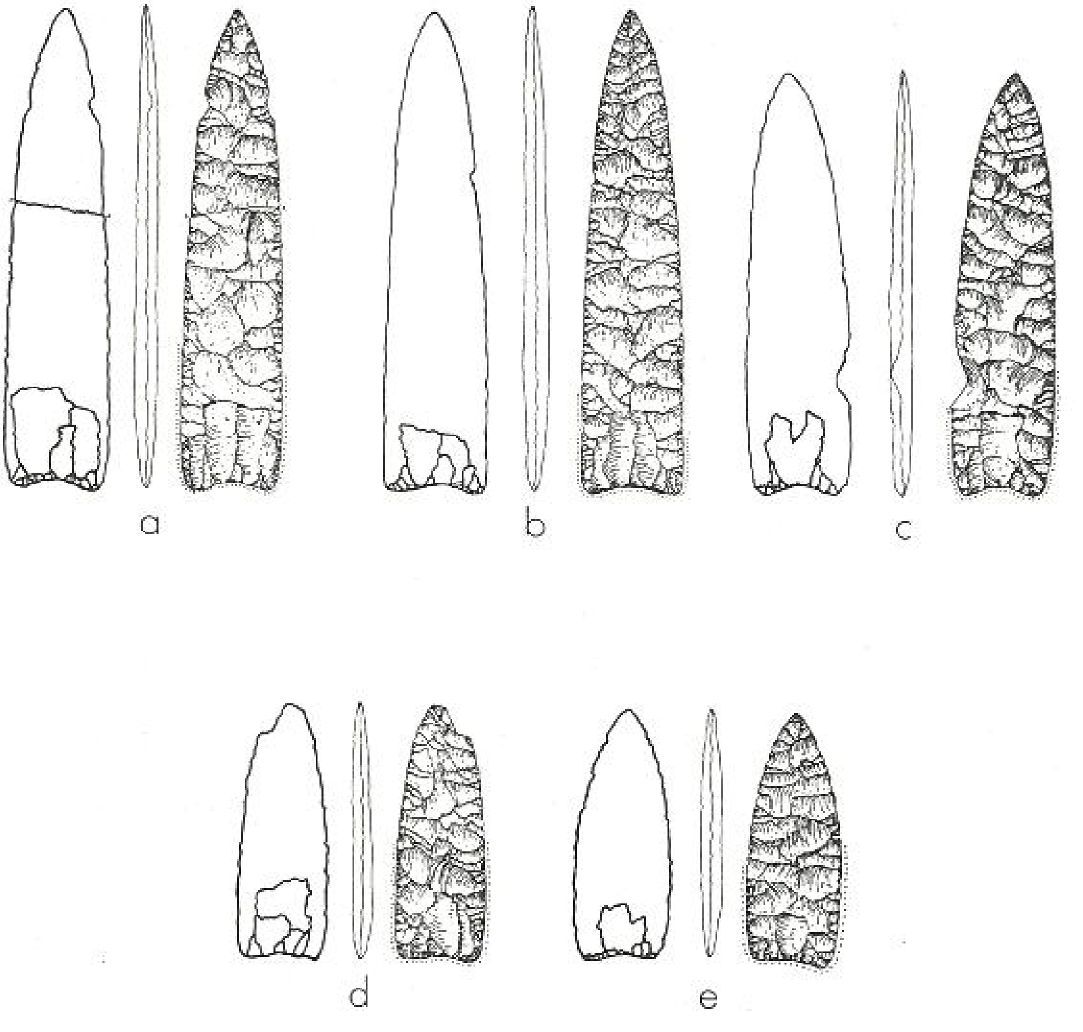
IDAHO ARCHAEOLOGIST



Volume 8, Number 1

Volume 8, Number 1
Spring 1985

IDAHO ARCHAEOLOGIST

The *IDAHO ARCHAEOLOGIST* is published semi-annually by the Idaho Archaeological Society a non-profit association of professional and amateur archaeologists, organized under the laws of the State of Idaho. Subscriptions are $7.50 per year and may be obtained by writing the *IDAHO ARCHAEOLOGIST*, P.O. Box 7532, Boise, Idaho 83707.

NOTICE TO AUTHORS: Manuscripts should conform to the style sheet for *American Antiquity*. Manuscripts should be typed double-spaced with 1½ inch margins and submitted in the original and two copies. The *IDAHO ARCHAEOLOGIST* will publish articles and shorter contributions concerning the archaeology of Idaho and those areas of adjacent states and provinces including the Columbia drainage and the Great Basin. Technical papers and theoretical papers having a wider audience will be considered. Manuscripts should be addressed to:

Mark G. Plew, Editor
IDAHO ARCHAEOLOGIST
Department of Sociology, Anthropology
and Criminal Justice Administration
Boise State University
1910 University Drive
Boise, Idaho 83725

CONTENTS

ARTICLES AND REPORTS

SHORT CONTRIBUTIONS

EDITOR'S PREFACE

This issue of the ***IDAHO ARCHAEOLOGIST*** is marked by a number of changes, including a new editorship and significant changes in the journal format. While the journal will continue to be published semi-annually in the spring and fall of each year, with this issue, each volume will be paginated consecutively. Because of this and other changes there will not be a second number for 1984. Instead, this issue will be Volume 8, Number 1. An index of the first seven volumes are published in this issue.

Additionally, a number of format changes are being initiated. The journal will now consist of two major sections, an Articles and Reports section and a Short Contributions section. The first section will publish field reports and longer synthetic papers while the Short Contributions section is intended for publication of short descriptive material culture notes, comments, book reviews, short field reports, letters to the editor, etc. Authors submitting descriptive notes or short field reports should include a location map and artifact illustrations.

This issue also marks a change in the editorial policy of the journal. Beginning with this issue, all papers will be anonymously reviewed. The number of reviewers will be expanded as required, to insure that all manuscripts are adequately examined. The journal will continue to publish papers dealing with the archaeology of Idaho and surrounding areas. In addition, technical and theoretical papers having a wider audience will be considered. The ***IDAHO ARCHAEOLOGIST*** continues to encourage avocational and professional archaeologists to submit papers.

Finally, as I assume the editorship, I acknowledge the very healthy state of the journal. This is due in large part to the leadership of William Norquist and Kenneth M. Ames the previous editors; their fine staffs and the many individuals from the Idaho Archaeological Society and the professional community in Idaho who have contributed their time and efforts. On this foundation, the journal remains committed to the ideals and objectives of the Idaho Archaeological Society which are to protect and preserve the remnants of the past and to foster an understanding of the prehistory of Idaho.

Mark G. Plew
Editor

ARTICLES AND REPORTS

A REVIEW OF THE SIMON CLOVIS COLLECTION

James C. Woods and Gene L. Titmus
College of Southen Idaho

INTRODUCTION

In the autumn of 1961, Mr. W. D. Simon of Fairfield, Idaho, unearthed a cache of chipped stone tools while conducting earth-moving activities in Big Camas Prairie, southcentral Idaho (fig. 1). This collection was subsequently reported to Earl H. Swanson, Jr., and B. Robert Butler of the Idaho State University Museum who later conducted several seasons of fieldwork at the site.

The collection was morphologically identified as Clovis and has since been included in a number of studies (Bonnichsen 1977, Butler 1963, Butler and Fitzwater 1965, and Muto 1971a, 1971b). This paper is an effort to contribute to the understanding of Clovis technology as it is manifest in the northwestern Great Basin. Of primary concern is the provision of a more detailed discussion concerning reduction sequence than has been previously described, an experimental study of quartz crystal reduction based on examples in the Simon collection, and a discussion of final stage tool morphology.

BACKGROUND

Butler was first to report the Simon collection and assign tentative morphological and functional tool classifications (Butler 1963, Butler and Fitzwater 1965). Muto (1971b) reviewed Butler's functional classification and concluded the collection represented a reduction continuum from early to late stage production of projectile points rather than an assortment of knives, scrapers, spokeshaves, and projectile points as proposed by Butler. Muto's analysis was concerned with a description of the early stages in the reduction sequence, whereas Bonnichsen (1977) concentrated on the collection's completed tool forms, in particular the projectile points. Bonnichsen concluded that the Simon site projectile points could be used to define a northern variation of Clovis especially when compared to the collection from the Anzick Site in Montana. He contrasted these to a southern variation in which he included specimens from the Murray Springs and Naco sites. This division into sub-types was based on projectile point length, channel flake morphology, and the method of platform preparation employed. Bonnichsen also noted the presence of several features which suggested the use of heat treatment on the Simon and Anzick collections. Based on the presence of thermal alteration and the definition of two geographical sub-types, Bonnichsen hypothesized the rapid spread of Clovis technology in the New World was a result of the *in situ* development of heat treatment technology. This enabled craftsmen to utilize a vast resource of cherts and chalcedonies to manufacture tools using reduction strategies previously unavailable. Since there was a significant technological variation between the northern and southern Clovis collections, Bonnichsen concluded that a rapid migration theory as proposed by C. Vance Haynes was not tenable (Bonnichsen 1977:200).

Any comprehensive study of regional distributions of Clovis Point sub-types must first begin with detailed descriptions of known collections. Although studied previously, a complete description of the Simon Clovis material was not available. Thus, the collection was reexamined to determine if a distinctive northern variation of Clovis technology could be defined.

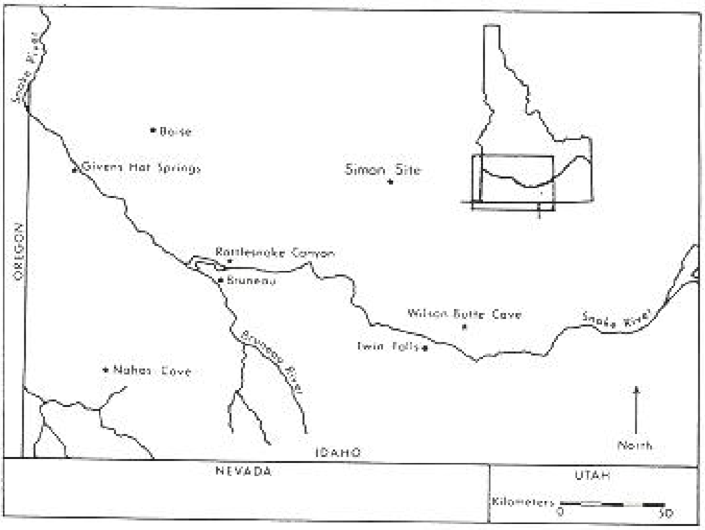


Figure 1 Map of southwestern Idaho

ANALYSIS

The collection consists of thirty-three tools representing three reduction sequences defined according to tool size. Tool outlines for the collection were recorded (fig. 2a), then the completed projectile points were separated from the remaining bifaces showing a clear division between larger and smaller tool forms (fig. 2b, c). Thus, the stages leading to the large projectile points represent one sequence, the stages leading to the smaller projectile points represent a second, and the three largest bifacial tools were separated into a third sequence.

Each of the three sequences were then sub-divided into stages of reduction using criteria established by Sharrock (1966). Sharrock provided intuitive criteria for defining five stages of biface completion including overall symmetry, margin morphology, width-thickness ratios, number of

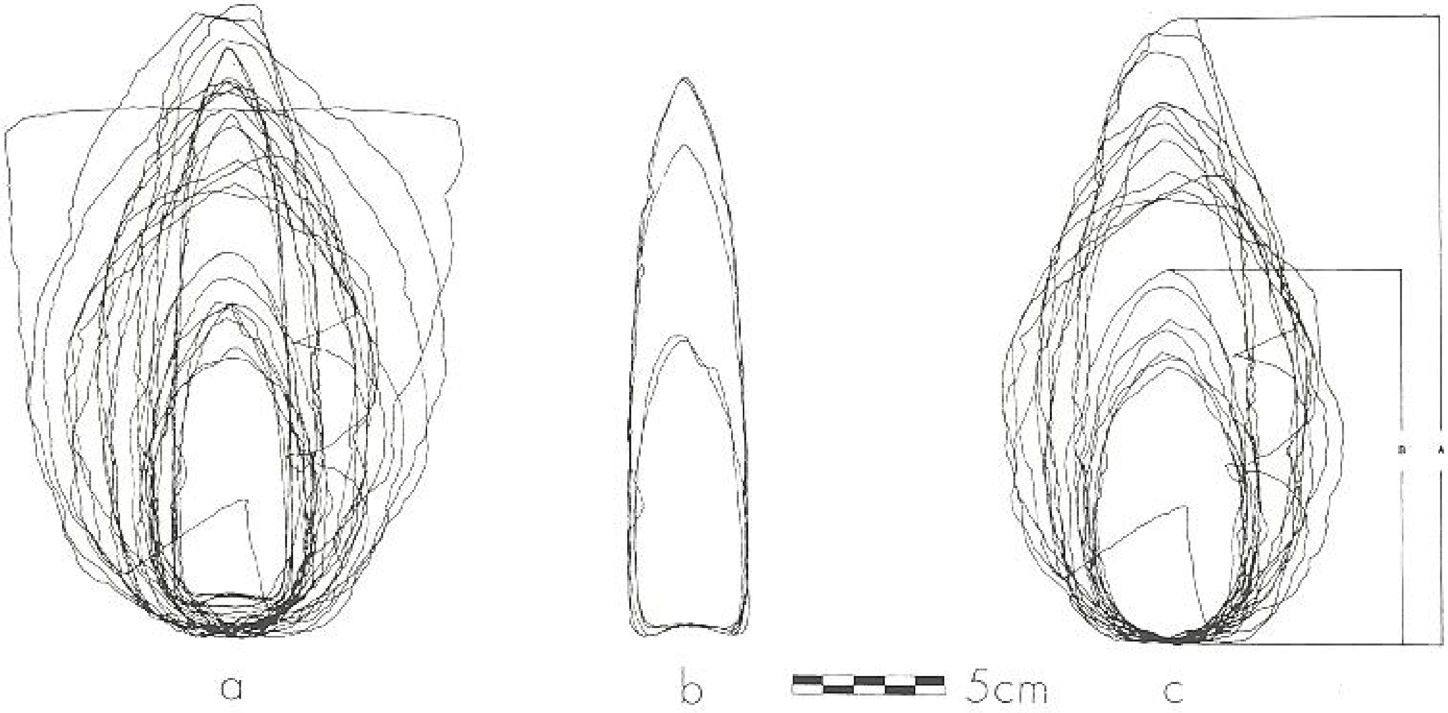


Figure 2 Tool outlines for the Simon Clovis collection. a) outline of the entire collection, b) outlines for the completed projectile points, c) outlines for the bifacial blanks in sequence A and B.

flakes per tool face, and characteristics of the negative bulb of force.

The only problem encountered with using these simplified criteria on the Simon collection involved the variable of number of flakes per tool face. Several late stage bifaces retained a minimal number of flake scars due to the unusual width, length, and flatness of thinning flakes. Several specimens in this collection exhibit thinning flake scars which run the full width of the biface.

The first sequence includes all bifaces and completed projectile points over 12 cm. in length excluding three large tools defined as a third sequence. Included in the first sequence are sixteen specimens representing all five stages of reduction. Five stage one bifaces (fig. 3), four stage two bifaces (fig. 4), three stage three bifaces (fig. 5b, c, d), and one stage four biface (fig. 5a) can be identified. Three completed projectile points represent stage five of this sequence (fig. 6a, b, c).

The second sequence includes ten specimens representing four reduction stages. Stage one bifaces for this sequence are absent. Three stage two bifaces (fig. 7f, g, h), four stage three bifaces (fig. 7b, c, d, e), and one stage four biface (fig. 7a) can be identified. Stage five of this sequence consists of two completed projectile points (fig. 6d, e).

The third sequence is represented by one stage three biface (fig. 8b) and two stage four bifaces (fig. 8a, c) of unusually large dimensions.

Analysis suggests that at least four of the Simon site bifaces were manufactured from macro-flakes. Two of the bifaces were produced from a chert with identical color patterns that suggest macro-flakes were removed from a single core in sequence. Two other specimens retain flake scars from the ventral surface of the original macro-flake.

Muto's analysis of the reduction strategy used on the Simon collection suggests that major portions of the margins were prepared as platforms in a single operation. He states:

> ". . . only in a few instances were individual platforms prepared. Most of the beveling, strengthening and grinding takes place along major portions of the edges being worked. In no instance, however, was there evidence of total edge preparation on the pieces in this collection" (Muto 1971:88).

On this last point we agree; however, our analysis suggests a heavy reliance on individual platform preparation with a bifacial and bilateral flake removal sequence. Although light platform grinding does occur on the stage one through four bifaces, most platform preparation is in the form of edge beveling, followed by a rounding of the margin by rubbing or scruffing with the percussor. This process is defined as buffeting (Young and Bonnichsen 1985) and is used to strengthen the platform area in much the same manner as platform abrading.

Muto noted that either soft hammer percussion with an anvil or indirect percussion could have been employed to produce the distinctive thinning flake shown on all stage four bifaces. However, these same thinning flake attributes can be replicated by hand-held direct percussion.

Five completed projectile points are in the collection. Three are from the first sequence and two are from the second sequence as previously discussed. Several attributes are worthy of note. Broad, flat, collateral flakes were widely spaced apart with flake scars that tend to intersect from the opposite margin. This flake orientation tends to reduce convexity of the tool face but leaves a triangular section between flake scars which must later be removed to straighten the tool margin. The flaking sequence is random and varies from specimen to specimen.

Basal thinning is often in the form of multiple as well as single channel flakes of a size within the range possible by pressure. Basal grinding occurs on all five points and extends beyond the termination of the channel flake on all but one point, and in each case includes grinding of the basal concavity. Grinding is very light and produced with a fine-grained abrader. Grinding strokes are oriented parallel to the tool margins. Micromorphological features on one specimen suggest that basal grinding was produced along the entire length of the margin and the final pressure flaking removed all but that remaining on the proximal margins. This suggests that margin abrading may have served as a form of platform preparation for the final sequence of pressure flakes as well as an integral aspect of the haft element.

QUARTZ CRYSTAL REDUCTION

Four bifaces from the Simon collection are manufactured of quartz crystal (fig. 9). One of these was not available at the time of analysis. Replication experiments were conducted to determine the nature of fracture in quartz crystal and determine the method of manufacture used on the Simon quartz crystal bifaces.

Quartz crystal has a complex atomic structure. The silicon atoms lie on three interpenetrating hexagonal lattices which have in the vertical direction, a spiral arrangement in respect to each other (Ford 1947:470). This spiral arrangement creates unusual fracture patterns when quartz crystal is fractured by natural causes. However, results of our experiments show that if the intended fracture planes are oriented properly, quartz crystal can be easily controlled and yields exceptional edge qualities.

Fractures can be controlled in all directions excluding that perpendicular to the long axis of the crystal. Quartz crystal is most isotropic near its termination or distal end and the basal portion possesses a complex growth structure which inhibits clean fracture propogation. When flakes are removed from the basal portion of a quartz crystal, fractures are generally not controllable. Heat treatment was attempted to determine if the character of the crystal could be altered. Several attempts at various time and temperature combinations failed to produce any observable change in fracture character.

From unaltered quartz crystals, larger flakes and blades can readily be detached intact although there is a considerable crushing and shattering of the smaller debitage. Flake scar and flake surface character of quartz crystal varies significantly from other siliceous materials. Growth patterns within the crystal produce atypical striations, disoriented compression rings and hackles, and provide an interesting array of step-like fractures. These fractures were not altered on crystal exposed to heat treatment.

In examining three of the four quartz crystal specimens in the Simon collection, it is clear that they could have been produced with the same techniques and tool kit used to produce the remainder of the collection. All four of the quartz crystal bifaces could have been produced from a single crystal at least 14 cm. in diameter and 30 cm. in length. Crystals within this size range have been recovered

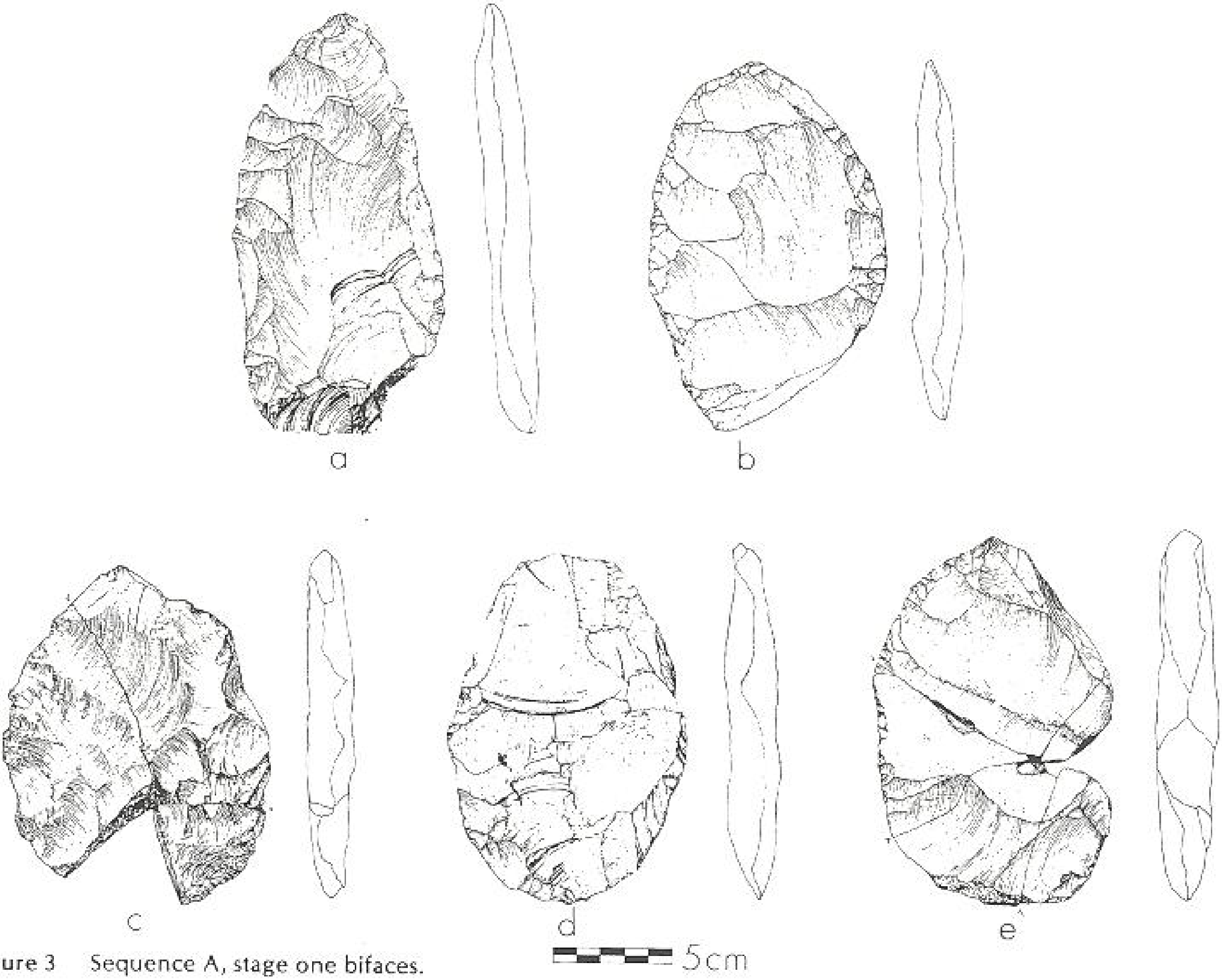


Figure 3 Sequence A, stage one bifaces.

in several locations close to the Big Camas Prairie. The smaller of the bifaces studied was produced from the distal end of the crystal and the largest specimen was oriented with the distal end of the biface at the distal end of the crystal. This specimen has been heavily abraded on both dorsal and ventral faces in what could have been an effort to remove extremely sharp surface irregularities often produced on quartz crystal, which can prove to be hazardous to the tool user.

Using soft-hammer percussors and minimal platform preparation, a series of quartz crystal bifaces were produced using techniques nearly identical to those suitable for working other isotropic materials. The only observable alteration in the technique involved the holding method employed. Tool margins were not only extremely sharp, they possessed numerous irregular saw-like projections which required the tool-maker to employ the use of protective padding during the manufacturing process.

TOOL DAMAGE

Fourteen of the tools in the Simon collection have been severely damaged, reportedly from forces exerted by the earth-moving equipment that exposed the cache. Damage consists of seven cases of bending breaks, four cases of margin damage, and three cases of radial fractures with areas of impact located at tool midsections. It should be noted that Frison and Bradley have recorded similar fracture featues on some bifacial tools from the Hanson Folsom site (Frison and Bradley 1980:97) and noted some margin modification and use-wear characteristics on the resulting pieces. Their interpretation suggested intentional biface fracturing for the production of specialized tools. The Simon collection specimens with this same pattern of fracturing have all been reassembled preventing further examination.

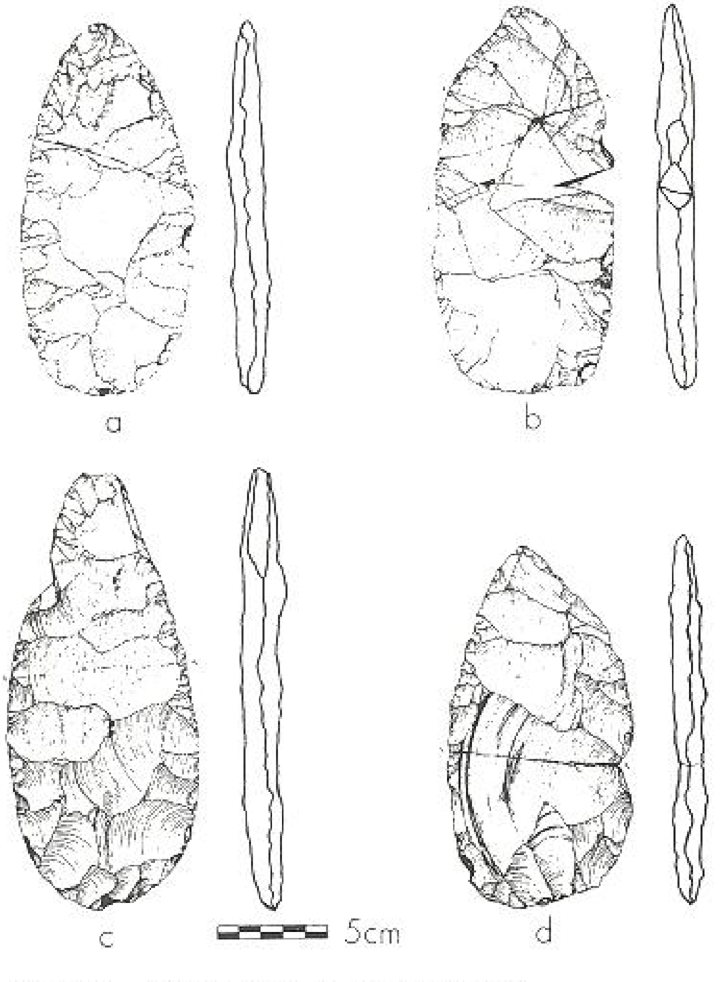


Figure 4 Sequence A, stage two bifaces.

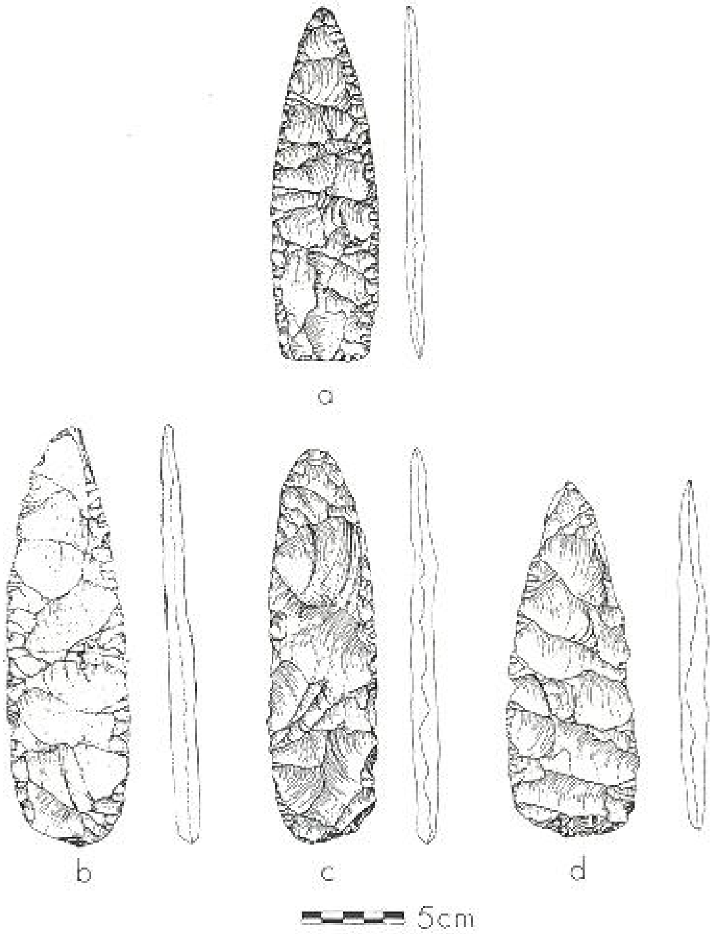


Figure 5 b, c, b, Sequence A, stage three bifaces. a, Sequence A, stage four bifaces.

CONCLUSIONS

The Simon collection includes chipped stone artifacts representing three reduction sequences: large lanceolate projectile points over 12 cm. in length, small lanceolate projectile points under 12 cm. in length, and large bifacial tools. The inclusion of various stages of reduction for the three sequences provides an unusual opportunity to study Clovis reduction strategy in the northern Great Basin.

From the first-hand account of W.D. Simon and subsequent fieldwork by Butler and others, it appears this collection represents a cache of some nature. Bonnichsen (1977) has compared several cultural features found at the Simon site to similar features at the Anzick site in Montana which was associated with human remains. He believes the Simon site, like the Anzick site, may represent a burial cache. He bases this assumption on the use of red ochre, the presence of large-scale tool forms, and the lack of associated production debitage. It is possible the sequence of large projectile points represents the specialized production of burial goods, as metric data on Clovis points from kill sites in the western United States suggests the large points from the Anzick and Simon sites are well beyond the normal size range (Gorman 1972:219). Work by Pavesic (1985) provides evidence that the practice of exaggerating scale on burial

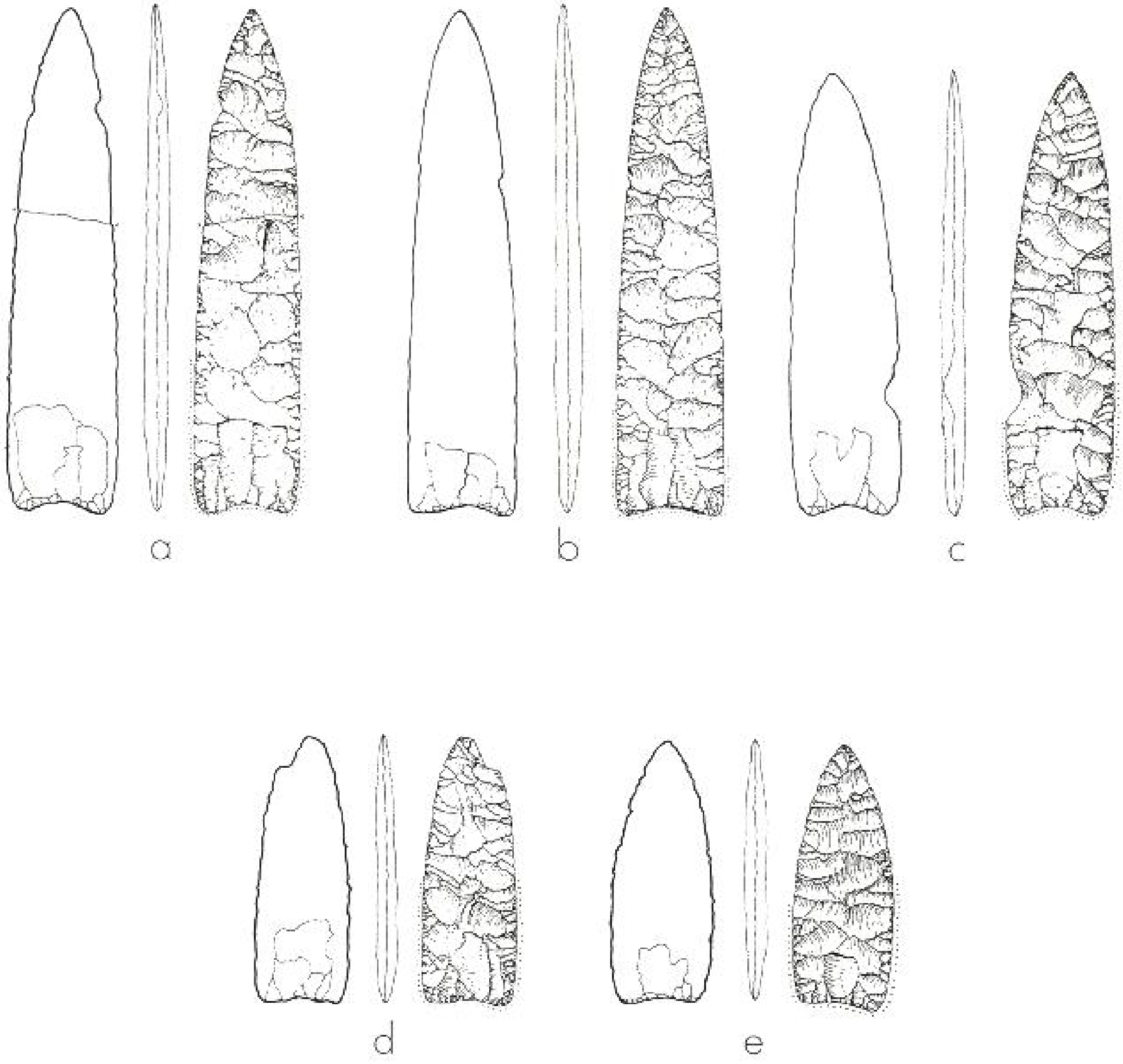


Figure 6 a, b, c, Sequence A, completed projectile points. d, e, Sequence B, completed projectile points.

goods was employed in the region during later periods. Therefore, the possibility that the two collections represent burial caches raises some doubt as to the use of these two collections alone to define a northern variation of Clovis morphology.

Technologically, the Simon collection cannot be isolated from other collections in the western United States as comparable technological analyses are not available. The Simon flintworker relied upon a reduction strategy that included production of macro-flakes, bifacial thinning, margin straightening and shaping, basal abrading, basal thinning by channel flake removal, and finally, bilateral pressure flaking. This strategy has not been defined as unique to the northern Clovis collections. Thus, comparative technological studies of Clovis materials from throughout the northern and southern region of the western United States will be necessary before regional sub-types can be effectively used in the debate between the rapid migration hypothesis vs. an *in situ* development hypothesis for Clovis presence in North America.

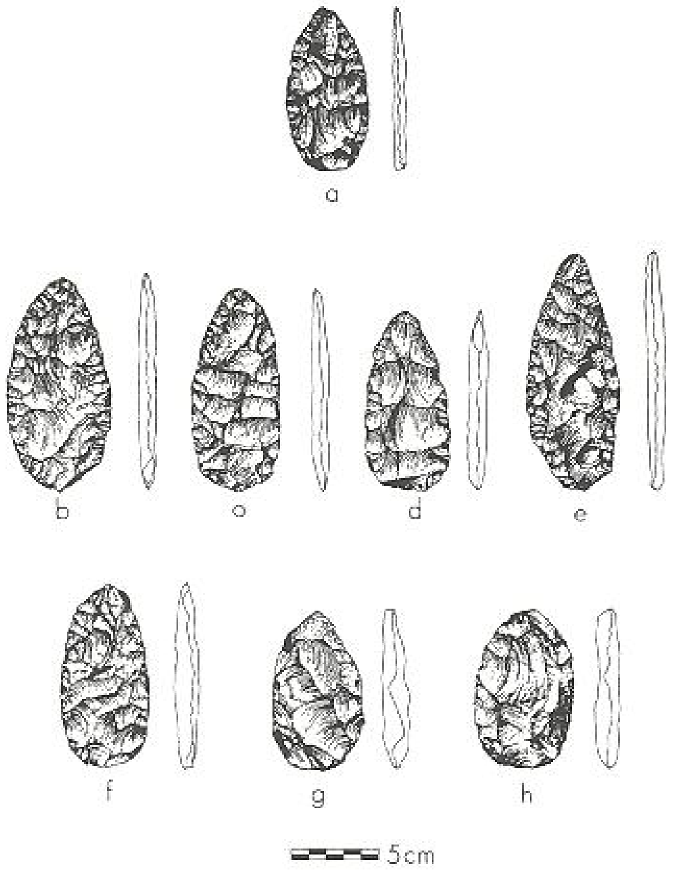


Figure 7 f, g, h, Sequence B, stage two bifaces. b, c, d, e, Sequence B, stage three bifaces. a, Sequence B, stage four bifaces.

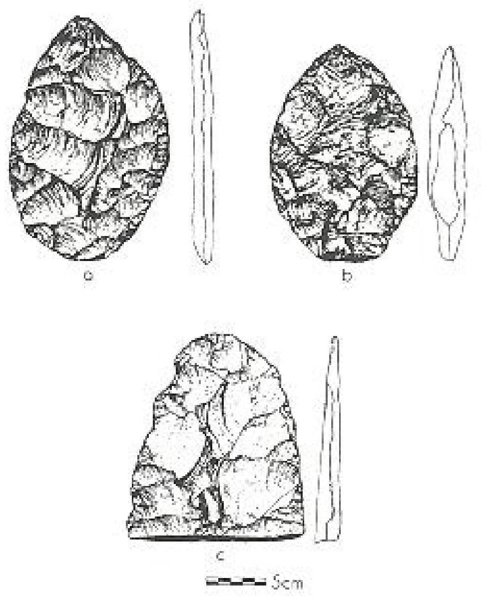


Figure 8 b, Sequence C, stage three biface. a, c, Sequence C, stage four bifaces.

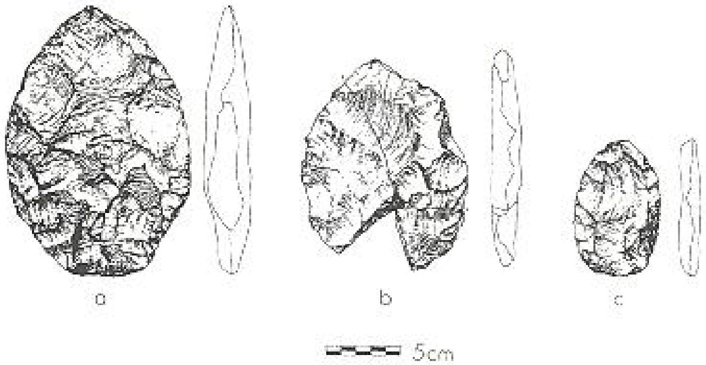


Figure 9 Quartz crystal bifaces from the Simon collection.

REFERENCES

Bonnichsen, Robson

1977 Models for Deriving Cultural Information from Stone Tools. **National Museum of Man, Mercury Series No. 60.** Ottawa.

Butler, B. Robert

1963 An Early Man Site at Camas Prairie, Southcentral Idaho. **Tebiwa** 6(1):22-23. Pocatello.

Butler, B. Robert and J.R. Fitzwater

1965 A Further Note on the Clovis Site at Big Camas Prairie, South-Central Idaho. **Tebiwa** 8(1):38-40. Pocatello.

Ford, William E.

1947 **Dana's Textbook of Mineralogy**, 4th ed. John Wiley and Sons, Inc. New York.

Frison, George C. and Bruce A. Bradley

1980 **Folsom Tools and Technology at the Hanson Site, Wyoming.** University of New Mexico Press, Albuquerque.

Gorman, Frederick

1972 The Clovis Hunters. In **Contemporary Archaeology.** Edited by Mark P. Leone, Southern Illinois University Press.

Muto, Guy R.

1971a A Stage Analysis of the Manufacture of Chipped Stone Implements. In **Great Basin Anthropological Conference 1970: Selected Papers.** Edited by C. Melvin Aikens, University of Oregon Anthropological Papers, No. 1, 1971.

1971b **A Technological Analysis of the Early Stages in the Manufacture of Lithic Artifacts.** Unpublished M.A. thesis, Idaho State University, Pocatello.

Pavesic, Max G.

1985 Cache Blades and Turkey Tails: Piecing Together the Western Idaho Archaic Burial Complex. In **Stone Tool Analysis: Essays in Honor of Don E. Crabtree.** Edited by Mark G. Plew, James C. Woods, and Max G. Pavesic, University of New Mexico Press, Albuquerque.

Sharrock, Floyd W.

1966 Prehistoric Occupation Patterns in S.W. Wyoming and Cultural Relationships with the Great Basin and Plains Culture Areas. **University of Utah Department of Anthro., Anthro. Papers** No. 77. Salt Lake City.

Young, David E. and Robson Bonnichsen

1985 Cognition, Behavior, and Material Culture. In **Stone Tool Analysis: Essays in Honor of Don E. Crabtree.** Edited by Mark G. Plew, James C. Woods, and Max G. Pavesic, University of New Mexico Press, Albuquerque.

THE REDISCOVERY OF PENCE-DUERIG AND HANGING VALLEY CAVES, SOUTH-CENTRAL IDAHO AND THE PROBABLE PROVENIENCE OF THE POTTERY REPORTED FROM THE FORMER SITE

B. Robert Butler
Idaho State University

INTRODUCTION

Unbeknownst to archaeologists working in southern Idaho in recent decades, two caves on the north rim of the Snake River Canyon above Twin Falls visited in 1937 by a crew from the forerunner of the Idaho Museum of Natural History, Pocatello, were confused with one another on archaeological site survey forms made out in 1958. The consequences of this confusion were severalfold and are discussed in the paper.

The caves in question were among several in the immediate vicinity of Devil's Creek Corral above Twin Falls, Idaho, visited by a party of students and faculty members from the Southern Branch of the University of Idaho, Pocatello, in the spring of 1937 for the purposes of collecting archaeological and zoological specimens. The party was guided by Mr. Robert Pence, one of the students. Pence, together with a friend, Mr. Jack Duerig, had been to the locality the previous autumn to visit a cave site called to his attention by a local resident; this cave was soon to be called Pence-Duerig Cave in their honor. While there, they also came across another cave site, which was soon to be referred to as Hanging Valley Cave. The names were assigned by one of the faculty members in the field party, Dr. Charlton G. Laird, Chairman of the Historical Museum Committee at the Southern Branch of the University of Idaho, who was chiefly concerned with the archaeological aspects of the field trip. The Historical Museum Committee was the forerunner of the Idaho State University Museum, which officially became the Idaho Museum of Natural History in 1977. Laird prepared a preliminary report on the archaeological findings of the field trip in April, 1937. However, a final report was not completed until 35 years later, and then by a graduate student at Harvard, Ruth Gruhn, who had just completed the excavations at Wilson Butte Cave on the Snake River Plain north of the Hanging Valley and Pence-Duerig cave sites (Gruhn 1961b).

According to Gruhn's published report (1961a:1), Pence-Duerig Cave "is located in the southern part of Jerome County, in Section 33, Township 9S (Boise Base Line), Range 18E (Boise Meridian). That is the location given on the Idaho State College Museum Archaeological Site Survey filled out by Donald L. Peterson and Alan Lyle Bryan on 8-17-58 for site no. 10-JE-4, "Shelter known as the Pence-Duerig Cave." Peterson and Bryan further state that the site is located "along the base of the east rim in the alcove above and north of Devils Corral." As is apparent from a careful reading of Prof. Laird's preliminary report, the locational information given on the archaeological survey form and in Gruhn's published report for Pence-Deurig Cave is actually that for Hanging Valley Cave. Hanging Valley is the name that Laird gave to what is now known as Devil's Corral:

> The first cave visited had no archaeological significance. The two remaining caves, which apparently have not been named and which are here called, Hanging Valley Cave and Pence-Bruger [Duerig] cave, are very close to the Snake River, perhaps three miles west of Hansen Bridge near a private fish hatchery owned by [left blank in preliminary report]. They can be reached as follows: some two miles north of Hansen Bridge the highway jogs to the right a little south of its intersection with State Highway number 25. A graded road runs west for nearly three miles before coming to a dead end a short distance from the Snake River Canyon. About a quarter of a mile north on this road is a farm house on the left through which a desert road leads to the west. At the top of a low grade while the traveler is still in sight of this farm house, the road forks. One should take the right hand road which approximately follows a power line. This desert road is said to continue on the north side of the Snake to the Jerome-Twin Falls highway. Perhaps a mile beyond the fork it passes to the north by two or three-hundred yards of a hanging valley which runs west for perhaps another mile roughly parallel to the Snake River into which it empties a little to the west of the fish hatchery mentioned above. On the south side of a horse-shoe which is the upper extremity of this hanging valley is the cave which I have called Hanging Valley Cave. This horse-shoe is surrounded by a lava rim 20 to 50 feet high and two or three hundred yards across. The valley floor is sedimentary sand and there is evidence that water has poured in considerable volume over the rim. The valley itself would seem to have carried a rather heavy flow of water as though it might at one time have been a channel of the Snake. There are two or three more lava walls in the valley floor before the valley opens out into the Snake canyon, perhaps half the way down from the level of the prairie to the present bed of the Snake. The cave in question is in a depression in the lava wall, about the middle of the southern arc of the horse-shoe at the head of the valley. It is at the foot of the cliff perhaps 50 feet high, bell shaped and seems to be the top of an old lava bubble with the front edge broken off. It is 44 feet wide at the opening, 56 feet wide inside, 25 feet deep, 5½ feet high at the center.
>
> The whole cave had been so pawed over that it seemed unlikely that little could be learned at least not without a careful and systematic search of the original stratification materials of the cave. Pictures were taken. Mr. Pence recovered some mortars and [metates] that he had cached on an earlier visit which have subsequently been placed in the museum. The most of the party was left sifting for fragments while Pence, Laird, and Hume visited another cave which had not yet been excavated.

This cave had been reported by an old-timer and rediscovered by Pence and Bruger [Duerig] last autumn. They picked up a few objects on the surface including a horn implement — probably used for dressing leather — and one shaft, but had kept the whereabouts of the cave secret. In recognition of the magnanimity [of] Mr. Bruger [Duerig] and the Pence brothers in giving the museum an opportunity to excavate the cave [it was] decided to call this the Pence-Bruger [Duerig] cave. It is perhaps three quarters of a mile west of the Hanging Valley mentioned above. Just west of a little cove in the river which lies at the base of a lava mesa rising out of the bottom of the Snake canyon. It is almost directly up the talus slope from two large Juniper trees. The canyon side here is composed of several rock walls undispersed with talus slopes. The cave is at the top of the second of these slopes at the foot of the highest of the rock walls a declevity of sixty or seventy feet. Except for a low rock wall a little back from the brink of the canyon this rock face constitutes the top of the canyon itself.

Like the cave previously mentioned this one seemed to have been a lava bubble. It is somewhat more commodius than the other. It is 57 feet wide at the opening, 46 feet deep, and 9 feet high. The actual opening however, has been obscured by considerable folds of rock which must render the cave practically invisible from the opposite canyon wall. Large rocks have fallen also within the cave particularly toward the rear. Toward the fore part of the cave they have fallen in such a way as to leave three relatively open spaces. The largest in the center is perhaps 25 feet across and 15 or 20 deep spaces to either side are 10 to 15 feet either way. The ceiling is roughly dome shaped, but the cave has very definite walls of varying height but seldom less than four feet. In the northeast corner rocks have fallen in such a way as to make a subterranean chamber four or five feet high, but quite narrow.

There remained time only to take a few pictures and to return to the Hanging Valley where a camp was made for the night. The next morning the entire party returned to the Pence-Bruger [Duerig] cave. (Dictated by Charlton G. Laird 4-9-37)

RECOGNITION OF A PROBLEM IN THE REPORTED LOCATION OF PENCE-DUERIG CAVE AND THE IMPLICATIONS THEREOF

A suspicion that Peterson and Bryan, and consequently Gruhn, might have confused Hanging Valley Cave with Pence-Duerig Cave came to me while I was reexamining the cultural identifications made of Late Period cultural materials recovered from certain cave sites in the Upper Snake and Salmon River Country. All of these materials had been referred to as Shoshonean. However, some of them, particularly those comprising the Dietrich phase in south-central Idaho, were almost certainly Fremont rather than

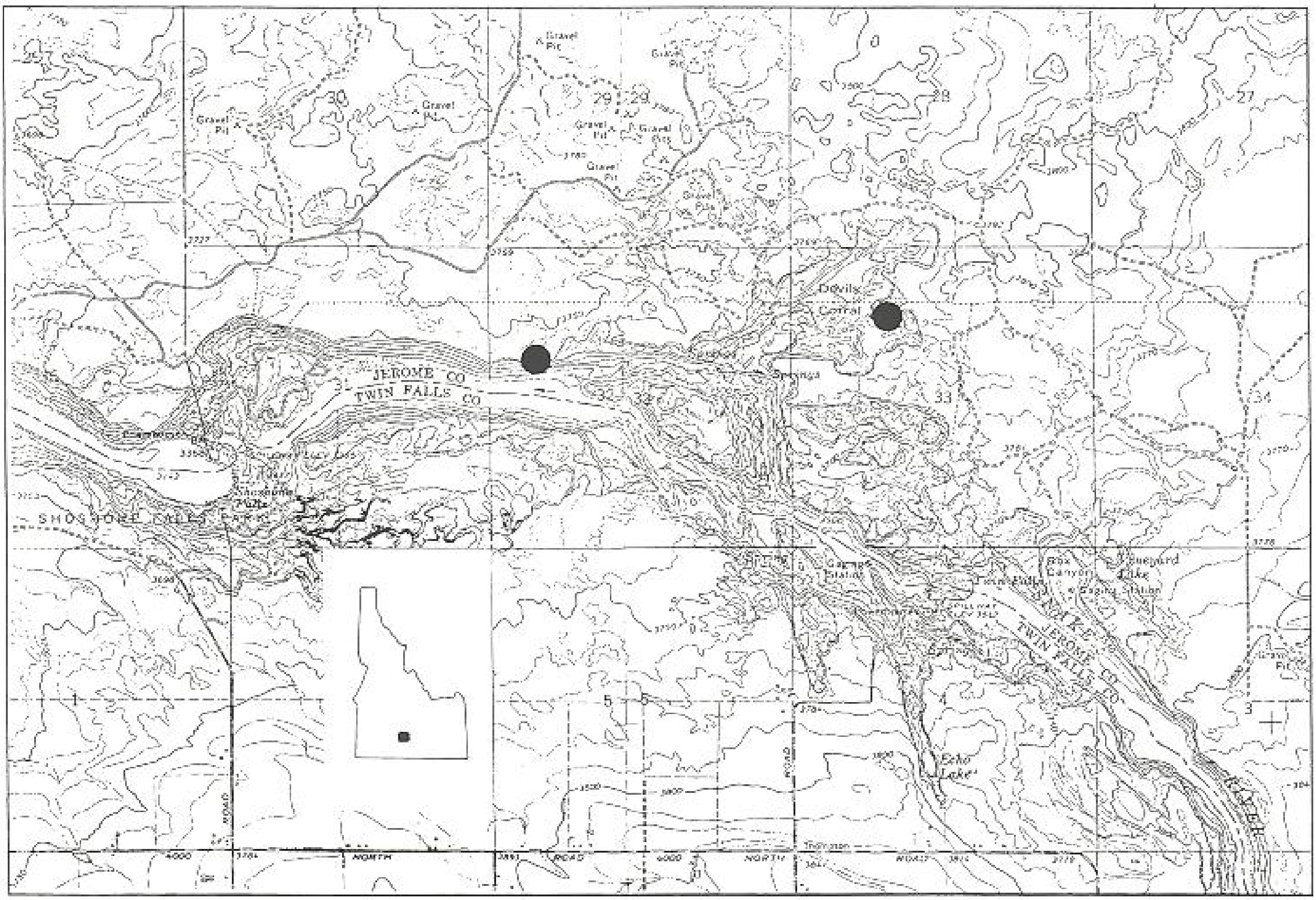


Figure 1 Map showing locations of Hanging Valley Cave (large black dot to right in Devil's Corral) and Pence-Duerig Cave (large black dot to left of center) verified in 1981.

THE SEARCH AND THE RESULTS

Armed with Laird's notes, USGS topographic maps (the Twin Falls and Kimberly 7.5′ quads), and low-level aerial photographs, Hanson, along with several of his cohorts from the Shoshone District Office, searched for Hanging Valley and Pence-Duerig Caves and eventually found both of them exactly where and as described by Laird in his preliminary report of 1937. Hanson presented a brief paper on the rediscovery of the two sites at the Annual Meeting of the Idaho Archaeological Society held at the University of Idaho, Moscow, October 3, 1981, and subsequently gave me a draft of that paper, along with photos and exact locational data on each site, for which I wish to express my deepest appreciation. The locations for the two cave sites are as follows:

Pence-Duerig Cave (10-JE-4)
T9S, R18E, SW/4 NW/4, Sec. 32
(Twin Falls 7.5′ quad)

Hanging Valley Cave (10-JE-5)
T9S, R18E, NE/4 NW4, Sec. 33
(Kimberly 7.5′ quad)

Figure 3 Photo of Pence-Duerig Cave taken in 1981. Made from a black-and-white negative of a colored slide provided by Dr. John Hanson, Shoshone District Office, BLM. Black-and-white negative and print produced by Mr. Warren Bybee, Idaho State University cinematographer.

The archaeological survey records at the Southeastern Idaho Regional Archaeological Center, Idaho Museum of Natural History, Pocatello, were adjusted accordingly as of February 3, 1982. It should also be noted that the map location and photograph shown of Pence-Duerig Cave in Gruhn's report (1961a: Fig. 1) on the artifacts collected from that site are not those of Pence-Duerig Cave; rather, they are both of the Hanging Valley site. A photo of the latter site, taken in December, 1981, is shown in Fig. 2; a recent photo of Pence-Duerig Cave is also shown in Fig. 3.

SUMMARY AND CONCLUSIONS

Because of an error made on an archaeological site survey form filled out in 1958, the location of Pence-Duerig Cave was given as that for Hanging Valley Cave, and the actual location of Pence-Duerig Cave went unrecorded. These two caves were among three examined in the spring of 1937 by a field party from the Southern Branch of the University of Idaho. An important collection of perishable and non-perishable artifacts was recovered from Pence-Duerig Cave at that time. However, no pottery of any kind was among the artifacts recovered. An analysis made of the artifacts in 1961 led to the conclusion that they were Shoshonean in origin. Later analysis of the Dietrich Phase materials suggest that these artifacts may be Fremont rather than Shoshonean in origin. One of the principal reasons given for believing that the artifacts were Shoshonean was a group of three potsherds said to have been found at Pence-Duerig Cave that were added to the Pence-Duerig Cave collection in 1961. These potsherds, of Shoshonean ware type, were found many years after the 1937 excavations at Pence-Duerig Cave and probably came from Hanging Valley Cave. A search for Pence-Duerig and Hanging Valley Caves made in the summer of 1981 confirmed the fact that an error had been made in the archaeological site survey records with reference to the location of Pence-Duerig Cave, which error ultimately led to the mistaken belief that pottery of Shoshonean ware type had been recovered from that site.

ACKNOWLEDGEMENTS

A special note of thanks is due Dr. John Hanson and his associates at the Shoshone District Office of the BLM for taking the time to relocate the Pence-Duerig and Hanging Valley Caves, and also for sharing what was learned in the process.

REFERENCES

Butler, B. Robert
1981 When Did the Shoshoni Begin to Occupy Southern Idaho?: Essays on Late Prehistoric Cultural Remains from the Upper Snake and Salmon River Country. **Occasional Papers of the Idaho Museum of Natural History, No. 32.** Pocatello.

Gruhn, Ruth
1961a A Collection of Artifacts from Pence-Duerig Cave in South-Central Idaho. **Tebiwa** 4(1):1-24. Pocatello.
1961b The Archaeology of Wilson Butte Cave, South-Central Idaho. **Occasional Papers of the Idaho State College Museum,** No. 6. Pocatello.

SHORT CONTRIBUTIONS

A CLOVIS FLUTED PROJECTILE POINT FROM SOUTHWEST IDAHO

James L. Huntley
Idaho Archaeological Society

In eastern Idaho the Early Big-Game Hunting tradition is represented by Folsom and Folsom-like projectile points found in both surface (Butler 1980), and excavated contexts (Miller and Dort 1977). Clovis points have also been found in eastern Idaho at the Simon Site near Fairfield in Camas Prairie (Butler 1963), and the mouth of the Portneuf River near Pocatello (Butler 1968b:38). While not plentiful, these early points are more common in eastern Idaho than in the western part of the state. This may be attributed to the proximity of eastern Idaho to the Great Plains geographic province where the early lancolate and fluted point traditions fourished.

Though rare, a number of early finds have been made in southwestern Idaho. These iclude an Eden point from near Bowmont a few miles north of Snake River (Huntley 1978); a small, lancolate fluted point from the Jordan Creek area (Huntley 1980), and an Agate Basin type projectile from the Owyhee Mountains (Huntley 1978). Swanson (1961) reports a Folsom point from Owyhee county, and Moe (1980) has recently described a fragmentary surface find from the Reynolds Creek drainage in Owyhee county south of the Snake River. A complete Clovis point has recently been recorded from a surface location near Glenns Ferry. (Green, personal communication). In 1982, a Clovis point was found at Alkali Springs located on Highway 95 about ten miles southwest of Marsing, Idaho (see Fig. 1).

In April of 1980, the Alkali Springs archaeological site was surveyed and test excavated as a result of the relocation of Highway 95. The survey and test excavation were under the direction of Idaho Transportation Department archaeologist Jenna Gaston (1980).

In the two years after the site was surveyed and tested, a deep fill for the new road was made just west of the site. A dirt access road runs along the north edge of the site, being part of the old French John Carrey stage road built in the early 1870s. (Huntley 1978). Run-off from the winter's snows and rains in 1982 caused erosion in the vehicle tracks of the road. Eddie Torrey and a companion observed a point fragment eroding from the vehicle track and brought it to the author who identified it as a Clovis fragment.

The Alkali Springs specimen (see Fig. 2) is fashioned from a jade-green semi-translucent agate found in the general Owyhee area. Small outcrops have been reported in the Coal Mine Basin area near the Idaho-Oregon boundary. Some of this material has dendritic inclusions, however, dendrites were not observed in the Alkali Springs fragment. The material has also been reported from the Brace Flat area in the west-central part of Owyhee county north of the Owyhee River (Plew and Woods 1981).

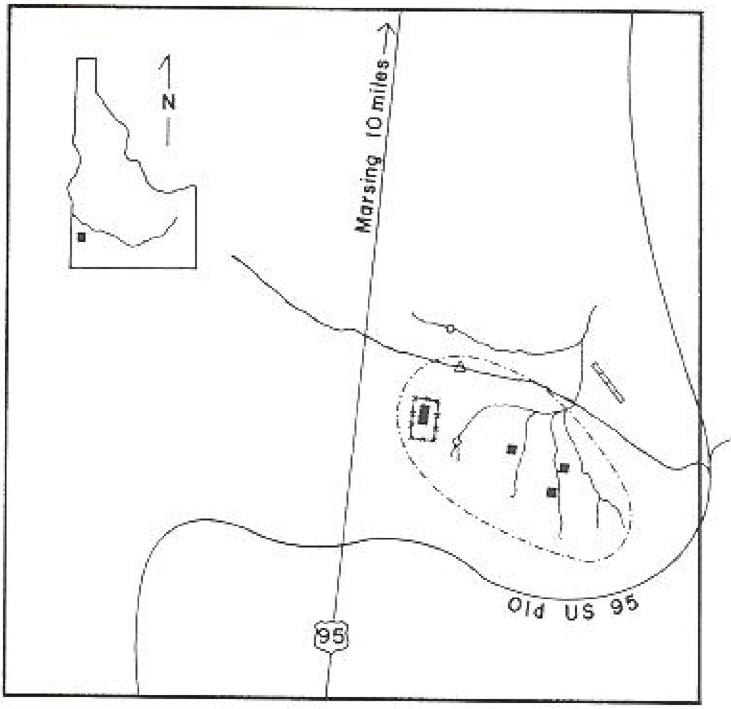


Figure 1 Map Showing Alkali Springs Location

⊸ springs
willows
+ fenced area
■ test pits
--- main campsite
dry arroyos
water trough
△ projectile point

The specimen, if complete, would have been a relatively long, thin, fluted spearpoint. The basal concavity is shallow and does not show evidence of retouch.

A single flute on the obverse face is well executed and would be approximately one-half the length of the point if the point were complete. Small basal thinning flakes of 12 to 15 mm. in length run parallel to the flute. On the opposite face, the flute is less pronounced. It would appear that two or more attempts finally achieved a short flute that ended in a ragged hinge fracture. Again, the base was thinned by one or two small parallel flakes. The specimen measures approximately 4.5 x 3.8 x .08 cm. The flutes measure 41 x 10-14 mm. and 15 x 16 mm. respectively.

Though common on the eastern Snake River Plain, finds of fluted projectile points in western Idaho have been few.

This may be ascribed to eastern Idaho's proximity to the Great Plains where the tradition is more widely represented. In this context, the recent discovery of a Clovis fluted point from the Alkali Springs site is important because it further delimits the distribution of these points in an area where the use appears to have been limited.

Figure 2 Alkali Springs Clovis Point

REFERENCES

Green, Thomas J.
1980 Personal Communication.

Huntley, James L.
1978 An Eden Point from Southwestern Idaho **Idaho Archaeologist** 3(1):2-3.
1978 Archaeological Survey of the Bridge Creek-Ditch Creek Area in Owyhee county. Manuscript in Author's possession.
1980 A Fluted point from the Jordan Creek Drainage in northwestern Owyhee county. **Idaho Archaeologist** 3(3):7-9.
1981 One Hundred and Fifteen Years of Collecting and Relic Hunting in southwestern Idaho. Its cause and effect on the archaeological record. **Idaho Archaeologist** 6(1-2):11-19.

Miller, Susanne J. and Wakefield Dort, Jr.
1978 Early Man at Owl Cave: Current Investigations at the Wasden Site, Eastern Snake River Plain, Idaho. In Early Man in America from a circum-Pacific perspective, edited by Allan Bryan, **Occasional Paper** No. 1, Department of Anthropology, University of Alberta. Edmonton.

Moe, Jeanne M.
1981 A Folsom Point from the Owyhee Mountains of Southwestern Idaho. **Idaho Archaeologist**, 6(1-2):45-46.

Plew, Mark G. and James C. Woods
1981 Cryptocrystalline Quarry Localities in the Owyhee River Country. **Idaho Archaeologist** 5(1):11-13.

Swanson, Earl H. Jr.
1961 Folsom Men in Idaho. **Idaho Yesterdays.** 5(1):26-30.

COMMENTS ON CERAMIC VESSEL WALL STRENGTHS

John S. Curtis
Idaho Archaeological Society

The following are comments and observations on two papers published in recent issues of the ***IDAHO ARCHAEOLOGIST***. They are related papers so I will consider them together. The first appears in the Volume VI, Number 3, Winter, 1983 issue and is titled "The Cone and Anvil Method: A New Technique for Quantifying Ceramic Vessel Wall Strength" by Kelly Cluer. The second one appears in Volume VII, Number 1, Summer 1984 issue and is titled "Experimental Studies in Ceramic Vessel Wall Strength" by Kelly Cluer. My comments will deal primarily with the engineering aspects of the papers since that is the field in which I am the most comfortable.

The engineering aspects of these papers and the accuracy of the analysis and of the results leave a great deal to be desired. The lack of accuracy can be best illustrated by a statement made in the fifth paragraph of the first paper under "Methods and Techniques" wherein the author states "Because the surface area of a cone is proportional to its length . . ." The surface area of a cone is actually proportional to the square of the length of the cone. The author does, however, go ahead and correctly compute the surface area of the cone. The author immediately compounds the problem when discussing the wall strength of the sherd by failing to define what is meant by "wall strength". There are many kinds of strength — compressive strength, shear strength, tensile strength, yield strength, ultimate strength, fatigue strength, creep strength, breaking strength, and the list goes on. Unless the term strength is carefully defined, confusion is sure to result. I assume from the context and further descriptions in the papers that what is meant by the author is ultimate tensile strength. Ultimate tensile strength is the maximum strength of the material in tension and for a ceramic material is probably equal to the breaking strength.

The conventional method for determining the ultimate strength of a material is to prepare a sample of the material having a known or carefully measured cross-sectional area and apply a load to the sample in such a manner that a uniform stress is induced in the sample. This means that the load vector must pass through the centroid of the cross-section of the sample. The load at fracture divided by the cross-sectional area is then the ultimate strength of the material. If an eccentric load is applied, the stress will be much higher in part of the material than in the remainder of the cross-section and a fracture will be induced in the highly stressed portion and the entire sample will fail by crack propagation. This failure will occur at a much lower load than otherwise and a false indication of ultimate strength will be obtained. The ultimate strength obtained for a brittle material using an eccentric load could differ from the actual ultimate strength by as much as a factor of ten. Stress concentrations can also cause grossly erroneous results. A stress concentration can be caused by a small void in the material or a notch or a crack and a very small flaw or notch can cause the results to be in error by as much as a factor of ten in a brittle material. For example, notice how easily a piece of window glass can be broken when a stress concentrating notch is placed in the glass by a glass cutter.

If we consider the manner in which the reported tests were conducted, we see that the load was applied very eccentrically and when applied a very sharp stress concentrating factor was introduced into the material being tested. The combination of the eccentric load and the stress concentration introduced is enough to completely invalidate any results obtained. The computed load must be that force which is normal to the plane of the fracture. The author computes the force on the surface of the cone when it is the force normal to the plane of the fracture which is important. The force normal to the surface of the cone must be resolved into a force normal to the fracture plane to be correct. Further, the wrong area is used to determining the ultimate strength. It is not the area of the surface of the cone which is important but the fracture area which should be used in the determination of strength.

It is difficult to understand what is being measured by these tests. It is not ultimate strength. It is my opinion that what is being measured, and perhaps reasonably well, is hardness. The method used is a standard technique for measuring hardness, although conventionally, the tests are not run to failure. Since hardness and ultimate tensile strength bear a consistent relationship to each other, the tests may have some validity. If the results were described as a strength index or a Cluer index or given some other designation, many objections would be removed.

To illustrate my contention, Kent's Mechanical Engineers Handbook of Design and Shop Practice eleventh edition gives the ultimate tensile strength of aluminum as 9000 psi with various alloys of aluminum running in the vicinity of 20,000 psi. The ultimate tensile strength of cast iron is given as being in the range of 42,000 to 48,000 psi. In Cluer's first paper, sherd wall strengths of up to 108,000 psi are reported and in the second paper wall strengths of up to 80,000 psi are reported with the average wall strength being 24,000 psi. When these values are compared with the strength of cast aluminum and cast iron it does seem that the sherd wall strengths reported are unreasonable.

Several items in the second paper deserve comment. Table 1 is listed as a table of data yet it contains a column headed "Wall Strength". Wall strength is not an item of data but is a contrived figure based upon other items which were measured but not included in the table. Figure 3c shows a regression line on a scattergram. I am unable to duplicate the regression line and find that another fits the data better. Figure 4 and the discussion which explains it appear to be inaccurate. I see no reason why wall strength cannot increase with decreasing size. It does for glass fibers and I suspect that it would for a ceramic as well. Wall strength has to this point in the paper meant unit strength, not overall strength. It is dangerous to use the expression "it is obvious" in a technical paper as the author does in his conclusions. That which is obvious to one may be profoundly mysterious to another, or even wrong as in this case.

CERAMIC VESSEL WALL STRENGTHS: A REPLY TO CURTIS

J. Kelly Cluer
University of Arizona

Respectfully acknowledging John S. Curtis' comments on my recent papers dealing with the cone and anvil method of determining ceramic vessel wall strength (Cluer 1983, 1984), I will certainly admit to their "engineering" shortcomings. However, the papers were meant to treat the subject of ceramic archaeology in a very experimental way. In the initial stage of these experiments I did receive advice from professional engineers; however, they are not to be held responsible in any way for the contents of the papers. I would like to address some of Curtis' comments.

First, Curtis disagrees with my statement that surface area on a cone is proportional to its length (Cluer 1983:11). The word "proportional" does not in itself imply any scaling factor and is therefore a general term that can be used to describe many different numerical relationships. Curtis incorrectly specifies that surface area is proportional to the **square** of the cone's length. There are no squared terms involved in the calculation of lateral surface area on a cone (Nielsen 1962:105).

Curtis makes an issue of the alleged lack of definition regarding my wall strength term. Wall strength was clearly defined (in p.s.i.) as pounds of load on the system divided by the surface area of the cone in contact with the sherd at time of fracture (Cluer 1983:11). "Wall strength" as used here was not necessarily intended to coincide with any conventional engineering term because this project was highly experimental in nature and had no direct engineering analog.

The fact that there is no conventional engineering technique for measuring wall strength comparable to the cone and anvil method brings me to Curtis' third major point (in his third paragraph) in which conventional techniques with which he is familiar are compared to certain aspects of the cone and anvil method. This paragraph is eloquently written yet it precisely illustrates why I undertook the cone and anvil experiments. Simply stated, prehistoric ceramics are not amenable to conventional (engineering) "strength" measuring techniques because 1) they are always made of inhomogeneous materials, 2) they never have a perfectly smooth surface, and 3) they are always an irregular shape. Curtis mentions "preparing" the sample which presumably means trimming the sherd's three dimensions to known quantities (which would alleviate problems 2 and 3 above). However, this is undesirable because we are looking for a non-destructive technique. Sherds fractured by the cone and anvil are easily restored to their original condition. But if all three dimensions are trimmed the sherd loses its identity and archaeological significance to future students. "Eccentric" loading is no doubt a theoretical problem, but perhaps a problem we can live with for now.

In paragraphs three and four Curtis mentions the problem of "stress concentration." Again, I'll admit that this is a theoretical problem. However, how can we eliminate stress concentrations in a ceramic paste which is full of (as just one example) irregular quartz grains?

In reference to paragraph five, a measure of wall strength — defined as the load on the system divided by the surface area of the cone in contact with the sherd at moment of fracture — is what is being determined, not hardness. Here Curtis states that hardness and tensile strength bear a consistent relationship to each other. This statement is very misleading. Consider the following two examples. Three materials arranged in order of increasing hardness accompanied by average tensile strength values: nylon - 5,100 kg/cm^2; aluminum - 2,040 kg/cm^2; and granite - 175 kg/cm^2. This illustrates a nice inverse relationship between hardness and tensile strength. Three more materials, also listed in order of increasing hardness and with accompanying tensile strength values: wood (pine) — 410 kg/cm^2; brass - 2,550 kg/cm^2; and steel - 5,100 kg/cm^2. This example would lead one to believe there was a positive relationship between hardness and tensile strength. The point of this digression is to demonstrate that there is no "consistent" relationship between hardness and tensile strength. (Tensile strength values taken from Baker and Costa 1981:120 and Giancoli 1980:106). Curtis then correctly points out, however, that the experiments were run to sherd failure. That failure is the basis of the experiments and indeed constitutes a measure of strength.

I concede to Curtis' request that the wall strength term be called an "index" and will use the term "wall strength index" from here on. In so doing I will also drop the units (p.s.i. or kg/cm^2) from the index values. I would also like to make explicit that "vessel servicability" (Tony Martin, as cited in Cluer 1983:14) is conceptually equivalent to the wall strength index as used here.

The comparison of cast iron and aluminum tensile strength values to my wall strength index values (Curtis' paragraph seven) is invalid because my definition of the wall strength index is not comparable to conventional engineering strength tests (Curtis' paragraph three); the two sets of values are completely different derivations. Again, "p.s.i." should be dropped from my quoted wall strength indices.

At the beginning of paragraph eight Curtis objects to my use of the word "data" (Cluer 1984: Table 1). This is basically a disagreement on writing style and I am not compelled to address that comment. In the same paragraph he mentions difficulty in reproducing the regression line of my Figure 3c (Cluer 1984). There are several ways to regress data points to a linear form. Here a conventional SPSS (as cited in Cluer 1984:14) least squares regression formula was used. However, the low correlation coefficient and dubious significance factor (Cluer 1984: Table 2) may suggest that there is no unique best regression for the points. Further, when points are highly uncorrelated different regression techniques may result in very different regression lines through the same data set.

Also in paragraph eight, Curtis writes that my Figure 4 (1984) is wrong in its modeling of hypothetical wall strength. His reasoning relies on an analogy to glass fibers — an almost completely homogeneous material. I am not convinced that the "wall strength" of glass fibers increases with decreasing "size" (diameter?). But even if that is the case it is irrelevant because glass fibers cannot be compared to prehistoric ceramics: glass fibers are homogeneous and fired to complete fusion; prehistoric ceramics are very inhomogeneous, both texturally and thermally, and were seldom fired to complete fusion.

To demonstrate the effects of textural inhomogeneity on the wall strength index, or vessel servicability, I have sketched some hypothetical pot sherds in cross section

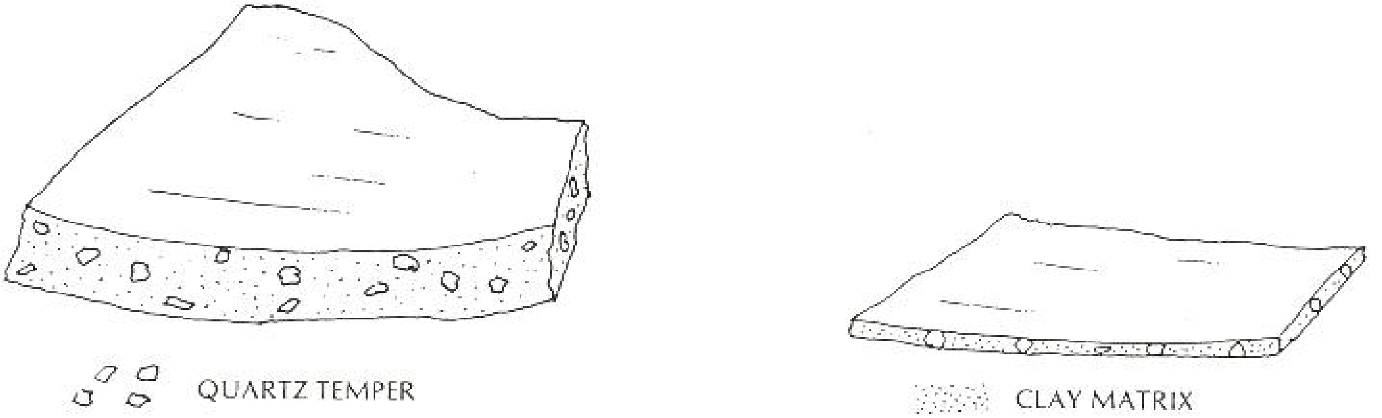


Figure 1 Schematic cross sectional views of a thick and thin sherd. Temper in the thick sherd has relatively little influence on the structural quality. In the thin sherd temper diameter actually exceeds the wall thickness and imparts a noticable weakness to the structure.

(Fig. 1). For simplicity imagine that these sherds are composed of a clay matrix with poorly-sorted quartz grains as the tempering agent (a common composition). In a relatively thick sherd the temper will cause stress concentration but not enough to affect the integrity of the piece. For a very thin section, however, the temper diameter can exceed the average wall thickness. Where temper particles intersect both wall surfaces there is essentially no strength because quartz does not fuse with clay at presumed prehistoric firing temperatures.

Thermal inhomogeneities involve differential thermal expansion, temperature phase changes, etc. in the multitude of mineral grains comprising a pot sherd. A full evaluation of these factors is beyond the scope of this reply but to illustrate one possible situation, consider the thin sherd in Figure 1. When two different minerals are directly adjacent to one another and the integrity of the sherd at that point is a function of their mutual bonding, or adhesion, their thermal properties become very critical. Some tempering minerals may contain significant water in the crystal structure of their low-temperature phase. Upon rapid heating that trapped water may burst, disintegrating the mineral grain and significantly fracturing a thin wall so that the entire structure is weakened. Thus, there is a practical lower limit on wall thicknesses that will produce a servicable vessel.

Finally, I am pleased to have the opportunity to respond to comments on my wall strength papers. As I stated in the conclusions of the 1983 paper, much further research needs to be done in this area of experimental archaeology. The techniques I described are certainly subject to major modification as new ways are found to analyze prehistoric ceramics. It is through constructive criticism by responsible workers aware of the engineering and practical aspects of these analytical systems that true progress will be made.

REFERENCES

Cluer, J.K.
1983 The cone and anvil method: A new technique for quantifying ceramic vessel wall strength. **Idaho Archaeologist** 7(1):9-14
1984 Experimental studies in ceramic vessel wall strength. **Idaho Archaeologist** 7(1): 9-14.

Costa, J.E., and V.R. Baker
1981 **Surficial geology.** John Wiley and Sons, New York.

Giancoli, D.C.
1980 **Physics, principles with applications.** Prentice-Hall, Englewood Cliffs, New Jersey.

Nielsen, K.L.
1962 **Mathematics for practical use.** Harper and Row, New York.

INDEX TO THE IDAHO ARCHAEOLOGIST, VOLUMES I-VII

Fred M. Sanger
Idaho Archaeological Society

Beginning with Volume VII, the *IDAHO ARCHAEOLOGIST* was published twice each year. The previous volumes, I-VI, were quarterly publications, though four issues were not published in each of the preceding years. In this context, Volumes I, II, III, V and VI are incomplete. Further, Volume IV was published in 1980 and 1981, while Volume V was published in 1981 and 1982. Only papers, reports and short notes are included in the index.

Vol. I, No. 1

Page No.

Vol. I, No. 2

Vol. I, No. 3

Vol. II, No. 1

Vol. II, No. 2

Vol. III, No. 1

Vol. III, No. 2

Vol. III, No. 3

Vol. IV, No. 1 July 1980

Vol. IV, No. 2 Fall 1980

Vol. IV, No. 3 Winter 1981

Vol. IV, No. 4 Spring 1981

Vol. V, No. 1 Fall 1981

Vol. V, No. 2 Winter-Spring 1982

Vol. V, No. 3 Summer 1982

Vol. VI, No. 1-2 Fall-Winter 1982

Vol. VI, No. 3 Winter 1983

Vol. VII, No. 1 Summer 1984

Idaho Historical Society
610 North Julia Davis Drive
Boise, Idaho 83706