Welcome To
ACOTW™

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Volume II, Number 12 December 2010

This Month We Explore *"Rock, Paper, Scissors"* In The Form Of Hard Rock Knapping, Cast Paper Sculpture & Cutting Tools Such As The Calf Creek, Bell & Andice Base Notched Blades.

Thank you for subscribing to our newsletter, "Arrowhead Collecting On The Web".

I hope you enjoyed the recent edition, Volume II, Number 11, of our digital e-magazine, the November, 2010 issue.

"Arrowhead Collecting On The Web" provides an on-going series of articles and graphic presentations of information related to the many different aspects of discovering and learning about artifacts of previous cultures found today.

Now with over 1,200 monthly subscribers across North America, plus South America, Africa, Europe, Australia and Asia, with this edition, we have now completed our second calendar year, Volume II. This new December 2010 edition addresses the following topics, among others:

- Calf Creek, Bell & Andice dart point/knife blades from the Archaic Period come to larger than life with this photographic collection shared by one of our readers who enjoys the photography almost as much as the collecting! *(see pages 6-7).*
- Today, many avid arrowhead collectors live in the middle of the country, in the same region where early peoples settled thousands of years ago. We take a look at a selection of Archaic Period projectile points from a farm in Tennessee *(see page 4-5)*.
- *Rock, Paper, Scissors*. Most of what we look at in ACOTW is stone, but you may also enjoy the paper sculptures of native peoples and events as portrayed by Allen and Patty Eckman *(see pages 8-10)*.
- Hard rock knapping. Our series about stone tool production continues with a discussion of the challenges which faced ancient stone knappers who were creating tools and hunting weapons out of volcanic basalt *(see pages 11-19)*.
- Check out the world's oldest ground stone axe discovery dated to 35,000 BP from Australia *(see page 20)*.

Read, learn, find, enjoy. And pass it all along to your family and friends.

In 1987, Allen Eckman stumbled onto cast paper as a fine art medium and instantly recognized the beauty and possibilities for creating high detail, strong, acid free, pure, fine art sculpture. Since 1988, Patty and Allen Eckman have developed and perfected the medium of cast paper. Today, Allen and Patty create stunningly beautiful and highly detailed sculptures of Native American people out of cast paper using their own patented method. See pages 8-10.

Our editorial objective is to help our readers become long-term, even serious collectors of arrowheads, over the years to come. Here are some of the things we hope to accomplish for you in this process:

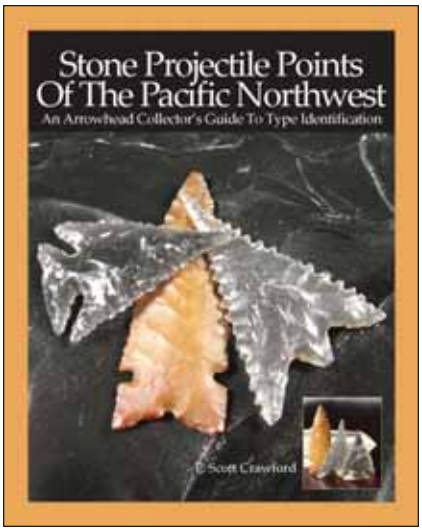
- Help you find new points and understand what it is that you are finding;
- Help you to recognize the different kinds and styles of collectable arrowheads and other implements;
- Help you to understand about the life ways of the cultures represented by the stone tools which remain;
- Help you to discover ways to find good and desirable arrowheads from other sources, such as eBay and special subject web sites;
- Help you understand about modern flint knapping, how new points and implements are made, how to recognize them, and how to appreciate those items for the skill and the craftsmanship of the work which they exhibit;
- Help you to understand that some people still try to sell unsuspecting collectors items which may or may not be what the items are described to be, that you should be careful when you think about buying points for your collection;
- Help you to learn about authentication services and their value to you as a collector.

As we do these things, we will maintain your readership and interest in our newsletter for many years to come.

Thank you for your participation, and your interest in "Arrowhead Collecting On The Web".

Sincerely,

F. Scott Crawford
Carrollton, Texas



When you want to know how to identify the ancient Indian (native American) stone arrowheads which you and your family may find in the Pacific Northwest, read the new book:

Stone Projectile Points Of The Pacific Northwest
An Arrowhead Collectors' Guide To Type Identification

This 144 page book is now available online at www.Amazon.com, ISBN number: 1453798471; or directly from the publisher through the web site:

www.BlackRockPublishing.com

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Authentic Artifact Collectors Association

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www.ArrowheadCollectingOnTheWeb.com
F. Scott Crawford, Carrollton, Texas

About The Author

From the time when I was 13 or 14 in the forested foothills of the western Oregon Willamette Valley and found my first arrowhead, an obsidian "bird point," in a field my dad had plowed for an experimental crop of maize, I have always wondered about the people who used these stone tools, how they lived, and what became of them.

Some friends had collected Indian artifacts in the desert areas of eastern Oregon and my brothers and I all enjoyed looking at their display of those arrowheads. So, to find some points of our own, on the family land, was particularly exciting. After that, whenever we were working in the bean fields, or tending livestock, or moving irrigation pipes, or just wandering across the back 40, we always would keep an eye out for bits and pieces of worked stone, tools and points, to add to our growing collection.

Today, I still keep an eye out for remnants of past cultures. And as the world has changed so much, I can now do much, but not all, of that wandering and learning on the internet, on the world wide web. That's how I came to be collecting arrowheads on the web, and why I began to put together this newsletter, for others across the land who also are interested in " Arrowhead Collecting On The Web".

FSC

p.s. There is still a time and a place for criss crossing a plowed field, or walking along the banks of a stream, just to see what you might find. Knowing where to look and how, is part of what we plan to explore in the pages of "Arrowhead Collecting On The Web." Read, learn, find, enjoy.

p.p.s. You are invited to visit my flint knapping web site: www.StoneBreaker-FSC.net

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Arrowhead Collecting On The Web

After the November issue of "Arrowhead Collecting On The Web" was distributed electronically, the publisher sent an e-mail offer to our subscribers regarding the new availability of a hard copy of each edition, for those who wanted to receive it, in addition to the free, regular e-magazine, with a small quarterly payment to cover the cost of paper and envelopes, handled through PayPal, in most cases. This is the story of how that offer came into being. There is a link where you may order hard copies of ACOTW at: ***http://www.ArrowheadCollectingOnTheWeb.com/Welcome-ACOTW.html***

How One Reader's Ink Jet Ink Problem Led To The Availability Of A Hard Copy Of ACOTW For Our e-Magazine Subscribers.

November 16, 2010

Scott,

I can't read on-screen without severe discomfort, and so I printed this issue.

One comment, intended to be constructive, is that black or very dark pages with white print are not very compatible with ink-jet printing. Pages 3 and 16 of this issue were real (black) ink wasters, even though they are dramatic graphically. I have enjoyed this issue, although I'm only at p.10 as I'm writing, and have already learned a lot. We had a small field nearby, south of Iowa City, when I was a boy, that was rich in 'arrow heads', and we usually hunted for them after a rain. I often wondered exactly how the point was attached to the arrow shaft, and this issue--I couldn't believe it!--showed actual examples of the real thing. Amazing and worth the whole issue, especially since your presentation and photos are so well done.

Sincerely,

Ed Klein

November 17, 2010

Hi Ed,

Thanks for your comments. And I appreciate the feed back.

Sorry about the ink drain with the solid bleed images when you print out on an ink jet. I am looking at a way to provide a printed copy of the publication to readers who would want to get a hard copy. I will be sending out a notice shortly so readers can give back an indication of whether they would like to receive a hard copy. There would be a minimal cost, maybe two or three dollars per issue, to pay for printing, postage, envelope, etc., but it will be less than the cost of printing it themselves for most folks. This would be in addition to the normal electronic delivery of the e-magazine. Would that be a service you would be interested in?

Scott

November 18, 2010

Hi Scott,

Yes, by all means I would be interested in a printed copy. I worked as a design engineer on computers from the very beginning, (nearly--1950/Los Alamos), but that doesn't mean I like everything about them. Paper and ink was a great invention!

Also, I'm curious about the point attached. The scorched-looking area makes it appear the arrow was burned and left carbon on the point. But that couldn't remain for 100+ years, surely?

Sincerely,

Ed Klein

November 20, 2010

Hey Ed,

If that was burned on the original implement shaft, it was hundreds or even thousands of years ago. It may have been in the wooden shaft for a long time, even, but in a moist area the carbon would usually be long gone. It is more likely a stain from something in the ground where it remained for a long time after it was used. However, there are cases of points which still have asphalt or some other material which was used as a binding agent or glue. I have sent out an email to all the subscribers about signing up to get a hard copy of the e-magazine, this evening. Did you get that email?

Scott

November 20, 2010

Scott,

No, no such (re-hard copy) message received.

Ed

November 20, 2010

I will forward a copy of the message to you. It has a link to order hard copies, if you want.

Scott

November 28, 2010

Scott,

The print version arrived last week and it is excellent! Much better than expected. I'm surprised you could turn all that around so quickly, but I'm glad you did.

Thank you,

Ed Klein

Ed Klein's Iowa point with stained or burned area on the bifurcated base of the shaft. Given the age of this dart point, it is more likely a stain, either from materials in the soil, or if some form of glue was used to bind it, it may have been stained by that material. The stone looks like a chert such as Burlington or Keokuk.

November 20,

Hi Scott,

Just requested and paid for hard copy, BUT you may require some additional postage as mine will need to be sent to New Zealand. Please advise.

I will also need to take you up on your offer to produce the representative arrowheads for our archery presentation. You may recall I asked about reproducing some heads, as a set I purchased via ebay was just made as clay casts. Regards,

Kelvin O'Hara

November 21, 2010

Kelvin,

I have the list we talked about before: ***North-west Serrated Arrowhead*** *(Rogue River Gunther point, jasper or agate);* ***Dakota Barred Shoulder Arrowhead*** *(Avonlea point, Hixton quartzite or Knife River Flint);* ***California Long Point Arrowhead*** *(Stockton point, obsidian);* ***Georgia War Arrowhead*** *(Pinellas point, chert or flint);* ***Sioux Blunt Hunting Arrowhead*** *(a broken point, trimmed to be used as a "stunning" arrow for birds or rabbits, etc., not a sharp point);* ***Apache Triangular Arrowhead*** *(Chaco Canyon corner notched point, obsidian or agate). The types listed after your* ***"kinds"*** *are probably representative; however, a photo of the casts would help make sure. I have the proper stone.*

Scott

My grandfather, Donald Wilkins, always used to say that he "was born in Kentucky and fetched up in Misery."

Long Before My Grandfather's Parents Had An Old Kentucky Home, There Was A Major Concentration Of Population Where The Ohio River Crosses Middle America To The Mississippi.

These four flint or carnelian agate Archaic period dart points were found on a farm in Smith County, Tennessee. They were in a set of three frames of field grade Archaic period points which the publisher purchased in 2007.

OHIO RIVER

MISSISSIPPI RIVER

MISSISSIPPI RIVER

From left to right, these points seem to be: a "Pine Tree", an early Archaic medium to large side notched, usually serrated point in use from 8000 to 5000 B.P.; a "Beacon Island", a late Archaic, 4000 to 3000 B.P., small to large sized, triangular point with a rounded, bulbous base and defined, even barbed shoulders; another "Beacon Island" point; and perhaps a well-used "Pentagonal Knife" from the middle Archaic period 6500 to 4000 B.P.

(...continues on p. 5)

Another branch of my ancestral families took an immigrant wagon train from the Kentucky region, traveling across the Oregon Trail in the late 1840's, noting the 1847 eruption of Mt. St. Helens in the diary of their transcontinental passage.

This Mid-Continental Region Was An Excellent Environment For Growing Population Centers, From PaleoIndian Times, Through The Archaic, Woodland And Mississippian Periods.

OHIO RIVER

Above we have two close-up views of the "Pine Tree" point. The details of the serration along both edges and on both faces of the blade are readily visible. This side notched point is from the early Archaic period, from 8000 to 5000 Before Present (B.P.). It measures 2-1/8" long by 1" wide.

A closer view of one of the "Beacon Island" points, in use during the late Archaic period from 4000 to 3000 B.P. The Beacon Island point is identified by a rounded, bulbous base and defined, sometimes barbed shoulders. Here we can see the good pressure flaking at the tip of the projectile point. This point measures 2-5/8" long by 1-1/8" wide.

"Because my head is in the Calf Creek/Andice world, I had to drag out my first Calf Creek for this photograph. It was in the last Billy Calloway auction. Found in the early 1950s by Eric Glasscock. He was an independent surveyor who worked for the oil companies. The artifact was found in Los Aminas County, Colorado. Rogers COA."
Bruce Pailler

Bell, Andice & Calf Creek Archaic Dart/Knive Points: Close Technological Cousins In Texas/Oklahoma/Arkansas/Missouri.

"Andice/Bell/Calf Creek Points From Frio, Medina, and Uvalde Counties"

DAVID CALAME, SR.
www.TexasArrowheads.org

Distribution

"Andice/Bell/Calf Creek points are distributed throughout Texas, Oklahoma, Arkansas, and Missouri. Adams (1950) first distinguished these deep basal-notched points from other forms in the Tablerock Reservoir basin in southwestern Missouri. In Oklahoma most of the sites cluster in the south central part of the state, with two in the panhandle area (Wyckoff, 1994b, 1995). In Texas Andice/Bell/Calf Creek points are most common in the central and southern areas of the state. However, they are widespread, having been found in Wheeler County in the Panhandle on the Oklahoma border (Joe Miller, personal comunication), in Crosby County (Parker and Mitchell, 1979) and Lubbock County (Weber, personal files) in the Cap Rock area, Tarrant County (Larry Banks, personal files) and Dallas County (W.W. Crook collection, Dan Prikryl, personal communication), Lamar County (J.B. Sollberger, personal communication) and Van Zandt County (Johnson, 1962) south of the Red River, San Augustine County in deep East Texas (O.D. Bounds, personal communication), Anderson County on the Trinity River (Raymond Dolezel, personal communication), Wharton County in Southeast Texas (Patterson, n.d.), San Patricio County (Chandler, 1983) and Victoria County (Schmiedlin, 2000) on the Texas coast and Val Verde County in Southwest Texas (Johnson, 1964. Petroglyphs of Andice/Bell/Calf Creek points have been found in Brewster County (Weber, personal files)."

Type Descriptions

"Prior to the published type descriptions by Sorrow, Shafer and Ross (1967) and Perino (1968) Andice/Bell/Calf Creek points were not recognized as a distinct Early Archaic type in Texas collections. As noted by Prewitt (1983) some were included within the Bulverde type description (Suhm, Krieger and Jelks, 1954; Johnson, 1962; Hester, 1971). In their various forms, particularly after barb loss or when they exhibit unusual reflaking, Andice/Bell/Calf Creek points still are some-times not recognized in collections (Schmiedlin, 2000, fig. 15a)."

"Currently the most widely available reference for Texas type descriptions is the *Field Guide to Stone Artifacts of Texas* by Turner and Hester, latest edition (1999). Their descriptions of Andice and Bell points are based on earlier descriptions by Sorrow, Shafer and Ross (1967) and Prewitt (1983). They describe Andice points as large, broad, triangular points with convex lateral edges and long, essentially rectangular, stems and prominent, massive barbs that extend downward and are narrowest at the juncture with the body. They state that Andice points closely resemble Bell points morphologically, but are distinguishable by their greater size, stem length, and barb length."

(...continues on p. 7)

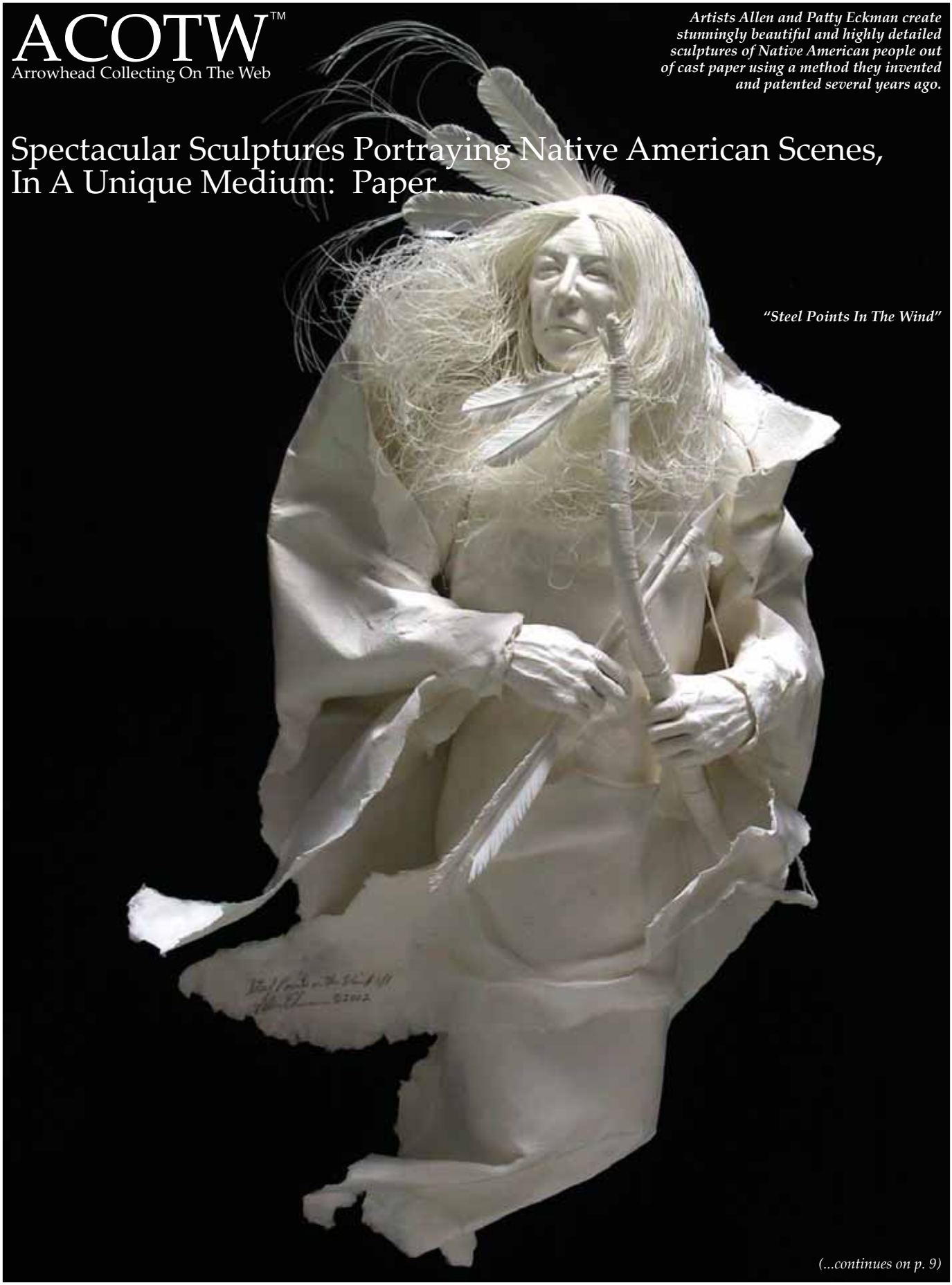
"I call this a Calf Creek on Steroids!"
Bruce Pailler

"Turner and Hester (1999) describe the Bell point as a wide, thin, triangular body and long, narrow barbs formed by basal notching. They further state that Bell points are similar to Andice points, but smaller, and that they share attribute similarities with Calf Creek and perhaps Cassattot River points of Oklahoma and Arkansas. However, the Cassattot River points illustrated in Volumes 40 and 42 of the Bulletin of the Oklahoma Archeological Society appear to be more dissimilar than similar."

Attempting to offer a more objective means of classifying Andice and Bell points, Weber and Patterson (1985) developed a discriminant function to distinguish quantitatively between Andice and Bell points, only to find (Weber, 1986) that most Texas specimens are mid-range between the idealized Andice and Bell descriptions previously presented and that the entire spectrum likely represents a single type. Wyckoff (1994a) considers the three types to be '**GREATLY OVERLAPPING VARIETIES OF A SINGLE BIFACE FORM**.' Wyckoff goes farther to say, 'Much of the more obvious variation results from different amounts of blade resharpening and reshaping...whether used as knives or projectiles or both, the blades were the most dynamic (i.e. alterable) parts of these bifaces. For this reason, blade size and shape comprise inappropriate attributes for defining different biface types. Thus, the continued recognition of Andice, Bell and Calf Creek as separate types needs reevaluation, especially through a process by which combinations of more stable attributes (such as stem form, size and thinning practices) are analyzed to see if they have particular distribution through time or space.' Paralleling Wyckoff's ideas, Weber (2000, 1994, 1991, n.d.) has shown that Texas Andice/Bell points are manufactured, resharpened and broken in the same manner, with individual specimens representing fossilized sequences of the technological continuum."

Artists Allen and Patty Eckman create stunningly beautiful and highly detailed sculptures of Native American people out of cast paper using a method they invented and patented several years ago.

Spectacular Sculptures Portraying Native American Scenes, In A Unique Medium: Paper.



"Steel Points In The Wind"

(...continues on p. 9)

In 1987, Allen Eckman stumbled onto cast paper as a fine art medium and instantly recognized the beauty and possibilities for creating high detail, strong, acid free, pure, fine art sculpture. Since 1988, Patty and Allen have developed and perfected the medium of cast paper far beyond any other artist in the world. Their work is considered to be the premier of the industry by many critics.

"Wife And Son Of White Bull"

(...continues on p. 10)

These Paper Sculptures Present The Wonderful Native Visions Of Allen & Patty Eckman.

Allen and Patty Eckman both completed their formal education at the Art Center College of Design in Los Angeles, California, in 1974, with Allen majoring in advertising art and Patty in illustration art. They established and operated an advertising company in Los Angeles until 1987, when they moved north to Creston, California, and made the switch from commercial art to fine art. They sold their first pieces in Visions Gallery in Morro Bay about June 1988.

The Eckmans are the inventors of the *Eckman Method ® of Cast Paper Sculpture* which is trademarked as theirs alone. Since 1988, Patty and Allen have developed and perfected the medium of cast paper far beyond any other artist in the world.

The cast paper process involves mixing an acid free paper pulp in the studio hydro-pulper from two raw stocks, cotton and abaca. Then the pulp is cast into molds which were made from original clay sculptures. The paper is then pressed under vacuum pressure or by hand in the mold where most of the water is extracted at the same time. After the dry and hardened casts are removed from the molds, the exclusive process of chasing, cast additions, cast alterations, sculpting in paper and detailing begins. Some works are so painstakingly detailed they can take many months to complete. Allen and Patty Eckman reside in Rapid City, South Dakota. Their home and studio is in the beautiful Black Hills. There, they find inspiration in the wildlife, the history and the climate.

Allen's inspiration for the Indian subjects he creates came from a significant event in his life. "When I was a small boy in Pennsylvania I found an arrowhead in a newly plowed field and took it home to my grandfather who told me we have a Cherokee ancestry. My great, great, great, grandmother's name was Tounacha Case. She was born in the year 1793 in North Carolina, by the census record. It does not say she was Cherokee because the box on the 1850 census record specifying ethnicity was left blank. My guess is that being married to Laxton Case (a white man) at the time of Indian removal and living in Cherokee country they somehow managed to obviate the 'Trail of Tears'. I really am interested in the Indian's material, physical and spiritual culture and that whole period of our nation's history I find fascinating. From the western expansion, through the Civil War and beyond is of great interest to me." Thus, many of his paper sculptures depict scenes from the history of the Cherokee.

You can see Allen & Patty Eckman's work on-line at www.EckmanFineArt.com

"Little Buffalo Dreamer"

"Taking The Bull With The Bow"

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This Paleo Indian period unifacial Basalt Knife is from Payette County, Idaho. It is included here to further illustrate the use of basalt as a resource which was particularly strong and tough as a tool, once the impliment was manufactured. This knife has a certificate of authenticity from Ben Stermer. The knife was obtained from the family in Idaho whose grandmother, Harriott Young, had found it many years ago. This is the front face of the knife, with a great deal of percussion flaking, and some of the original weathered stone surface, commonly seen on basalt tools.

Hard Rock Knapping -- Where Local Stone Resources Were Limited In Relative Knappability, Like Basalt & Other Hard, Coarse Grained Rock -- Posed A Challenge To Tool Makers.

Flaked Stone Basalt Technology in the Northern Sierra Nevada of California

STEPHEN W. EDWARDS

A replicative experimental study was carried out with the intention of elucidating the best technological strategies for producing Middle Archaic basalt projectile points and bifaces. This work led to an appreciation of the difficulties of working with Sierran basalts, as well as an admiration for the skills of Middle Archaic knappers. The study shows that, despite the technical challenges, expediency was not the sine qua non of Middle Archaic technology in the northern Sierra Nevada, and provides insight into regional archaeological assemblages.

DURING the Middle Archaic in the northern Sierra Nevada, basalt was heavily favored as the raw material for flaked stone artifacts. Basalt is abundantly available in bedrock outcrops at many locations, and quarry sites of considerable extent occur at some of them. The period of maximum use of basalt seems to have ended at around A.D. 500, probably coincident with the introduction of the bow and arrow. After this time, assemblages are dominated by chert, and obsidian is in greater evidence as well. Heizer and Elsasser (1953) first gave the name Martis to the major basalt based assemblages in the northern Sierra Nevada.

Since then, numerous additional assemblages have been assigned to the so-called Martis Complex, mostly at moderate to high elevations from the Lake Tahoe region to the Feather River country of Plumas County (Johnson 1980). A few lower elevation sites are known, such as CANEV-15 near North San Juan in Nevada County (Elsasser 1960). Basalt assemblages classified as Martis occur on both sides of the Sierran crest and into west-central Nevada (Elston 1986a).

Elston (1986b) presented a summary of tentative Martis stages and chronology, portraying Martis as a unique contrast to earlier and later assemblages by its abundant, large basalt bifaces. Martis is also characterized by a variety of projectile points, assumed by their relatively large size to be dart points. In recent years, considerable discussion has emerged regarding characterization of Martis as a complex or a tradition (see Neuenschwander [1994] and Ataman et al. [1999] for a history of the discussion). Recent interpretations (e.g., Elston 1986a; Kowta 1988) tend to depict Martis as merely a name referring to possibly unrelated assemblages, unified only by their use of basalt and a Middle Archaic technology.

It is not the purpose of this report to review characterizations of the Martis Complex, but rather to elucidate basalt flaked stone technology, with special reference to the Middle Archaic of the northern Sierra Nevada. The bulk of such basalt-based assemblages in this region have, at one time or another, been assigned to Martis, although basalt was also employed, albeit to a lesser degree, both earlier and later (Ritter 1970; Elston et al. 1977; Jackson 1999). The northern Sierra Nevada Middle Archaic assumes special significance because convincing evidence exists that the people responsible for the creation of such assemblages were also responsible for most or all of the complex petroglyph arrays that frequently occur in the same region (Elsasser and Gortner 1991; Foster et al. 1999). Hereinafter, for simplicity's sake, northern Sierra Nevada Middle Archaic basalt assemblages will be referred to as Martis.

To understand basalt technology, replicative experimentation is necessary. Previous replicative studies (e.g.. Noble 1983; Duke 1998a) made progress in the elucidation of technostrategies implied by Martis

(...continues on p. 12)

This Paleo Indian period unifacial Basalt Knife from Payette County, Idaho, measures 8-1/2" long by 3-3/4" wide. Shown here at 75% of actual size. This is the back face of the knife, which was unchanged by the ancient knapper. Illustrative photographs by the publisher of ACOTW.

assemblages, and many archaeologists working in the northern Sierra Nevada have experimented with knapping basalts (e.g.. Rondeau 1980; Bloomer et al. 1997; D. Stevens, personal communication 2000).

However, the relative intractability of basalt for biface manufacture has discouraged experimentation that would be extensive enough to test a diversity of knapping strategies. Knappers accustomed to obsidian or chert find their skills tested to the limits by basalt.

Perhaps the most serious obstacle is the cumulative damage to joints (fingers, hands, wrists, elbows, shoulders, and neck) caused by a sustained program of percussion and pressure of this demanding material (cf. Callahan and Titmus 1999). Despite such limitations, and even though further experimentation is needed, replicative studies reported here shed light on assemblage variability and typology.

Originally introduced to the art by Glynn Isaac, eminent African prehistorian then teaching at the University of California, Berkeley, the author has been a knapper since 1976. Initial interest was in the African Lower Paleolithic and the analysis of large bifaces (Edwards 2001).

Authentic replication entailed experimentation with many raw materials, but especially basalt, one of the two most widely used materials in Africa (the other being quartzite). More recently, the author turned his attention to Martis technology, and over a period of four years, a number of Martis replicas were attempted. The hope was to learn as much as possible about the technological skills and strategies reflected in Martis flaked stone assemblages.

APPROACH AND DEFINITIONS

From 1997 to 2000, extensive replicative experiments were conducted using basalt collected at Alder Hill/Prosser Lake in Nevada County, California, and at several sites in the Lakes Basin/Gold Lake area of Sierra County *(see map, p. 18)*. Using a variety of techniques, crude and refined bifaces were replicated, as well as expedient and refined projectile points, in both fine- and coarse-grained basalts. Four different kinds of percussors were used, including antler baton, wood baton, hard hammerstone, and soft hammer stone. The time required for each replication was recorded, along with notes on strategy and results.

This work was combined with a literature review, a study of collections housed at Tahoe National Forest, and an examination of artifacts in known surface scatters, especially at Alder Hill/Prosser Lake and at four sites in the Lakes Basin area.

"Refined" refers to a projectile point or biface with relatively straight edges in edge view, symmetrical plan form, fairly symmetrical cross section ("camber"), near absence of steps, and an organized flake scar pattern. It may be thick or thin but, all else held equal, thinner is more refined. "Crude" bifaces or points tend to have the opposite of all these attributes. An "expedient" projectile point is a crude one. Expedient points with a minimum of flake scars—most of them noninvasive so that the desired functional shape is achieved with a minimum of effort should theoretically prove more common in areas where raw materials are more coarse.

TECHNOLOGICAL OBSERVATIONS

Martis knappers were highly skilled at working with basalt, as illustrated in Elsasser (1960:Plate I), Neuenschwander (1994:*see top, p. 17)*. Any knapping session in basalt is always problematical at the outset, given the difficulty of the stone. Nevertheless, Martis knappers achieved complete control of attributes sufficiently often that it is clear they equaled in skill the best modern knappers.

Raw material quality differs dramatically between Martis quarries. The basalt of Oakland Pond in Plumas County, California (Bloomer and Hall 1998), is the finest of all. The various grades distributed around Gold Lake/Lakes Basin/ Church Meadows (including Oakland Pond) are generally finer grained and glassier than sources near Truckee, Squaw Valley, and Lake Tahoe in Nevada County and Placer County (Davis 1958; Duke 1998b; Ataman et al. 1999), *(see map, p. 18)*. Some archaeologists employ the whimsical term "basidian" for the former sources. Workability is drastically different between the basalts in these areas. Lakes Basin basalts are far more controllable; outcomes of percussion are more predictable and pressure flaking is far

This Paleo Indian period Basalt Knife is from the Silver Lake area in eastern Oregon. It measures 3-3/8″ long by 1-3/4″ wide. This knife was found in the early 1950's by Vernon Imel. The publisher obtained it from Jess Anders in 2007. It was made by percussion from fairly coarse basalt.

easier. Consequently, bifaces/projectile points manufactured from Lakes Basin basalts tend to have more regular flake scar patterns, both in replicated and aboriginal samples. Nevertheless, even with relatively coarse, step-prone Alder Creek basalt, Martis knappers frequently attained thorough control of attributes, including pervasively regular flake scar patterns and perfected cambers and platforms. The superior knappability of Gold Lake basalt partially explains why Ataman et al. (1999) discovered that about 35% of the projectile points from Martis Valley sites were of material from distant sources, although Alder Hill, Watson Creek, and Sawtooth Ridge sources were much closer.

Some of the raw materials that look like basalt at Martis sites may not be basalt at all. Material from presumed Martis surface sites along Bowman Lake Road in Nevada County was submitted to Steven Shackley at the Archaeological X-Ray Fluorescence Spectrometry Laboratory at the University of California, Berkeley. On the basis of trace elements, this black, aphanitic, basalt-like rock appears to be rhyodacitic (S. Shackley, personal communication 1999). However, assignment to rock type on the basis of trace element XRF is problematic (C. Skinner and S. Shackley, personal communication 1999).

The definition of boundaries between igneous rocks is actually based on the percentage of silica. Measuring silica content might be more than merely a pedantic exercise, as that number could add a dimension to assist in discriminating sources.

Knappable bedrock basalt occurs in many parts of California, as well as in western Nevada. Although Martis research has focused on Sierran sources, it is not out of the question that some Martis or Martis-like artifacts found at lower elevations or in the Central Valley of California were derived from Coast Range sources. The latter include excellent basalts in Lake, Napa, Contra Costa, and probably San Benito counties. In the author's experimental replications, rocks from all of these counties have been tested, and samples of all have been given to Craig Skinner at Northwest Research Obsidian Labs for XRF analysis. Skinner has added characterizations of these sources to his growing XRF reference data base.

Bifaces

Martis artifacts that have been described as "bifaces" are usually larger than projectile points. Many of the thicker ones resemble Stage 2 bifaces in the Callahan (1979) classification. In lithic scatters, it is easy to find Martis bifaces that are too small (and often too thick) to make functional knives, and were probably on their way to being thinned for projectile point production. Often, it is evident that the process was halted by a major step or stack (a stack is a steep bank of steps piled on top of each other, resulting from repeated failures to remove an initial step), such that the piece was too small to allow the required percussion cleanup. Larger, thinner bifaces are also common and are almost always found as fragments that are virtually never conjoinable with other major fragments. These large, thin bifaces would have made excellent functional knives. Many are far too large to have been made directly into projectile points without tremendous waste. A good example of a complete thin bifacial knife is on display at the United States Forest Service (USFS) North Yuba Ranger Station (Tahoe National Forest Accession Number 3394). This specimen is nine centimeters long and amygdaloidal in plan form, similar to a miniature version of a late Acheulean or Mousterian handaxe.

It is the author's assessment that regions where Martis artifacts occur are literally strewn with broken knives. It also appears that the fragments found in collections or in surface scatters are more commonly proximal (butt) ends. This fits the modern knapper's typical procedure very well: save the broken-off tips of knives or large bifaces for later reduction into projectile points. Although it is not possible to be certain whether a given fragment was originally proximal or distal, it makes sense as a working hypothesis that distal ends are usually more pointed, thinner, and more intensively flaked than proximal ones.

Elegantly flaked leaf-shaped knives about a decimeter in length, such as those that are common in prehistoric interments in lowland California, are rare in Martis collections, although pieces approaching this description are not unknown.

While the author has only begun to examine the USFS collection at Nevada City, a variety of moderately to highly refined large bifaces was noted. Particularly notable among these is a contracting-stem biface that is 9.2 cm. long (Tahoe National Forest Accession Number 17-3683), collected in the Truckee District and clearly made from the coarse basalt of that area. A very impressive approximately decimeter-long and broadly triangular tanged biface is on display in the Kentucky Mine Museum in Sierra City. In a private collection recently donated to the Tahoe National Forest (the Corbett collection), there is a class of elegantly flaked, narrow, lanceolate bifaces. Although broken, some of these appear to have been about a decimeter in length when intact. There is also a biface of this type on display at the North Yuba Ranger Station (Tahoe National Forest Accession Number 2883). A basalt biface approximately 14.5 cm. long from Kings Beach (CA-Pla-9) was illustrated in Heizer and Elsasser (1953:22), and interpreted by them as possibly Martis.

Broken and complete bifaces, including those that are large and thin as well as those that are thick and crude, litter the

Volcanic basalt is your quintessential hard, heavy rock. Vast quantities of the earth's crust are made of basalt, while much of the continental mass is made of granite, which is lighter and much more crystalline in structure. Fine grained basalt can be broken by percussion, as the curved surfaces visible on this chunk demonstrate. Basalt was used all over the world to make strong, tough tools. This example of the raw material is from the Indian subcontinent.

Martis landscape. Thin bifaces make excellent, precambered preforms for projectile points. Thus, finding pieces that refit to these broken, thin bifaces will probably always remain highly unlikely. Since distal ends of the bifaces make the best projectile point preforms, it is predicted that proximal ends will be more commonly encountered in debitage scatters. Another possible explanation for the rarity of elegantly flaked, complete, large knives is that crude ones are themselves highly functional (e.g., see Jones 1981). Other possible explanations are that Sierran basalt knappers had limited interest in refined bifaces/knives, or that some percentage of such artifacts was placed in interments, although no Martis interments or interment associations have yet been identified in the Sierra Nevada.

As opposed to projectile points, bifaces rarely snap in half during use. They certainly can break, as when they are used for chopping wood (E. Callahan, personal communication 1999). The vast majority of substantial biface breaks occurs during percussion thinning. Most fatal breaks come during thinning from Stage 2 to Stage 3 or from Stage 3 to Stage 4, when thinning is rapid and achieved by powerful percussions. Of course, that is the view of a modern knapper who produces bifaces but does not use them for subsistence and survival. Nevertheless, it is likely that most Martis bifaces were broken because they were in the process of being thinned, for whatever reason. This view may be tested by examining the distribution of broken versus complete bifaces in the archaeological record. If snapped biface fragments are dominant at sites judged to be quarries, or at near-quarry lithic reduction sites, while complete or nearly complete bifaces are relatively more frequent at greater distances from quarries, this scenario of most major breaks occurring during percussion reduction might be corroborated.

Flakers

Baton or cylinder hammer percussion is evident by the presence of controlled, invasive percussion scars on Martis tools. For both Lakes Basin and Alder Creek replications, antler was the baton of choice. However, a wood baton (Comarostaphylis [Ericaceae], very similar to manzanita, and Cercocarpus [Rosaceae], mountain mahogany) worked well for percussion flaking projectile points and small bifaces/knives, just as long as really thick places, such as knots or stacks, were avoided. Batons made of wood native to the northern Sierra Nevada are not dense enough for working very large (hand axe-sized) bifaces, nor for flaking difficult or thicker edges of smaller bifaces/projectile points. For that, an antler or a hammerstone is required (antler is far superior to stone as a hammer, although a soft hammerstone can produce good results).

In addition, the lightness of a wood baton forces the knapper to swing harder than would be the case with antler, and harder swings mean less control and less finesse. Compounding the problem is the fact that with wood, more percussions per flake removal are required than with antler; one begins swinging lightly to maintain control, and ends swinging harder with less control. Statistically, the more percussions, the more mistakes that result from bad aim. Finally, there is a tendency for a wood baton to increase the edge angle, since the flakes tend to be less invasive than with antler, probably because less force is applied with wood. Thus, in fashioning projectile points from basalt flake blanks, it is a viable strategy to rough out a biface to Stage 2 using a hammerstone, then to switch to a wood baton for more refined thinning, finishing with pressure flaking using an antler tine.

For basalt knapping, as with other raw materials, it is necessary to smooth the working end of the baton—whether of antler or wood—from time to time. Chatter marks flaked and gouged into the baton hamper its ability to do refined flaking. This is particularly true with basalt, which erodes antler rapidly. It is even more true of elk or deer antler (or hardwood), which would have been available to Martis people, than of the moose antler favored by modern knappers, because the former are much less dense. However, deer antler is denser than elk antler, and before the era of modern trophy hunting, large deer antler was probably more available.

These early and middle Archaic period Basalt dart points are from the Silver Lake area in eastern Oregon. The top three are Gatecliff points. The middle, bifurcated base point may be a late Paleo/early Archaic period Windust point. The middle two on each side, slanting upward, and the right middle one, slanting down are Cold Springs side notched points. The left middle one, slanting down, and the two at the bottom, may be Wendover points. These dart points were found in the early 1950's by Vernon Imel. The publisher obtained them from Jess Anders in 2007.

Although roughout of bifaces with a hammerstone is a far cruder enterprise than working with a baton, it is nevertheless possible to make a fairly thin basalt preform using a relatively soft hammerstone. One may then proceed directly to pressure flaking. Based on degree of control and narrowness of flake scars, thinner, sometimes narrower, and more finished Martis bifaces typically look like baton work; thicker, sometimes broader, and cruder ones look like hammerstone work.

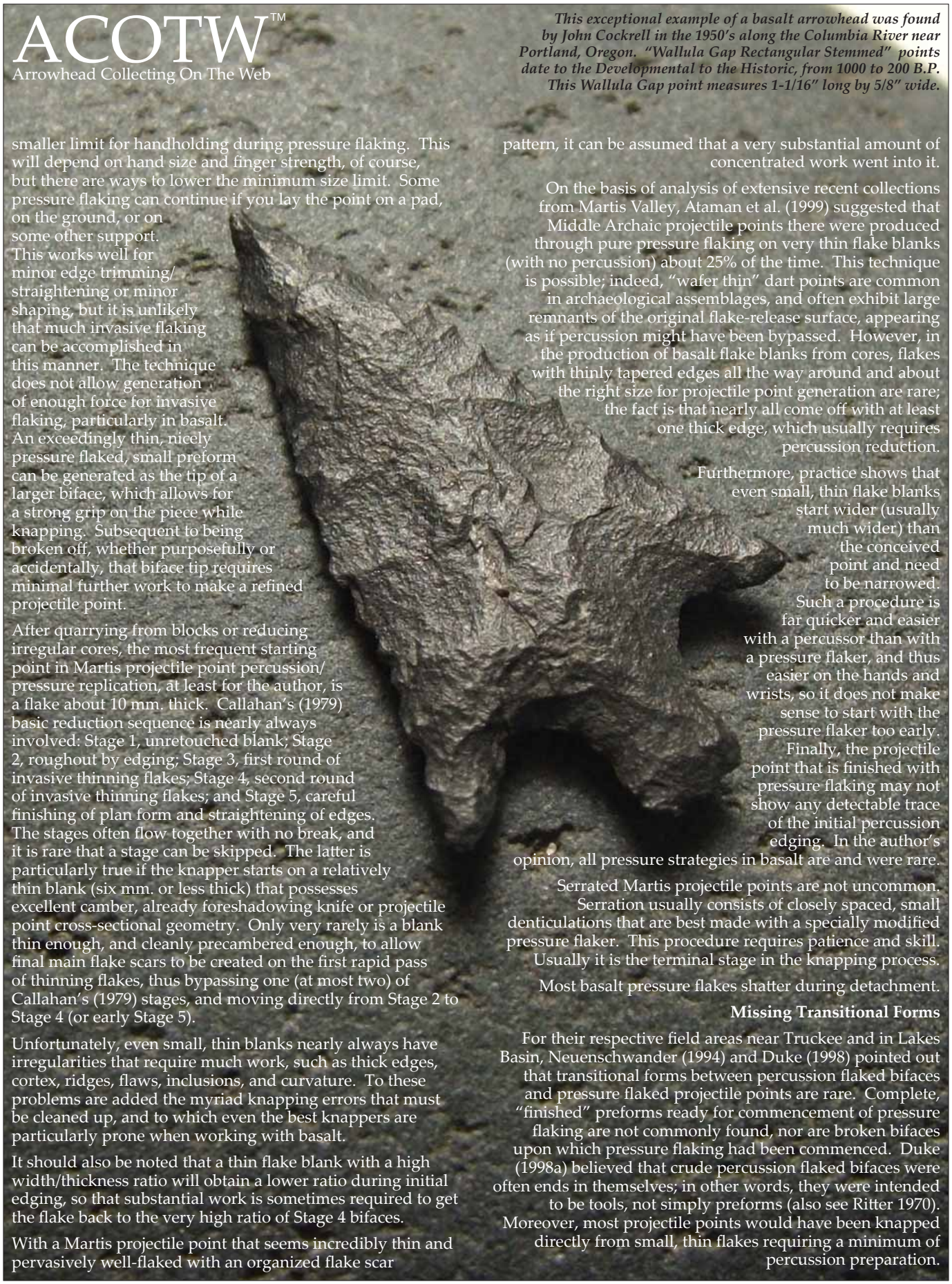
Pressure Flaking

As projectile points are reduced in size, they become too difficult to hold firmly enough to take the hard blows required for percussion in basalt. The vast majority of Martis projectile points has been pressure flaked. This is evident also from the fact that many display more or less uniformly sized and spaced narrow flake scars, indicating control and delicacy practically unattainable in basalt by percussion. An experienced modern knapper will normally recognize, with a high level of confidence, a point that has been intensively pressure flaked. Many knappers speak of the "rhythm" that often helps them regularize flake scars all along the length of a point. The most highly organized pressure flake scar patterns simply attain greater regularization than is the case even with controlled percussion. Pressure flaking in basalt is demanding. Different flows vary in their susceptibility to pressure control.

The Alder Hill material can be pressure flaked, even elegantly; but it is far more difficult to control than the Lakes Basin material. With obsidian or chert, platforms for pressure flaking are generally standard; that is, made by grinding or microchipping tiny flakes off the face opposite the face of the intended flake release. With basalt, such standard platforms work well, but it is often effective to thicken the edge by flaking or pressing off tiny flakes on the same side as the intended flake release. I call this reverse platform preparation. In both percussion flaking and pressure flaking in basalt, this approach is frequently useful. It is this technique that yields flakes with the "platform" on the dorsum of the flake—something that could be puzzling to investigators accustomed to working with obsidian, in which standard platform preparation is the rule. Platform preparation in basalt is best done with the antler baton or antler tine pressure flaker. Grinding with a hammerstone, a procedure that works very well for obsidian, is normally ineffective with basalt.

Pressure flaking of basalt can be accomplished with a short antler tine. This can be hard on the wrists, fingers, and shoulders. For more power and less strain on the wrists and shoulders, one can use a long, more or less straight antler tine, the butt end of which can be braced against the abdomen or side. The antler may also be mounted in a wooden handle or brace. Although pressure flaking works well in northern Sierra Nevada basalts, it cannot be relied upon for removing steps or for substantial thinning. To finish a projectile point with well-ordered pressure flake scars, free of steps, it is necessary to begin pressure on a thin blank or on a preform that is well cambered and free of steps.

Just as there is a lower size limit for handheld basalt bifaces or points during percussion flaking, there is an analogous,



This exceptional example of a basalt arrowhead was found by John Cockrell in the 1950's along the Columbia River near Portland, Oregon. "Wallula Gap Rectangular Stemmed" points date to the Developmental to the Historic, from 1000 to 200 B.P. This Wallula Gap point measures 1-1/16" long by 5/8" wide.

smaller limit for handholding during pressure flaking. This will depend on hand size and finger strength, of course, but there are ways to lower the minimum size limit. Some pressure flaking can continue if you lay the point on a pad, on the ground, or on some other support. This works well for minor edge trimming/straightening or minor shaping, but it is unlikely that much invasive flaking can be accomplished in this manner. The technique does not allow generation of enough force for invasive flaking, particularly in basalt. An exceedingly thin, nicely pressure flaked, small preform can be generated as the tip of a larger biface, which allows for a strong grip on the piece while knapping. Subsequent to being broken off, whether purposefully or accidentally, that biface tip requires minimal further work to make a refined projectile point.

After quarrying from blocks or reducing irregular cores, the most frequent starting point in Martis projectile point percussion/pressure replication, at least for the author, is a flake about 10 mm. thick. Callahan's (1979) basic reduction sequence is nearly always involved: Stage 1, unretouched blank; Stage 2, roughout by edging; Stage 3, first round of invasive thinning flakes; Stage 4, second round of invasive thinning flakes; and Stage 5, careful finishing of plan form and straightening of edges. The stages often flow together with no break, and it is rare that a stage can be skipped. The latter is particularly true if the knapper starts on a relatively thin blank (six mm. or less thick) that possesses excellent camber, already foreshadowing knife or projectile point cross-sectional geometry. Only very rarely is a blank thin enough, and cleanly precambered enough, to allow final main flake scars to be created on the first rapid pass of thinning flakes, thus bypassing one (at most two) of Callahan's (1979) stages, and moving directly from Stage 2 to Stage 4 (or early Stage 5).

Unfortunately, even small, thin blanks nearly always have irregularities that require much work, such as thick edges, cortex, ridges, flaws, inclusions, and curvature. To these problems are added the myriad knapping errors that must be cleaned up, and to which even the best knappers are particularly prone when working with basalt.

It should also be noted that a thin flake blank with a high width/thickness ratio will obtain a lower ratio during initial edging, so that substantial work is sometimes required to get the flake back to the very high ratio of Stage 4 bifaces.

With a Martis projectile point that seems incredibly thin and pervasively well-flaked with an organized flake scar pattern, it can be assumed that a very substantial amount of concentrated work went into it.

On the basis of analysis of extensive recent collections from Martis Valley, Ataman et al. (1999) suggested that Middle Archaic projectile points there were produced through pure pressure flaking on very thin flake blanks (with no percussion) about 25% of the time. This technique is possible; indeed, "wafer thin" dart points are common in archaeological assemblages, and often exhibit large remnants of the original flake-release surface, appearing as if percussion might have been bypassed. However, in the production of basalt flake blanks from cores, flakes with thinly tapered edges all the way around and about the right size for projectile point generation are rare; the fact is that nearly all come off with at least one thick edge, which usually requires percussion reduction.

Furthermore, practice shows that even small, thin flake blanks start wider (usually much wider) than the conceived point and need to be narrowed. Such a procedure is far quicker and easier with a percussor than with a pressure flaker, and thus easier on the hands and wrists, so it does not make sense to start with the pressure flaker too early. Finally, the projectile point that is finished with pressure flaking may not show any detectable trace of the initial percussion edging. In the author's opinion, all pressure strategies in basalt are and were rare.

Serrated Martis projectile points are not uncommon. Serration usually consists of closely spaced, small denticulations that are best made with a specially modified pressure flaker. This procedure requires patience and skill. Usually it is the terminal stage in the knapping process.

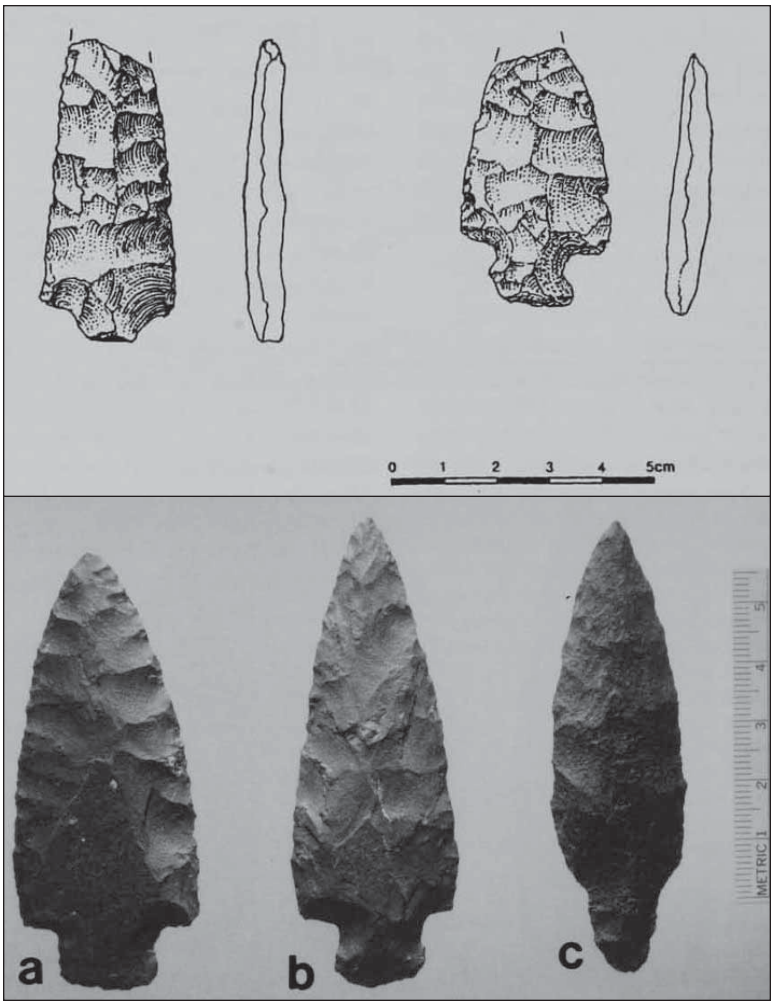
Most basalt pressure flakes shatter during detachment.

Missing Transitional Forms

For their respective field areas near Truckee and in Lakes Basin, Neuenschwander (1994) and Duke (1998) pointed out that transitional forms between percussion flaked bifaces and pressure flaked projectile points are rare. Complete, "finished" preforms ready for commencement of pressure flaking are not commonly found, nor are broken bifaces upon which pressure flaking had been commenced. Duke (1998a) believed that crude percussion flaked bifaces were often ends in themselves; in other words, they were intended to be tools, not simply preforms (also see Ritter 1970). Moreover, most projectile points would have been knapped directly from small, thin flakes requiring a minimum of percussion preparation.

Top. *Examples of refined dart points from an excavated assemblage at Lakes Basin Campground, Plumas National Forest. Neuenschwander (1994), Peak and Associates, Sacramento, California.* ***Bottom.*** *Dart points made by the author from basalts of the northern Sierra.* ***A*** *and* ***B*** *are from Oakland Pond, and* ***C*** *is from Alder Creek.* ***A*** *made from a very thin flake and finished with pressure flaking.* ***B*** *roughed out with a soft hammerstone, thinned and shaped with a wood baton (Cercocarpus), and received final edge adjustments, cleanup of small steps near the tip, and shaping of the stem via antler pressure flaking.* ***C*** *knapped entirely with a wood baton (Comarostaphylis), from a thin flake.*

Neuenschwander (1994) suggested that percussion flaked preforms were exported from his study site at Lakes Basin Campground for finishing elsewhere. In line with Duke's (1998a) model, in presumed Martis lithic scatters, one can find small, thin flakes not much larger than most Martis projectile points that have percussion flake scars or even pressure flake scars well under way. Furthermore, many Martis points have a remnant flake-blank release surface, suggesting that the initial blanks were thin and required minimal or no invasive thinning. But small, thick bifaces, too small and thick to be effective as functional knives (probably meant as preforms) are also commonly encountered at Martis sites.



Halves of thin, well-worked larger bifaces are also common. The missing halves, already prepared by careful reduction, probably went into projectile point production. The remaining halves may then be regarded as possible records of the missing transitional forms. It is important to recognize that during manufacture of bifaces, most fatal breaks occur during percussion thinning from Stage 2 to Stage 3 or 4; once pressure flaking is commenced, such breaks are far less common. Perhaps they were even more rare in Martis days than they are for modern knappers.

After all, we are experimenting; Martis knappers were using their lithics for survival and were expert knappers of basalt as well. This would account for the rarity of percussion flaked preforms upon which pressure flaking had been commenced.

BASALT KNAPPING CHALLENGES AND STRATEGIES

Alder Creek and Lakes Basin basalts (but probably more the former than the latter) have weak internal flow-lamination that facilitates the splitting off of large, flat flakes during quarrying or reduction of large blocks or cores. These blanks naturally tend to have thick, nearly vertical margins around most of their perimeters. The subtle internal lamination can often be used to advantage when steps occur during biface reduction. Indirect percussion with a beveled antler tine placed against the step can extend the aborted flake release well across the piece, following the lamination. A thick knot or stack on the edge of any biface shorter than about five cm. is usually fatal; in basalt, the hand is not strong enough to hold a piece this small against the forceful blows required to remove the problem. Stacks or thick knots on small basalt bifaces can sometimes be removed using a modified bipolar technique, which involves setting the stack onto a hammerstone or anvil, then striking the opposite face of the biface, directly over the stack, with an antler baton.

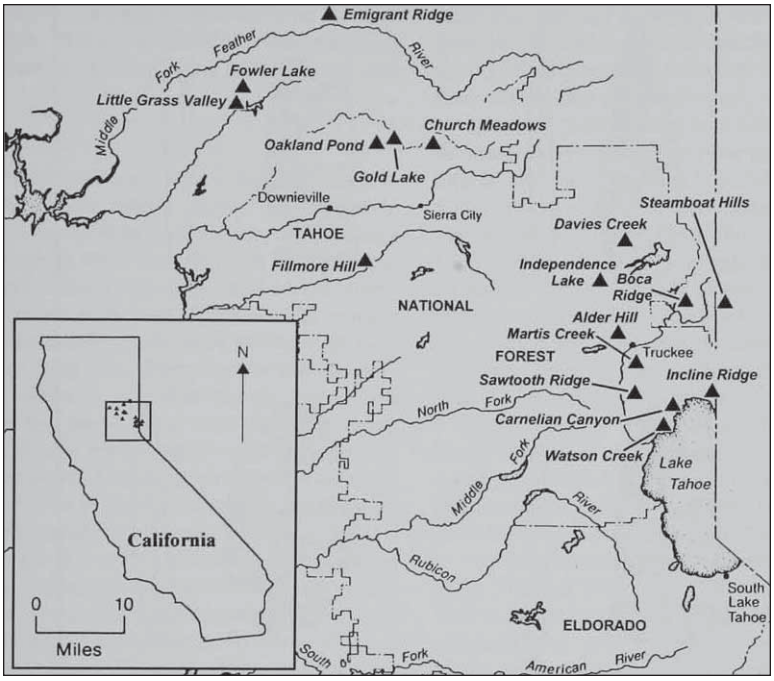
The various lower size limits for holding basalt in the hand during biface reduction are significantly lower for most cherts, and especially so for obsidian, both of which require far less forceful flake removals. Thus, the advent of bow and arrow technology would favor a switch to chert or obsidian. Production of very small, arrowhead-sized points in basalt is an enterprise fraught with difficulties. Even if one starts with a very thin flake or preform, it will probably remain relatively thick as it reduces in length and breadth to arrowhead size. One is then faced with the necessity of pressure flaking a biface that is too small to hold firmly against the force required to do so with basalt.

One way to solve this problem, as detailed above, is to pressure flake the point while it is still the tip of a larger biface. Another technique that has worked for the author is to leave a stem on the preform while pressure flaking, for leverage. When the pressure flaking is complete, the stem may be removed using bipolar percussion, baton against anvil. If the resulting truncated base is too thick, it may be thinned somewhat using the same technique. It is at this point that there are certain limitations. Once an arrowhead-sized basalt point has been produced by this or any other technique, it is very difficult to notch it unless it is extremely thin. This can be problematic if the knapper (such as the author) has large hands and weak wrists (which are made so by pressure flaking basalt!). Martis knappers were undoubtedly physically better prepared for pressure

Map: Selected geologic sources of basalt in the northern Sierra Nevada, including sites mentioned in the text. Map by Craig Skinner.

flaking basalt, and probably could handle thicker preforms. Assemblages in the northern Sacramento Valley do contain significant numbers of arrowhead-sized basalt points (R. Milliken, personal communication 1999; E. Ritter, personal communication 2000).

Most of the author's well-flaked basalt dart points each required about an hour's worth of flaking. In that time interval, two or three comparable obsidian points could be generated. Basalt dart points commenced on irregular blanks with thick margins and/or flaws require still more time. Admittedly, a point might be worked simply and expediently at first, with a minimal number of flake removals to achieve the desired function; later reworking after some period of use might then refine the point. In such a case, the knapping time required to achieve refinement would be spread out over two or more long-separated sessions.



However, it is to be expected that most damage to projectile points would involve fatal snaps or significant tip or stem removals (Flenniken and Wilke 1989), so that reworking would not be a simple case of resharpening. Resharpening per se does not normally produce a refined biface or point; for that, it is necessary to knap strategically, including preserving or creating camber, avoiding or eliminating steps, and making the flake scars invasive (Edwards 2000). A refined basalt biface approximately a decimeter long can be made in about 20 minutes with an antler baton, provided the starting blank is a good one. More complicated blanks can extend the knapping time dramatically. Martis assemblages commonly include very simple, expedient (unrefined) bifaces and/or points. However, fragments of refined bifaces, as well as complete or partial projectile points, are clearly dominant elements in many assemblages.

Noble (1983) noted that the great variablity in projectile point typology within the Martis Complex may have resulted in part from the difficulty of working Sierran basalts, and getting a blank to reflect the form initially desired. For example, it is very difficult to notch a basalt projectile point deeply, unless the point is quite thin. In the author's replications, points that were intended to be notched frequently ended up as contracting stems because the attempt to notch them failed. Deep versus shallow notches probably depended on thin versus thick preforms.

Finally, it is predictable that cores, flakes, and tools should diminish in size in direct proportion to distance of site from raw material source. This should also affect typology to some degree. For example, smaller points might tend on average to be thinner, and thus be more susceptible to notching.

CONCLUSIONS

Replicative manufacture of a refined basalt projectile point or biface of Martis type takes substantially longer than manufacture of a comparable artifact in obsidian or chert, and it is much more difficult. It is physically demanding and takes concentration, dedication, and energy.

A fair percentage of Martis artifacts are, in fact, not merely expedient tools but refined ones. Despite the challenges of working basalt, pressure flaking was used routinely by Martis knappers. Indeed, the vast majority of Martis projectile points were pressure flaked. However, an approach employing only pressure, bypassing any percussion, would have been exceedingly rare, even if the flaking on some projectile points suggests to archaeologists that such an approach must have been used.

The basic biface reduction model proposed by Callahan (1979) applies to Sierra Nevada basalt and Martis technology. Although wood batons have been used by many modern knappers for making basalt bifaces, Sierran woods are substantially inferior to antler for percussion flaking basalt. There are techniques to facilitate pressure flaking of very small basalt projectile points, involving the initiation of pressure finishing while the preform is still large, which affords a certain amount of leverage.

The conspicuous rarity of elegant, refined "knives" in Martis assemblages probably results from multiple causes, such as the utility of cruder bifaces and the habitual use of "halves" of broken bifaces to make projectile points.

The scarcity of artifacts that are transitional between percussion bifaces and pressure-flaked points has a reasonable technological explanation; most breakage occurs during percussion thinning and skilled Martis knappers probably made few fatal mistakes once pressure was commenced.

Flaked Stone Basalt Technology in the Northern Sierra Nevada of California -- Stephen W. Edwards, 2000, *Journal of California and Great Basin Anthropology, 22(2)*, University of California Merced Library, UC Merced. **eScholarship**, University of California. eScholarship provides open access, scholarly publishing services to the University of California and delivers a dynamic research platform to scholars worldwide.

NOTE

"Basalt" has been employed as a broad raw material category in Californian and American archaeology. XRF analyses are beginning to suggest that some important basalt-like raw material sources are not, in fact, basalt; however, other tests, especially assessment of percent silica, should ultimately be brought to bear.

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World's Oldest Ground-Edge Stone Axe Found In Northern Australia.

Friday, November 5, 2010

SYDNEY (AFP) – Archaeologists revealed they have found a piece of a stone axe dated as 35,500 years old on sacred Aboriginal land in Australia, the oldest object of its type ever found.

The shard of stone, found in Australia's lush and remote far northern reaches in May, 2010, has marks that prove it comes from a ground-edge stone axe, Monash University's Dr. Bruno David said on Friday.

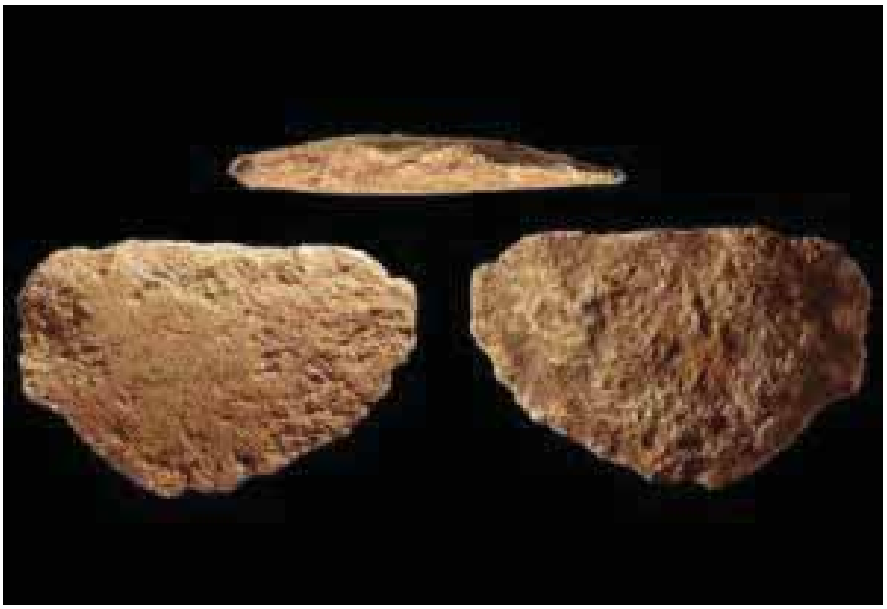
"We could see with the angled light that the rock itself has all these marks on it from people having rubbed it in order to create the ground-edge axe," he told the Australian Broadcasting Company.

"The person who was using the axe was grinding it against a sandstone surface in order to make it a smoother surface."

Dr. David said the previous oldest ground-edge axes were 22,000-30,000 years ago from Japan and Northern Australia, and that the conventional belief has been that the tool first emerged in Europe when populations grew and forests flourished at the end of the last Ice Age.

There is evidence for stone tool use among the earliest hominid ancestors 3.4 million years ago; however, the use of grinding to sharpen stone tool edges such as axes is associated with modern humans.

"While there have been reports of much older axes being found in New Guinea, the implements were not ground." This suggests that axe technology evolved into the later use of grinding for the sharper, more symmetrical and maintainable edges this generates. "The Nawarla Gabarnmang axe, found some 40km from its source, is evidence of 35,000 years of the movement of tools, technologies and ideas across the northern Australian landscape. This new evidence for the earliest securely dated ground-edge implement in the world indicates that



The pieces of ground-edge stone axe was found in west Arnhem Land. Credit: Monash University/Bruno David.

Australia was an important locale of technological innovation 35,000 years ago," he said.

"What this all means is that we know that the conventional story that comes from Europe does not explain the origin of axes globally. So we've got to think of it in a very different way."

Dr. David said the discovery is evidence that Aboriginal Jawoyn people from Arnhem Land could have been the first to grind axes to sharpen their edges. The piece of stone was found in a remote patch of the Northern Territory amid traditional Aboriginal rock art paintings believed to date back thousands of years. "It's a very remote location, it's quite a spectacular site that is covered in rock art," Dr. David said, adding that the cave where the stone was found was well protected from the elements.

Nawarla Gabarnmang is a large rock-shelter in Jawoyn Aboriginal country in southwestern Arnhem Land. Ray Whear and Chris Morgan of the Jawoyn Association discovered the rock-shelter perchance while flying by helicopter in June 2006.

Arnhem Land, a 97,000 square kilometre (38,800 square mile) patch of forests, rivers and gorges east of the Northern Territory capital of Darwin, is sacred to Aboriginal people.

Nawarla Gabarnmang is the archaeological site in Jawoyn country from which the 35,000 year old piece of ground-edge axe was found. Credit: Bruno David.

I Found This Arrowhead On The World Wide Web™

You can do it, too. Every month in "Arrowhead Collecting On The Web" we show you how your mouse can do the searching on the world wide web. We bring you information and links to on-line sources of authentic, ancient arrowheads. We talk about how to tell if an arrowhead is ancient, or if it's a modern reproduction. We give you links to reputable authenticators who can provide experienced, scientific examinations of arrowheads to verify and certify the authenticity of stone points and other tools you collect, buy or trade for. I found the ancient arrowhead, shown here, through a friend on the world wide web, although it was originally found near Shady Cove in Jackson County of southern Oregon in the 1960's by Harvey Huber. I purchased it in July, 2010.

Harvey Huber found this expertly made, completely opaque, red jasper Rogue River style "Gunther" arrowhead in the place where it was last used, abandoned or stored away and forgotten. Now, any collector can tell you that there are times when you will want to wander the fields and streams yourself. So, every month, in the pages of "Arrowhead Collecting On The Web", we also provide articles and photographs to show you how to effectively look for and find ancient arrowheads and other stone tools for your collection. We also share stories by readers across America who write about and photograph their own, personal finds. Don't miss a single article each month in **Arrowhead Collecting On The Web**.

Actual size:
1-3/16" x 3/4"

Arrowhead Collecting On The Web™

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e-Mail Letters:

November 30, 2010

Hey again, Scott--

I saw in your recent newsletter that you didn't want to provide people's contact information outright. I understand your tendency toward privacy, but if we're all volunteering the information to other people who have the same interest in connecting with each other, is there really any harm in just putting that info in the newsletter? Kinda like you would in a classified ad in the newspaper with a name and phone number?

No big deal, just wondering.

Kelly

November 30, 2010

Kelly,

I was wondering the same thing, and will consider how to modify the system. Maybe include name and phone number. I do not want to provide email addresses, though, since our web site privacy policy does not allow sharing or providing that information from subscribers to anyone.

Scott

November 30, 2010

Maybe you could do your original idea for the e-mail addresses. Something like: *"Names and phone numbers are listed here, but if you prefer to connect by e-mail just send an e-mail to fscottcrawford@arrowheadcollectingontheweb.com with "Exchange" in the subject line and your request will be forwarded to the contact you have identified in the newsletter. Any follow-up communications yadda yadda yadda..."*

BTW, are there any good places to look (and that are accessible) in Texas?

Kelly

November 30, 2010

Kelly,

That might well work, as you have suggested. I will do something along that line. Then, the question will arise, shall we leave the requests in a permanent feature, which can expand as more folks ask to be included.

As far as Texas, there are a number of areas which are outstanding for being places to find artifacts; however, the entire state is essentially private property. Several web sites are available about Texas artifacts, and some have links to private landowners who do allow folks to look, usually for a fee. Do a Google search for "Texas artifacts" or "Texas arrowheads". Also, you might consider www.DirtBrothers.org which is a group of collectors who visit construction sites, etc., as well as members' land, to perform "rescue" and other searching for artifacts. It is a really interesting site, with lots of information. I will put some information about it in a coming copy of the e-magazine, to let others know about it, too.

Scott

November 30, 2010

GREAT! Thanks a lot for the info! Ya gotta love the internet.

Kelly

***EXCHANGE** Listing Number One:*

"I live near Portland, Oregon and am interested in finding places within a day's drive that are available (and can provide owner's permission) to hunt points. I'm only interested in surface hunting and would only be walking and looking (no excavating). I'm especially interested in the lower Willamette Valley area, places in central Oregon or north to around the Seattle area. On an unreasonable whim, I might even fly to somewhere like Missouri for a weekend if someone would want to point me in the right direction. I'm open to information."

Kelly Griffin
office: 503-636-1754 cell: 503-969-5311

Names & Phone Numbers are listed in EXCHANGE, at the request of the reader. To contact by e-mail, send an e-mail to the publisher, with "EXCHANGE" in the subject line. Your e-mail request will be forwarded to the contact you identify by name.

Publisher's e-mail address:
fscottcrawford@
arrowheadcollectingontheweb.com

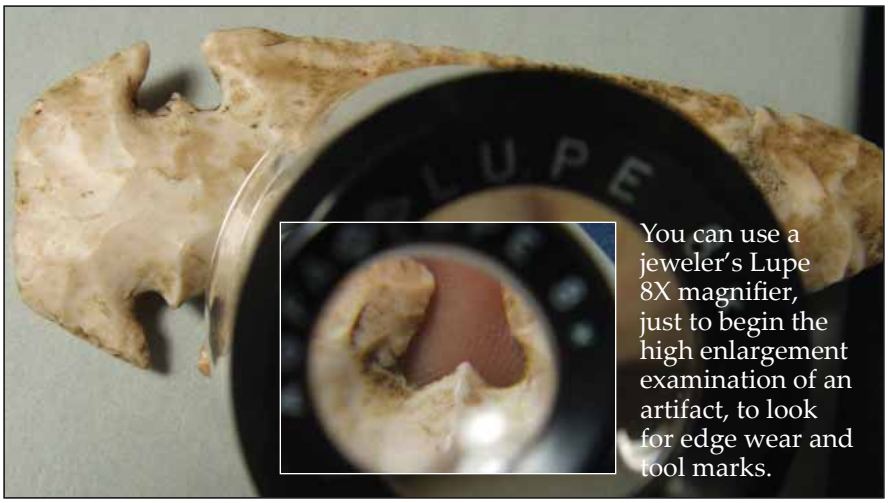
Great Basin Indian Artifact Collection For Sale!

Jess Anders has accumulated four large collections containing 50 large frames of nice arrowheads and a lot of nice knives which are now up for sale (by the frame). These consist of top quality pieces from Eastern Oregon; primarily Lake & Harney Counties. Please go to his new web page for a look: **www.GreatBasinIndianArtifacts.org** or give him a call at 541-549-8160.

www.GreatBasinIndianArtifacts.org

ACOTW™
Arrowhead Collecting On The Web

Artifact Authentication Services & Certificates Of Authenticity



Authentication and evaluation services for artifacts from all over the world are available from a number of highly respected sources.

Some offer these services for regional items, since they specialize in Western, or South Western, or South Eastern, or North Central or North Eastern artifact types.

And most of the authenticators have web sites. Read up on their services, learn about their specialties, obtain pricing and timing information, and determine how to send items for authentication and evaluation.

Here are some well known and respected authenticators:

Dwain Rogers
Texas Flint Authentication
4102 Birch Avenue
Temple, Texas 76502
Telephone: 1-254-791-5520

Jeff Baker
Baker Authentication
www.BakerCOA.com
P.O. Box 772
Paragould, Arkansas 72451
Telephone: 1-870-239-9722

Bill Jackson
Jackson Galleries
www.JacksonGalleries.com
P.O. Box 1005
Mount Sterling , Kentucky 40353
Telephone: 1-800-466-3836
Fax: 1-859-499-0160

Tom Davis
Davis Artifacts, Inc.
www.TomDavisArtifacts.com
P.O. Box 676
Stanton, Kentucky 40380
Telephone: 1-606-663-2741

Ben Stermer
Western Typology
www.WesternTypology.com
44207 W McClelland Dr.
Maricopa, Arizona 85238
email: BSte122241@aol.com

Jeb Taylor
Jeb Taylor Artifacts
P.O. Box 882
Buffalo, Wyoming 82834
Telephone: 1-307-737-2347

Ken Partain
www.kensrelics.com
7044 Market Street
Dover, Arkansas 72837
Telephone: 1-479-331-3486

Sam Cox
www.SamCoxArtifacts.com
968 Floyd Drive
Lexington, Kentucky 40505
Telephone: 1-859-351-5675

A European artifact gallery, which offers quality antiquities from all historic eras, and all areas around the world.
eBay Store: Stormbroek

Dealer located in Arkansas, features authentic artifacts from the south/central United States, many with Certificates of Authenticity.
eBay Store: SWarkArtifacts

Whatcha Got There?

I have enjoyed finding arrowheads and other artifacts over the years. Yet, I always wondered if there was an effective way to identify the types of points which I found? Beyond guessing? After much reading, studying, contemplating and analyzing the information which is available about dart and arrow point identification, and studying the descriptions of many different types, I put together a short list of questions which enables me to compile a description of a projectile point.

From this description, I can focus the answers to narrow down the type classification possibilities for any particular stone projectile point from this wonderful region. ***"Stone Projectile Points Of The Pacific Northwest"*** *uses this series of questions and answers to illustrate clearly the identification process for several dozen projectile points in my collection. You can use the same process to identify most of the points you find in the Pacific Northwest. This is how "Stone Projectile Points Of The Pacific Northwest" is An Arrowhead Collector's Guide To Type Identification.*

"Now You Can Know"

Actual size of this projectile point: 1-1/4" x 13/16"

Stone Projectile Points
Of The Pacific Northwest

PNW

An Arrowhead Collector's Guide To Type Identification

F. Scott Crawford
Collector since 1962.
Publisher of the monthly e-magazine:

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Arrowhead Collecting On The Web

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F. Scott Crawford, Carrollton, Texas, USA.

For additional information about the publisher's new book, "**Stone Projectile Points Of The Pacific Northwest**", you are invited to visit the informative web site:
www.BlackRockPublishing.com