson 1952). Construction of the Lavon Reservoir in 1953 inundated the site halting all archeological investigation. The site's location near Lavon dam within the deepest part of the lake has served to keep it submerged despite the recent severe drought and the lowering of the lake well below conservation levels (National Weather Service 2014).

Prior to its inundation, extensive surface collections were made from the site, the majority of which were in the private collections of Rex Housewright, Lester Wilson and Bobby Vance of Wylie, Texas. These three Dallas Archeological Society members had a pact to keep their collections together for future research, so the Housewright collection passed upon his death to Mr. Wilson, who passed the collection on his death to Bobby Vance. With the passing of Mr. Vance, the entire collection plus all its research maps and notes, were purchased by authors in order to keep this valuable set of data intact. The study of these materials and their accompanying field notes has proved invaluable to our ongoing research on the East Fork Late Prehistoric. It is within these collections that the spindle whorl described herein was found.

The Spindle Whorl

The spindle whorl had previously been carefully cleaned using water and a firm brush and then hardened in a bath of diluted muriatic acid. The artifact appears to have been constructed from the side-wall near the base of a flat-bottomed, grit-tempered vessel. Microscopic examination of the interior of the sherd across the breakage plane shows it to be constructed from a dark sandy paste, the "grit" being inherent to the clay matrix and not the product of a later temper addition. No decoration is present on the sherd and based on its overall thickness, color and composition, it is tentatively identified as type Williams Plain, one of the first and most numerous ceramics found in Late Prehistoric sites along the East Fork.

Color of the spindle whorl varies from brownish yellow (10YR 6/6) to very pale brown (10YR 7/4) to light reddish-brown (7.5YR 6/4). The sherd has been intentionally ground into a circular shape with a single perforation drilled just above its center. The artifact broke subsequent to its manufacture with the breakage occurring through the centerline of the perforation. Current dimensions of the artifact are 51.0 mm by 26.1 mm. Assuming the breakage occurred more or less through the center line of the artifact, the original dimensions would have been close to a circle, 51-52

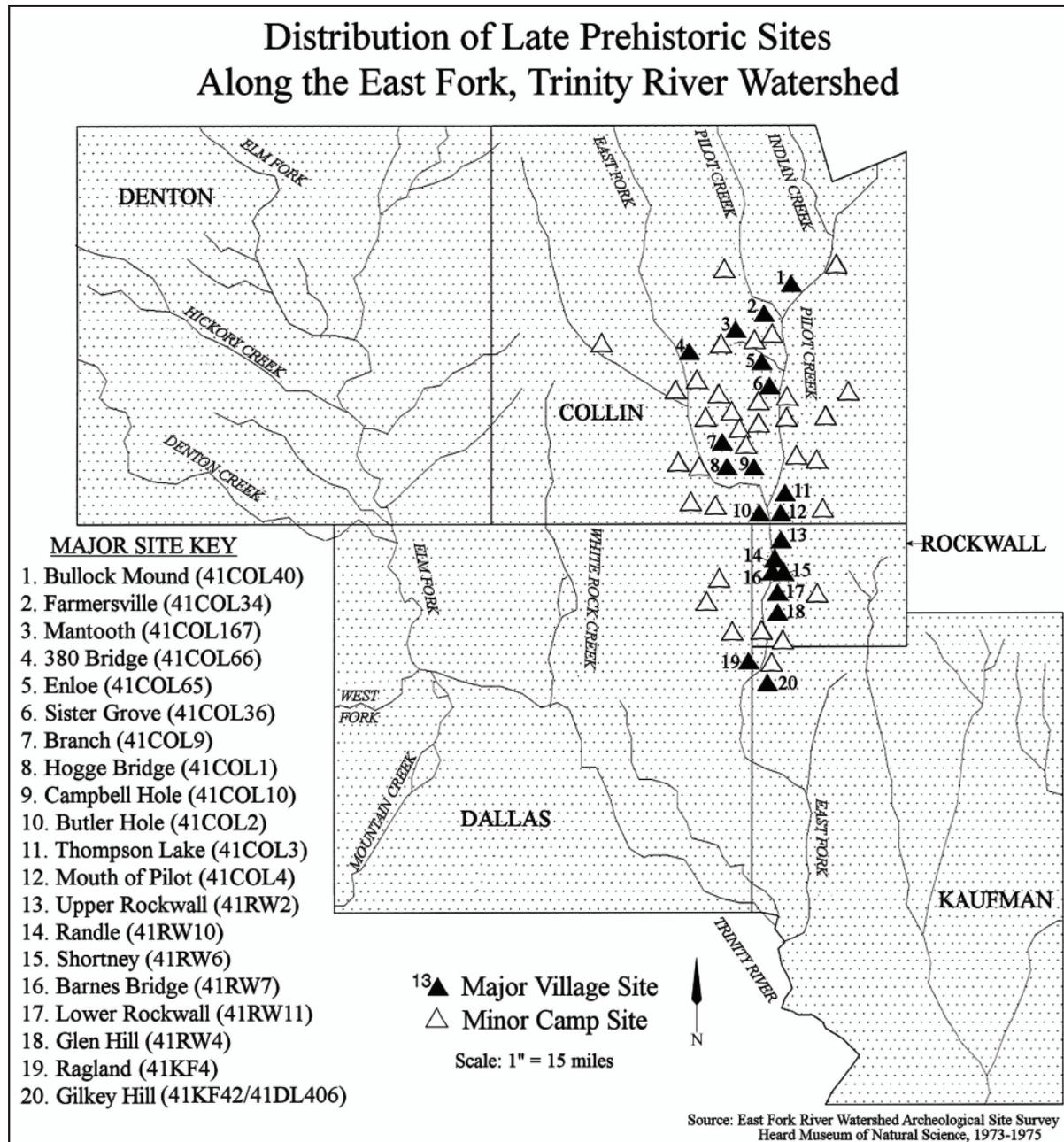


Figure 1. Distribution of the Late Prehistoric sites along the East Fork of the Trinity and its tributaries. Major sites are identified by solid black triangles and identified by name; minor seasonal campsites are shown as unfilled triangles.

mm in diameter. Thickness is fairly uniform across the sherd at about 6.5 mm, indicating that it likely came from near the base of a flat-bottomed vessel. Dimensions of the perforation are 6.2 mm by 2.0 mm, which would yield an original hole roughly 6 x 4 mm in size. The size and shape of the artifact are consistent with similar tools that have been identified as spindle whorls from Caddo sites across East Texas (Timothy K. Pertulla, personal communication, 2014). It is also

impossible to determine if the spindle whorl was constructed at the Hogge Bridge site from a broken vessel, but given the abundance of Williams Plain pottery both at the site and throughout the district, it is likely to have been manufactured locally.

Photographs of both the obverse and reverse sides of the artifact are shown in Figures 2 and 3.



Figure 2. Broken ceramic spindle whorl recovered from the Hogge Bridge site (41COL1), Collin County, Texas.



Figure 3. Reverse face of ceramic spindle whorl recovered from the Hogge Bridge site (41COL1), Collin County, Texas.

Conclusions

Spindle whorls are a consistent, albeit minor artifact from many Caddo sites, especially those where a thousand or more ceramic sherds have been recovered (Timothy K. Perttula, personal communication, 2014). Webb (1959) reported a large number of spindle whorls from the Belcher Mound site in Caddo Parish, Louisiana. Most were constructed from lower side-wall or basal pottery sherds, and were typically 50-63 mm in diameter with a single central perforation. Similar artifacts were reported from the George C. Davis site (41CE19) in Cherokee County, Texas (Newall and

Krieger 1949). The artifacts recovered from the Davis site varied from 50-70 mm in diameter. Perforated ceramic disks have also been reported from a number of sites throughout the Caddo occupational area (Perttula 1992, 2005; Perttula et al. 2011). The artifact described herein fits well within the observed dimensions of spindle whorls from East Texas Caddo sites.

The Hogge Bridge spindle whorl described herein is slightly smaller than the one found recently at the Sister Grove Creek site (Crook 2014). The latter was constructed from a part of the base of a plain sandy paste tempered vessel and was also broken down the centerline through its center perforation. The original complete spindle whorl was estimated to have been 72-73 mm in diameter, about 35 percent larger than the one from Hogge Bridge.

It is noteworthy that even after extensive surveying and collecting from the East Fork region (Harris and Suhm 1963; Lorrain 1965; Crook and Hughston 2008), the artifact described herein is only the second spindle whorl thus far reported from an inventory of over 10,200 ceramic sherds. Thus while the find may give a hint with regard to the local inhabitants producing some type of fiber, it does not appear that fiber production was extensive. Indeed, the artifact may have been used to produce fibers for the construction of something other than clothing, such as nets for fishing and/or trapping.

The spindle whorl's construction from a broken Williams Plain ceramic is intriguing for several reasons. As mentioned above, Williams Plain is the single most common sandy paste / grog-tempered type found in the East Fork. A total of 3,642 Williams Plain sherds have been recorded from the East Fork, representing 36 percent of all East Fork ceramics. Williams Plain has been found in all of the larger sites of the district and in many of the smaller campsites. Sherds are typically very thick with vessel bases in excess of 20 mm in thickness not uncommon. Vessels of this type are almost exclusively flat-bottomed, flower pot shaped bowls and jars (Schambach 2002).

Williams Plain is widely recognized as one of the diagnostic artifacts of the Woodland Fourche Maline culture of southeastern Oklahoma and southwestern Arkansas (Schambach 1998, 2001). While the Fourche Maline culture is suggested by Schambach (1995, 2002) to have extended into Northeast Texas as far as the George C. Davis (41CE19) site, it is not universally recognized as such. Story (1990) refers to this period as the "Early Ceramic Stage" in East Texas, representing the general time span between ca. 200 B.C. and A.D. 800 when ceramics are first adopted and produced in the region.

In Northeast Texas, the Woodland period follows the end of the Archaic and precedes the development of the post-A.D. 800 Caddo tradition (Cliff 1998). A

similar culture is present in sites along the East Fork. While many of the East Fork sites are on land that has been extensively cultivated, a few sites with stratigraphically intact areas have been excavated. These include the Sister Grove Creek site (Lynott 1975), the Enloe site (41COL65) (Crook 1989), the Branch site (Crook 2007), and part of the Upper Farmersville site (Crook 2009; Crook and Hughston 2009). These excavations have shown that while ceramics are typically penecontemporaneous with arrow points, pottery is also present below the introduction of the bow and arrow and concurrent with dart points, primarily the Gary point. The only ceramic type present at these earlier horizons is Williams Plain. As such, Williams Plain is seen as the earliest ceramic ware on the East Fork. Williams Plain was continued to be made until at least ca. A.D. 1200, which may help to also explain its abundance in the region (Timothy K. Perttula, personal communication, 2014).

A single radiocarbon date of A.D. 1000 +/- 70 was obtained from the Hogge Bridge site (Marmaduke 1975) fits well with both Williams Plain pottery and thus the spindle whorl.

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A CERAMIC PENDANT FROM THE GILKEY HILL SITE (41KF42 / 41DL406), KAUFMAN AND DALLAS COUNTIES, TEXAS

Wilson W. Crook, III

Introduction

Numerous sites of the Late Prehistoric period occur along the East Fork of the Trinity and its tributaries in a rough north-south line from Collin County in the north to northern Kaufman County, some 70 km to the south. The southern most of these occupations is Gilkey Hill (41KF42 / 41DL406). The Gilkey Hill site was initially described in a short paper by Harris in 1942. Since then, the site has been the subject of a number of subsequent minor excavations, each of which has typically focused on one or more singular features such as a hearth or a burial. The author visited the site several times in the summer of 1973 with the late R. K. Harris and made an extensive site survey and surface collection. A limited excavation consisting of several test pits and one 1.5 x 1.5 meter unit square were dug to determine the site's stratigraphy. From 2006-2011, a more extensive excavation was undertaken by AR Consultants, Inc. as part of work for a pipeline extension across the Trinity floodplain (Todd and Skinner 2006; Todd et al. 2011). Crook combined all of these previous excavation results coupled with an extensive analysis of all the artifact collections from the site and published a comprehensive overall site report (Crook 2011).

Recently the author and Mark D. Hughston concluded a study on all the known ceramic artifacts from the Late Prehistoric of the East Fork. As part of the research, we conducted a petrographic analysis on 504 grit- and grog-tempered sherds from 13 of the largest sites along the East Fork, including Gilkey Hill. Included in this was a relook at the material from the Housewright-Wilson-Vance collection that contained a number of unwashed Williams Plain sherds from Gilkey Hill. Cleaning the remaining caked soil from these artifacts revealed that one of the sherds had been both shaped and perforated for probable use as ornamentation. This paper serves to describe this unusual artifact and record its occurrence.

The Gilkey Hill Site (41KF42 / 41DL406)

Gilkey Hill is located about 4 km (2.5 miles) southwest of the town of Forney near the old settle-

ment of Gilkey Hill. The site straddles the Dallas – Kaufman County line immediately east of the East Fork of the Trinity River (Figure 1, Station 20). The site consists of an upper section that is located on a hill slope above the East Fork floodplain. Occupational material is present to a depth of 30 cm on the uppermost section. At the base of the hill is the largest concentration of artifacts. Test pits show the depth of the midden at this point is 75-90 cm. This upper section of the site, which represents approximately 80 percent of the occupation, is located in Kaufman County and given the site designation of 41KF42. West of the base of the hill there is a small mound on the East Fork floodplain that also contains cultural material. Test pits show the occupation thickness in this part of the site is less extensive, extending only to a depth of 30 cm. This westernmost part of the site lies just across the county line in Dallas County. Todd and Skinner (2006) designated this part of the site as 41DL406. Cultural material is identical in both parts of the site and thus they are believed to represent a single occupation. The total site thus covers an area of approximately 6 Ha (15 acres).

As mentioned above, extensive surface collections were made from the site including those in the private collections of Rex Housewright, Lester Wilson and Bobby Vance of Wylie, Texas (the "Housewright-Wilson-Vance Collection"). These three Dallas Archeological Society members had a pact to keep their individual collections together for future research, so the Housewright collection passed upon his death to Lester Wilson, who passed the collection on his death to Bobby Vance. With the passing of Mr. Vance, the entire collection plus all the research maps and notes were purchased by Mark D. Hughston and the author in order to keep this valuable set of data intact. The study of these materials and their accompanying field notes has proved invaluable to our ongoing research on the East Fork Late Prehistoric. It is within these collections that the Williams Plain sherd pendant described herein was found.

The Ceramic Pendant

Initial visual examination of the sherd showed the distal end has been shaped to a point; almost like a

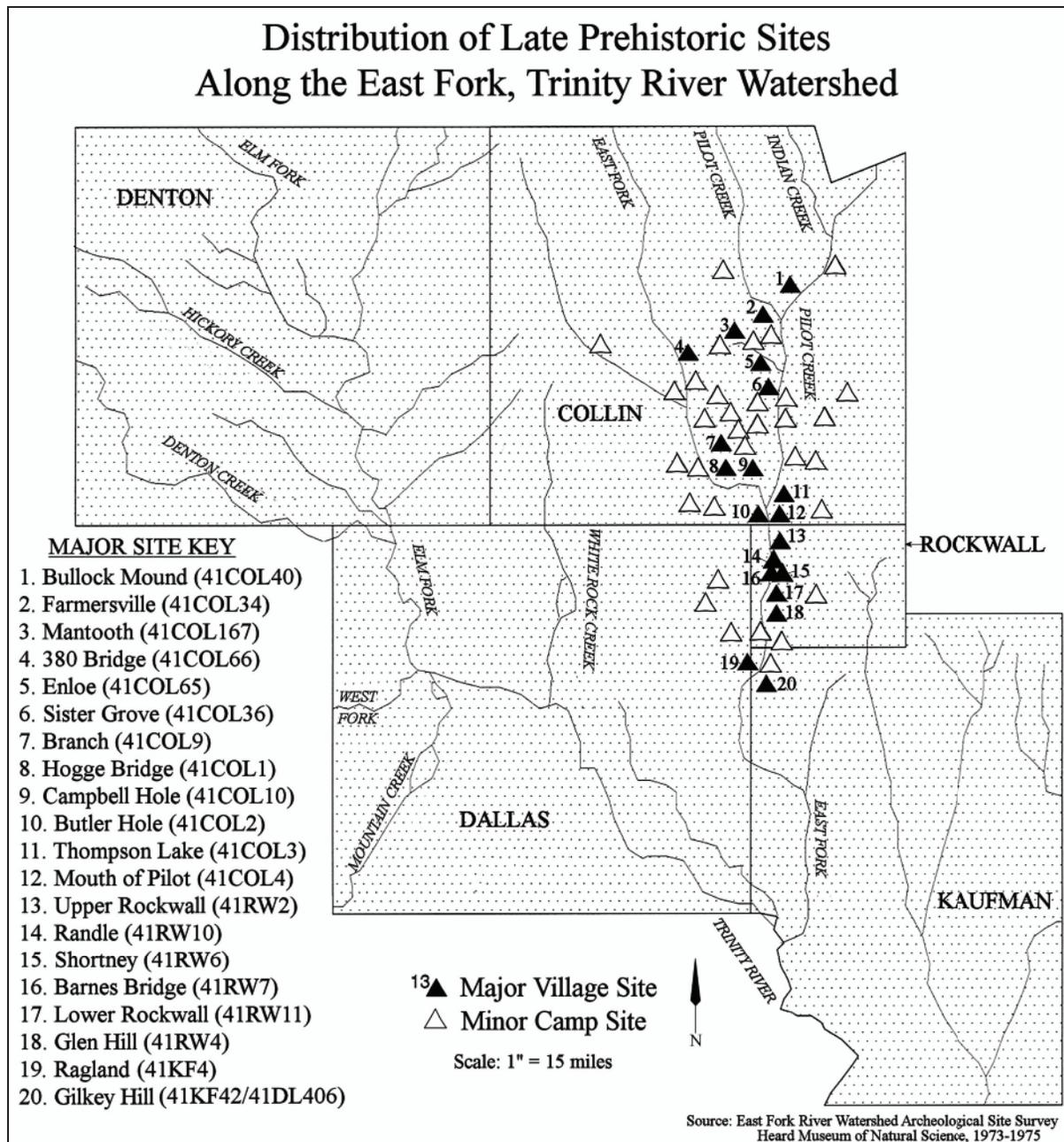


Figure 1. Distribution of the Late Prehistoric sites along the East Fork of the Trinity and its tributaries. Major sites are identified by solid black triangles and identified by name; minor seasonal campsites are shown as unfilled triangles. Gilkey Hill is Station 20.

guitar pick (Figure 2). However, the proximal end was completely covered in soil. Careful cleaning of the artifact using water and a firm brush revealed that the proximal end had also been both shaped by grinding and polishing and a small perforation, previously hidden by the soil coating, had been drilled in the upper center of the artifact. Length of the artifact is 27.0 mm with a width of 26.5 mm at the proximal end rapidly

tapering to 6.1 mm at its distal end. Thickness varies from 5.8 to 4.8 mm. The single perforation is very small, measuring 1.2 x 1.2 mm on the obverse face and 1.5 x 1.5 mm on the reverse face; the difference in diameters suggesting it was drilled biconally. The overall form of the artifact is thus a sub-triangular, tear-drop shape with the perforation suggesting it was



Figure 2. Williams Plain ceramic pendant from the Gilkey Hill site (41KF42/41DL406), Kaufman and Dallas counties, Texas.



Figure 3. Reverse face of ceramic pendant from the Gilkey Hill site (41KF42/41DL406), Kaufman and Dallas counties, Texas.

worn around the neck pointing downward (see Figure 2) as a pendant or part of a necklace.

Original color of the sherd varies from brownish yellow (10YR 6/6) to very pale brown (10YR 7/4). However, both the obverse and reverse faces show fire mottling indicating the sherd had been part of an extensively used ceramic prior to its shaping into a pendant. Microscopic examination shows that the sherd has been intentionally ground on all three edges and then polished into its tear-dropped shape with a single very small perforation drilled at the top of the artifact. No decoration is present on the sherd (other than the shaping and perforation) and thus based on its color and composition, it is tentatively identified as type Williams Plain.

Photographs of both the obverse and reverse sides of the artifact are shown in Figures 2 and 3.

Conclusions

Ornaments such as beads, gorgets, pendants, etc. are a consistent, albeit rare artifact from many East Fork Late Prehistoric sites. Almost all of these types of artifacts are made from shell or bone, or in the case of gorgets, from some form of non-indigenous exotic stone (Crook and Hughston 2008). A few beads have been found made from clay (Harris 1936, 1942, 1948; Harris et al. 1963; Crook 2007b), but these are extremely rare as compared to beads constructed from shell or bone. Two shaped sherds identified as spindle whorls have been recovered from the district, but these are circular in shape and have a much larger perfora-

tion that is also near the center of the artifact (Crook 2014). No other shaped sherds have been reported.

Shaped sherds are also rare from Caddo sites in East Texas, especially those that have not been made into spindle whorls (Timothy K. Perttula, personal communication, 2014). Two shaped sherds similar to the Gilkey Hill artifact were reported from the George C. Davis site (41CE19) in Cherokee County, Texas (Newall and Krieger 1946). The artifacts recovered from the Davis site, described as “egg shaped objects”, were of a similar size to the Gilkey Hill pendant but lack any perforation. Similar non-perforated shaped ceramics have also been reported from a few sites throughout the Caddo occupational area (Perttula 1992, 2005; Perttula et al. 2011). However, none look like the Gilkey Hill pendant. In this regard, the artifact described herein appears to be unique.

The fire mottling on both faces of the pendant suggests that it came from a vessel that had seen considerable use prior to breakage. Williams Plain is the single most common sandy paste / grog-tempered ceramic type found in the East Fork, occurring in large numbers in most of the larger sites of the district and in many of the smaller campsites. Vessels of this type are almost exclusively utilitarian flat-bottomed, flower pot-shaped bowls and jars (Schambach 2002).

Excavations in undisturbed sections of the Branch (41COL9), Upper Farmersville (41COL34) and Enloe (41COL65) sites have shown that Williams Plain is the earliest ceramic ware on the East Fork, possibly occurring as early as ca. A.D. 700-800 (Crook 2007a; Crook and Hughston 2009; Crook 1989, 2009). Williams

Plain continued to be made until at least A.D. 1200 that may help to also explain its abundance in the region (Timothy K. Perttula, personal communication, 2014). Why a sherd from a vessel at the Gilkey Hill site was subsequently skillfully made into a piece of ornamentation remains unknown.

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A PROBLEMATIC RADIOCARBON DATE FROM THE HICKORY CREEK SITE (41DN63) IN DENTON COUNTY, TEXAS

Wilson W. Crook, III

Introduction

The Hickory Creek site (41DN63) lies in central Denton County about 5 km south of the county seat of Denton. The site was discovered by Wilson W. Crook, Jr. and R. K. "King" Harris in 1956 while exploring upstream from the Lewisville site (41DN72) in search of similar occupations along the so-called "T-2" or "Lewisville / Hickory Creek" terrace of the Elm Fork of the Trinity River. In a small barrow pit dug for the adjacent Santa Fe Railroad, Crook and Harris discovered three worked flakes in association with burned mammal bones. Bob H. Slaughter of SMU later identified the bones as belonging to bison and camel (Crook and Harris 1957, 1958). A small amount of charcoal was found in a clay lens immediately next to the area containing the burned bones and worked flakes. As the occurrence was very similar to the 21 hearth features found at the Lewisville site, all the material was carefully excavated. In particular, the recovered charcoal was wrapped in aluminum foil and sealed in glass jars for possible future radiocarbon dating. Due to the relatively small amount of charcoal material collected, no date was possible to obtain in the 1950's by conventional radiocarbon technology.

The writer visited the site several times during the 1970's with both Wilson Crook, Jr. and King Harris in order to observe the geology and to see if any additional carbon material could be found. While fragments of mammal bones could be seen eroding out of one wall of the pit, no additional carbon material or flaked stone was found. Observed fauna included bison, camel, tortoise (probably *Testudo sp.*) and gastropods (*Anguispira alternata*). Since the late 1970's the borrow pit has been filled in and currently lies under a reclaimed portion of land near new sand and gravel operations. As neither Crook nor Harris ever published any of their site notes (other than a brief mention in Crook and Harris 1957:77-79), the writer collated their observations, field notes as well as my own study of the worked lithic material and published a short note on the site (Crook 2013).

Over the last two years, the three worked flakes have been subjected to X-Ray Fluorescence (XRF) analysis in an attempt to ascertain their provenance.

Additionally, a split of the preserved charcoal material originally collected by Crook and Harris was sent to Beta Analytic, Inc. for radiometric dating. This paper describes the results obtained from both of these analyses and places the site in context with the Lewisville site located 15 km downstream.

Artifact Analysis Using X-Ray Fluorescence

All three worked flakes collected from the Hickory Creek site were subjected to a trace element geochemical analysis using a portable X-Ray Fluorescence spectrometer (pXRF). The analysis was conducted using a Bruker Tracer III-SD handheld energy-dispersive X-Ray Fluorescence spectrometer equipped with a rhodium target X-Ray tube and a silicon drift detector with a resolution of ca. 145 eV FWHM (Full Width at Half Maximum) at 100,000 cps over an area of 10 mm². Data was collected using a suite of Bruker pXRF software and processed running Bruker's empirical calibration software add-on. The analysis was conducted during the summer of 2013 at the laboratory of the Gault School of Archeological Research located at Texas State University in San Marcos.

The three flakes were measured at 40keV, 55iA, using a 0.3 mm aluminum / 0.02 titanium filter in the X-Ray path, and a 60 second live-count time. Peak intensities for K α and L α peaks of 17 trace elements were calculated as ratios to the Compton peak of rhodium and converted to parts-per-million (ppm).

Provenance analysis of the trace element data collected from the artifacts was conducted using a database of geologic samples from the Edwards Plateau obtained by the Gault School of Archeological Research. A total of 464 geologic samples from 4 major geographic regions of the Edwards Plateau (Gault area, Fort Hood, Callahan Divide, Leon Creek) have been collected and analyzed using the same method described above. A statistical analysis based on the methodology developed by Speer (2014) was conducted on both the geologic database as well as the Hickory Creek site material. A summary of the analytical methodology utilized for sourcing Texas lithics can be found in Williams and Crook (2013) and Crook and Williams (2013).



Figure 1. Worked flake assemblage found in association with burned Pleistocene mammal bones, Hickory Creek (41DN63) site.

Left to Right: Flake #1 - Purple-black quartzite; Flake #2 - heavily patinated white to light-gray Edwards chert; Flake #3 - red-brown quartzite

The three flakes recovered from Hickory Creek are shown in Figure 1. Flake #1, a purple-black quartzite (5R 2/2), appears to be an iron-rich piece of Uvalde gravel. Remnant Ogallala Formation gravels containing predominantly quartzite are common constituents of the terraces along the Trinity River (Byrd 1971; Menzer and Slaughter 1971; Banks 1990). Geochemically, these quartzites are quite distinct as they contain relatively high amounts of yttrium, zirconium, niobium and strontium. Flake #3, a red-brown to light brown (5YR 5/6) medium-grained quartzite, shows an almost identical chemical signature as Flake #1, albeit with less iron.

Statistical analysis of the trace element signature from Flake #2, a white to light-gray chert (N9/0 to 5YR 8/1) indicates a match with Gault area chert at a 95% confidence level. This does not mean the flake neces-



Figure 2. Worked flake of Gault chert from the Hickory Creek (41DN63) site.

sarily originated from the Gault site in Bell County (41BL323), but that it has an identical trace element signature to those Edwards Plateau cherts found in the immediate area in and around the Gault site (Crook and Williams 2013). The result also confirms the author's earlier tentative identification of Edwards chert based on the flake's strong orange-yellow color fluorescence under both short-wave and long-wave ultraviolet radiation. A detailed photograph of Flake #2 is shown in Figure 2.

Radiocarbon Dating

As mentioned above, Crook and Harris recovered a small amount of charcoal in association with the burned mammal bones. Examination of this material under 20-60x revealed the presence of small (<10mm) circular pieces of charcoal embedded in reddish clay-rich sand, which contained a large amount of microscopic charcoal grains admixed with the sediment. A split of the recovered carbon material was sent to Beta Analytic, Inc. for radiocarbon dating. After pretreatment, 21 grams of charcoal and organic sediment was recovered and subjected to Accelerator Mass Spectrometry (AMS) dating. Radiocarbon age of the charcoal material was 32,180 +/- 230 BP (Radiocarbon Years), with a two-sigma calibration date of 35,625 to 36,625 Cal. Years BP (Table 1). This is very similar to dates obtained from the Lewisville site (Brannon et al. 1957; Fergusson and Libby 1962; Crook and Harris 1962; Li Liu et al 1986).

In the late 1970's, an extreme drought briefly re-exposed the Lewisville site. A short excavation was conducted from September, 1978 until February, 1979 when the site was once again inundated by the waters

Table 1. Radiometric Results from the Hickory Creek Site (41DN63)

Sample	Conventional Radiocarbon Age (Radiocarbon Years)	1 Sigma Calibration	2 Sigma Calibration	13C / 12C
41DN63 – F1 (Beta-376329)	32,180 +/- 230 BP	35,880 to 36,295 Cal. BP	35,625 to 36,485 Cal. BP	-24.2

of Lake Lewisville (Stanford 1982). A new hearth (Hearth 22) was uncovered during the excavations and carbon material obtained for radiometric dating. A date of 26,610 +/- 310 (RC Years) was obtained by the Illinois State Geological Survey (Li Lui et al. 1986). While younger than the “greater than 37,000 years” date originally obtained for Hearth 1 by Crook and Harris (1957, 1962), the date was still significantly older than the age of the Clovis material found at the site. Noting that the Cretaceous Woodbine Formation, known to contain lenses of lignite, cropped out less than 2 km from the Lewisville site, Johnson (1982) proposed that the aboriginal inhabitants of Lewisville must have used lignite as a fuel source along with local wood, which would thus account for the anomalously old radiocarbon date obtained in all the hearth analyses.

In support of this hypothesis, the Illinois Geological Survey conducted a detailed analysis of both Lewisville hearth materials along with Denton County lignite from the Woodbine Formation (Shiley et al. 1985). Carbon material analyzed from the Lewisville site included both samples from the newly discovered Hearth 22 as well as material collected by Crook and Harris in 1956 from Hearth 8 (Shiley et al. 1985). The carbon and associated hearth sediment was subjected to a series of analytical tests including X-Ray Powder Diffraction analysis (XRD), Neutron Activation analysis (INAA), as well as Mossbauer Spectroscopy to search for pyrite decomposition products (hematite, Fe_2O_3) as well as authigenic kaolinite ($\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$), both known by-products of coal (lignite) combustion. Both the XRD and INAA analyses not only failed to show any lignite combustion products but also demonstrated that the Lewisville hearth material was mineralogically quite different from Woodbine Formation lignite. A small peak assumed to be hematite was found in the Mossbauer Spectroscopy analysis of the hearth material and as a result, limited support was given to the hypothesis that lignite had indeed been admixed with charcoal (Shiley et al. 1985).

In addition, the radiocarbon laboratory at the Illinois State Geological Survey noted that Lewisville hearth carbon readily dissolved, even in cold dilute sodium hydroxide. This is characteristic of low-grade coals such as lignite that have been oxidized by expo-

sure to the air for a long time (Dennis D. Coleman, personal communication, 1986). The results were used as further support for the admixed lignite theory.

In order to determine if the Hickory Creek carbon material was similar to that from Lewisville, a portion of the split not utilized for radiocarbon analysis was subjected to both an alkali (sodium hydroxide) wash as well as X-Ray Powder Diffraction analysis. With regards to exposure to sodium hydroxide, no dissolution of the carbon material was observed. Moreover, Beta Analytical, Inc. in their pre-treatment of the sample for radiocarbon dating also failed to see any unusual dissolution. X-Ray Powder Diffraction analysis of the sediment showed it to be composed of a clay-rich quartz sand. Clays present were predominantly montmorillonite $[(\text{Na},\text{Ca})_{0.33}(\text{Al},\text{Mg})_2(\text{Si}_4\text{O}_{10})(\text{OH})_2 \cdot n\text{H}_2\text{O}]$ and illite $[(\text{K},\text{H}_3\text{O})(\text{Al},\text{Mg},\text{Fe})_2(\text{Si},\text{Al})_4\text{O}_{10}(\text{OH})_2 \cdot \text{H}_2\text{O}]$, with only traces of kaolinite. Limonite and hematite were found to be common constituents of the original formation sand (thus the sand’s yellow and reddish coloration) and are therefore present in the formation naturally and not principally as the result of combustion. These results confirm those of the Illinois State Geological Survey and do not support the hypothesis of the use of lignite at Hickory Creek.

Conclusions

The stratigraphy of the Hickory Creek site is identical to that found at the Lewisville site 16 km (10 miles) downstream (Crook 2013). The barrow pit was located in the second terrace above Hickory Creek, which is particularly well developed both along Hickory creek as well as along most of the Elm Fork of the Trinity River. Both Shuler (1935) and Taggart (1953) mapped this as the “Love Field” terrace; Crook named this the “Pemberton Hill - Lewisville” or “T-2” terrace (Crook and Harris 1957); and Ferring (1990) redefined it as the “Hickory Creek” terrace.

Fauna present in Hickory Creek terrace support a prolonged period of deposition. Slaughter et al. (1962) originally believed the faunal assemblage to be Sangamon (75,000-125,000 BP) in age. However, later work in Denton County (Slaughter and Ritchie 1962) and downstream along the Trinity River in the Moore pit

near Dallas showed the assemblage to more likely be of mid to late Wisconsin age (25,000-50,000 BP) (Slaughter 1966). A single date of 28,840 +/- 4740 years BP has been obtained from the upper Coppell Alluvium (equivalent to the Upper Shuler sands of the Hickory Creek or T-2 terrace) in Denton County (Ferring and Yates 1998). While the radiocarbon analysis may not be suspect, Ferring and Yates (1998) stated they believe an age of 30,000-40,000 years BP for the Hickory Creek terrace is not unreasonable.

Crook and Harris (1962) obtained several radiocarbon dates from the material in Hearths 1 and 8 at the Lewisville site which yielded radiocarbon age dates of "greater than 37,000 years BP" (37,000-43,000 years BP) (Brannon et al. 1957; Fergusson and Libby 1962). Subsequent excavations by Stanford (1982) at Lewisville yielded a date of 26,610 +/- 310 BP (RC Years) for material from Hearth 22 (Li Lui et al. 1986). It should be noted that when the Lewisville site was re-exposed during 1978-79, only the very upper surface of the original hearths (Hearth 1 in particular) were above water, but the hearths themselves could not be excavated as the lowest levels of the site were never exposed (Wilson W. Crook, Jr. personal communication, 1979). The new hearth found by Stanford (Hearth 22) was located well above the levels of Hearths 1 and 8 where the original age dates of the site were obtained. Thus a younger age date for Hearth 22 is stratigraphically consistent.

The date obtained from carbon material recovered from a similar geologic context at Hickory Creek as Lewisville yields an age generally comparable to that obtained by Crook and Harris (1957, 1962) (see below):

Lewisville Hearth 1 * (Humble 0-235)	More than 37,000 years BP
Lewisville Hearth 8 * (Humble 0-248)	More than 37,000 years BP
Lewisville Hearth 8 * (UCLA 110)	Greater than 38,000 years BP
Hickory Creek * (Beta-376329)	35,625 to 36,485 Cal. BP (2 Sigma)

It should be noted that all of the original age dates obtained from the Lewisville site exceeded the capability of the measurement, thus the dates were listed as "more than" or "greater than" and not as specific radiocarbon or calibrated years BP.

The lack of any geochemical or mineralogical evidence of lignite use at Hickory Creek supports the conclusion that the radiocarbon date is unaffected by contamination from older carbon material. The direct association of charcoal with burned, broken Pleistocene mammal bones coupled with three worked lithic

flakes further supports the observation that the bones, the flakes and the charcoal are the result of human occupation at the site. The lack of evidence for lignite combustion (no evidence of pyrite decomposition and lack of extensive authigenic kaolinite) supports the conclusions reached in similar analyses of Lewisville hearth material by the Illinois State Geologic Survey. Lastly, the date obtained from Hickory Creek is consistent with the estimated age of the Hickory Creek terrace (Ferring and Yates 1998).

The problem with the Lewisville site has always been the occurrence of a Clovis point, which has a well-established and quite limited temporal range, in association with the obtained radiocarbon dates. This association presumably provided motivation for later researchers to explain the point's presence via the lignite-use hypothesis (Johnson 1982; Stanford 1982). The presence of human occupational materials on a geologic formation (Hickory Creek or "T-2" terrace) also believed to be considerably older than Clovis, presents an additional anomaly. This has historically been explained by stating the human occupation was on a weathered surface (Stanford, 1982).

A further potential link between the Hickory Creek and Lewisville sites can be seen in Flake #2, which has been found in this study to be geochemically similar to Gault area chert. The flake is strikingly similar in color to both the Clovis point found in Hearth 1 by Crook and Harris in the original excavation of the Lewisville site and to flakes found in hearth material (Hearth 22) in the 1978-79 reinvestigation of Lewisville led by Dennis Stanford (Stanford, 1982). The close proximity of the Hickory Creek site to Lewisville (only 16 km upstream) makes it possible that the two occupations are related. This observation is further strengthened by the fact that the flakes from the Hickory Creek site are from the same geologic context as the Lewisville hearths. A detailed XRF analysis of both the Lewisville Clovis point and the flakes recovered by Stanford in 1978-79 could potentially further confirm the two site's association.

An interesting parallel can be made with the flaked stone material at the Hickory Creek site and the Burnham site (34WO73) in northwestern Oklahoma, roughly 420 km (260 miles) to the north. At Burnham, Don Wykoff and his team found a number of worked flakes in association with Pleistocene mammal bones, including bison (*Bison chaneysi*), horse, mammoth and other mammals (Wykoff et al. 2003). A large number of radiocarbon dates were obtained variously from associated hackberry seeds, gastropod shells and charcoal. These ranged from 22,670 +/- 330 (RA-C0352) to 46,200 +/- 1600 (NZA-2823) BP, with a cluster of dates between 35,689 +/- 710 (RA-C0354) and 37,590 +/- 820 (RA-C0291) that perfectly bracket the Hickory Creek date obtained herein (Wykoff et al. 2003). More-

over, the lithic material recovered is very similar to the three worked flakes found in association with the burned bones at Hickory Creek.

The results described herein from the Hickory Creek site do nothing to help explain the age-cultural material anomaly of clearly human-derived lithic material and Pleistocene (Wisconsin) fauna and instead lend support to a human occupation in North Central Texas in excess of 35,000 years BP. As this date remains considerably older than even the generally accepted older-than-Clovis claims in North America, both Lewisville and the Hickory Creek sites remain somewhat problematical.

Acknowledgments

I would like to thank the Gault School of Archeological Research located at Texas State University for access to their portable X-Ray Fluorescence unit. In particular, I would like to specifically thank Mr. Thomas J. Williams for his performance of the XRF analysis and subsequent canonical discriminant analyses of the data which led to the determination of the Gault area chert provenance for the Hickory Creek Flake #2. I would also like to thank the former Mobil Oil (now ExxonMobil) Energy Minerals Division allowing me to utilize their X-Ray Powder Diffraction unit and other mineral laboratory equipment for the analyses of the Hickory Creek material described herein. I would also like to thank Dr. Jon C. Lohse for his critical review and suggested changes of this manuscript.

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