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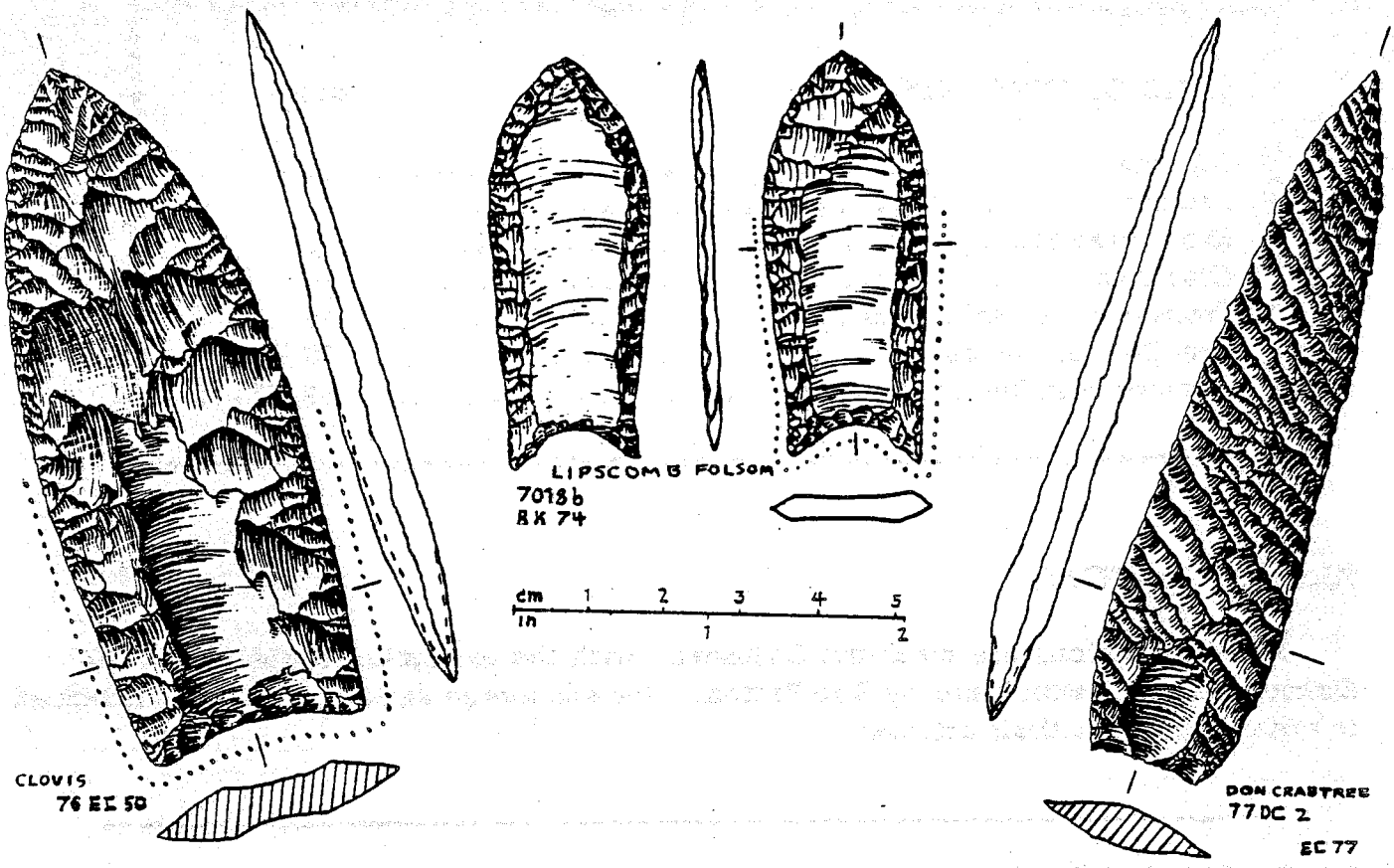

FLINTKNAPPERS' EXCHANGE

A NEWSLETTER OF, BY, AND FOR LITHIC TECHNOLOGISTS

EDITORS
Errett Callahan
and
Jacqueline Nichols

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WASHINGTON, DC 20064

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THE ILLUSTRATIONS

All illustrations are by Errett Callahan, with the exception of those in "The Denver Series," which are by Bob Patten. We encourage authors to submit finished ink drawings with their articles.

PAPERS FOR FLINTKNAPPERS' EXCHANGE

We invite papers and articles on any aspect of lithic technology. Papers may be sent to either editor two months prior to publication. Publication is on or about the first of January, May, and September.

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Jacqueline Nichols
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Washington, D.C. 20064

EDITORIALS

From the steady stream of orders we've received since our first issue came out, we can say that the response to Flintknappers' Exchange has been most encouraging. Thanks to all of you from both of us.

Now that we are bringing together flintworkers from across the country and around the world, I've been wondering what effect this will have on variability of knapping style. It seems to me we have a dilemma here. In attempting to coordinate the wide variety of lithic techniques being practiced around the country, many by independent invention, we may be on our way to creating a unified neo-tradition in lithic reduction which will erase variability of technique--at least, to a degree. And I'm not so sure that this is all for the good.

Having worked my first ten years in a

vacuum, without seeing another knapper of any competence at work, I evolved a number of unique holding positions and reduction strategies, all of which could apply to the archeological record. Since that time I've seen a number of other 'self-taught' knappers who have evolved unique and 'non-conventional' means of working. Some of these are our commercial knappers who work in a vacuum as a matter of choice. I admire their creative efforts and dogmatic stand against conventional methods and techniques.

In short, those of us who are willing to learn from others must not be overly eager to give up our own pet ways of working just to imitate another who is working in an "accepted" manner and who may be farther on down the line skill-wise. Superior workmanship may be due to increased perception of the mechanics of flint fracture, the use of and familiarity with a particular stone or stone working tool material, increased motor control due to greater exposure over time, or to factors other than technique. I would urge the knapper to try far-out and off-the-wall techniques, to stick with them until he really knows their limitations, and not be too eager to abandon individuality. As Don Crabtree, J.B. Sollberger, and others have noted, we may have only scratched the surface in pinning down all the potential ways of producing flaked stone tools and associated debitage.

On the other hand, if change is noticed among flintworkers as a result of the coordination engendered by this publication, it should be of some consolation to know that the change was not contrived, as if to fit some academic situation. Change will have resulted from the respect for and imitation of another knapper's work habits.

This kind of change should be reflected in the knapper's debitage over time. In light of this, I would suggest that flintknappers keep notes on where they create debitage, when they worked there, what materials they used, and what techniques and holding positions they used at the time. A few photographs of the knapper at work could easily document knapping techniques. In addition to providing records which could lead the way to studies of culture change in the knapper's debitage, this information could serve to prevent confusion over the future archeological record of that site.

Unlike traditional archeologists, flintworkers create rather than destroy sites. To prevent confusion, I have made it a practice of assigning a site number to all areas where I work. I save samples of the rock I use, bagging it along with my records. I use a system similar to the standard archeological practice, except that I use a letter rather than a number for the terminal digit. Thus 44-KW-D, the Pamunkey Indian Village site, is the fourth (D) experimental site recorded in King William County (KW) in Virginia (44). (See Bonnichsen, this issue, "Craftsman", for an alternate practice.)

Errett Callahan

Bill Starna's very important letter (see LETTERS, this issue) expresses the dissatisfaction felt by archeologists with flintknappers' work to date. This dissatisfaction is reciprocated, and the hiatus he notes is real. Many archeologists approach flintknappers as sample-producing machines. What archeologists then turn out is expressed in statistical statements which do not seem to flintknappers to have anything to do--or, at least, much to do--with their craft.

We--the editors-- fall into these opposing camps, and we have to go to a lot of trouble to explain things to one another. Errett is probably looking at more statistics than he cares to, and I have reluctantly come to realize that my most clear-cut,

my most elegant results, are not my most useful. However, we have established that Errett's staging strategy can be represented mathematically in a way that we think will interest flintknappers; and we have found that we can assign probabilities to flake sizes, which will be of interest to archeologists. In other words, we think this gap is well worth the effort in bridging it.

During the next two years we will be making a specific effort at bringing archeologists and flintworkers together. Flintknappers' Exchange will be sponsoring a series of regional knap-ins, so that flintknappers can get together in their regions, and archeologists can attend and pose problems to the knappers. We would appreciate our readers writing to us--just a postcard--to let us know the regions where you would be able to attend (Southwest, Mid-Atlantic, Great Basin, Plains, etc.). Please include on the postcard your name, address, affiliation (if any) and any two regions. If you have any thoughts on a format for the knap-in that you would like to share with us, we'd like to hear them. We reiterate: this is not an academic journal, it is an exchange medium.

Jacqueline Nichols

LETTERS

Only this noon hour during break I was perusing Flintknappers' Exchange and thinking that this is what I had been hoping for for many years now but never expected to become a reality. Congratulations on taking up the challenge, and I speak from experience, since I have personally published a small bi-monthly on another topic since 1965 and I know the pressures which come to bear on the editor.

George Bradford, Cambridge,
Ontario, Canada

* * * *

I think Flintknappers' Exchange would be a good idea...One interesting thing would be, in that way, to make a kind of flintknapper's club, international. I think I know most of them, however, last time I was in the States I discovered one or two I did not know. Among them Sollberger. Bien amicalement.

Francois Bordes,
Bordeaux, France

* * * *

I like the idea of your newsletter. I agree that there is a hiatus between the flintknappers and others in the field, and I would hope it could be lessened. I have often felt that a lot of what flintknappers do was dead-end. I could not see the direct application--and it seemed to me that decimal points were being added to data that didn't really make it any more useful...There are all sorts of interesting problems that can be solved by flintknappers, however. I, for one, would like to see as definitive a paper or statement as possible regarding how one can differentiate geofacts from artifacts...I think what you are doing is critical.

William A. Starna
SUNY Oneonta, New York

* * * *

Congratulations for a super publication. It has great potential and will be a major contribution to archeology.

Don Crabtree
Kimberly, Idaho

* * * *

I was intrigued to receive Volume I, No. 1 of Flintknappers' Exchange. It is an important publication that you are undertaking...You may be interested in knowing that we will be developing our first workshop in flint knapping as part of the 1978 summer archeological field school to be held at the Kampsville Archeological Center. At a later date, we will send you information on this...and perhaps we can contribute an article to a future issue...Good luck on the important venture that you are undertaking.

Stuart Struever, Northwest U.
Evanston, Illinois

* * * *

I just received the first issue of Flintknappers' Exchange in time to refer to it in my reply to comments on my Current Anthropology article, "A History of Flint-Knapping Experimentation, 1838-1976". The article will appear in the July issue and I would be happy to send reprints (when they arrive) to any of your readers who do not subscribe to CA or have easy access to it...May you enjoy many stimulating years of publication!

Lucy Lewis Johnson, Dept.
of Anthro. and Sociology
Vassar College
Poughkeepsie, N.Y.

* * * *

The newsletter Flintknappers' Exchange is a fantastic idea to fill a real need that up to now has been ignored. So I'm sending in my $5.00 for a year's subscription with enthusiasm and hope to send in some information from my own experiments and activities as time permits.

John Fagan,
Portland, Oregon

* * * *

Many thanks for an impressive and most interesting first issue of Flintknappers' Exchange.

John Pfeiffer
New Hope, PA.

* * * *

Well done!!...I only hope that my enthusiasm is not the exception and the newsletter continues the purpose and standards established, reaching out to excite, involve, and encourage those unheard voices whose ideas, techniques, and experiments need a vehicle for expression.

Jack Cressen
Moorestown, N.J.

* * * *

The Flintknappers' Exchange is a great idea and sorely needed...communications are difficult at best and this should help get ideas available and, more importantly, make a wide range of criticism available to researchers...I really feel the Flintknappers' Exchange will serve a badly needed service. Try to keep it simple and straightforward.

Bruce Bradley
Tucson, Arizona

* * * *

I've just received my 3rd letter...from Sollberger for a total of 18 pages of correspondence, so what little effort that has gone into FE has been well rewarded from my point of view. It is interesting to note that while many of our concepts are the same there has been a considerable amount of dialogue settling differences in terminology and explicitly defining terms.

Bob Patten
Lakewood, Col.

* * * *

experimentation

We start off this section this month with a suggestion for a "tip-sheet", and follow with just such a tip from J.B. Sollberger. Such "tips" are welcome in this section. Next, we include some comments on previous submissions to this section. Finally, in response to several requests for advice to the novice, we are printing/re-printing two papers written expressly for beginning knappers.

A SUGGESTION

I have some suggestions for F.E.: I thought it might be nice if you included a "Reading Materials Listing Section" for special topics (e.g. beginning in lithics, special techniques, etc.) or maybe in just a general format. Also, maybe a "knapping tips section", if anyone would provide the tips on certain procedures, etc.

Mark Dubuc
SUNY Albany, New York

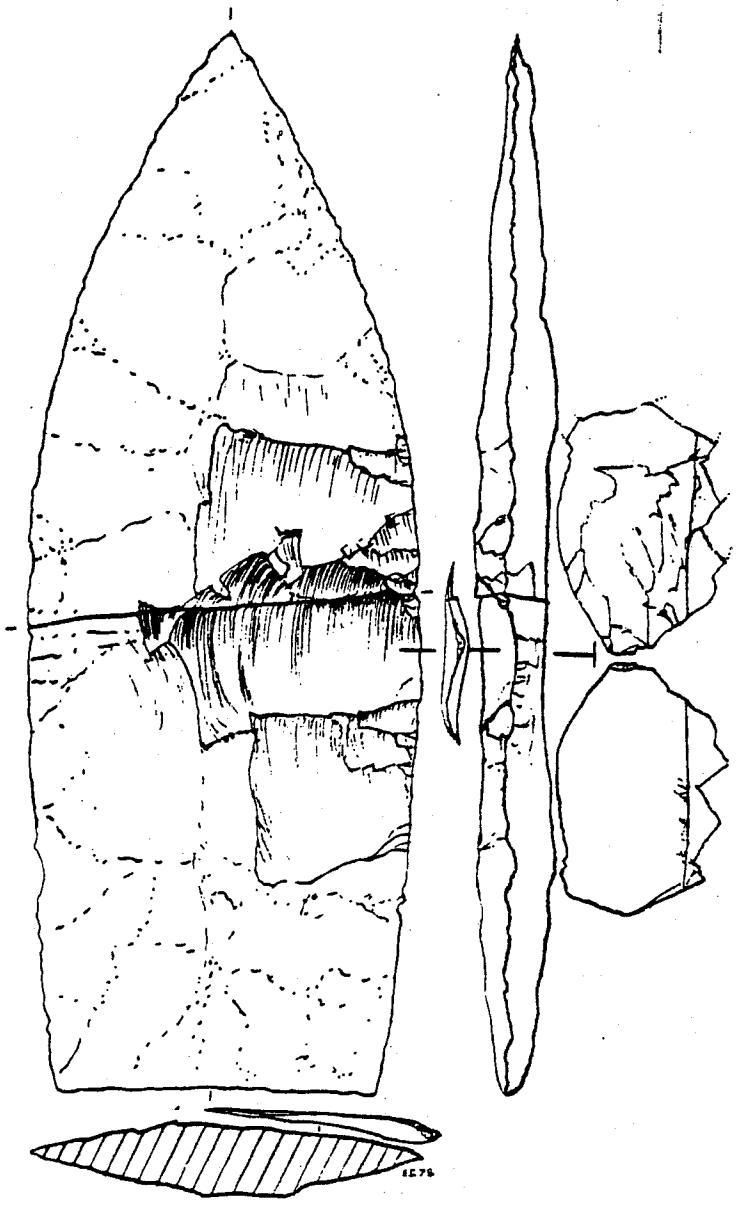
* * * *

SAVE THOSE BROKEN BIFACES

Flintknapping is done to regain the lost prehistoric stone age skills and methods for fabricating tools. Both the novice and the journeyman can profit in this research for the price of a bottle of Elmers Glue. Some of the newer miracle adhesives may be still better.

After suffering an experimental platform, over-strike, don't cast the work aside. Glue the halves back together and set the piece up to cure for about 10 days. Then, resume your experiment.

I have done this on dozens of large bifaces with great success, some may come apart after a few billet blows but many will hold together. The fractures pass right thru the glue-joint--not always of matching thickness,--but consider the flint, chert, and experience gained. I can vouch for reasonable success on multi-grades of



Biface broken in manufacture, reglued, and reflaked across glueline.
J.B.S. 1978

Flintknappers' Exchange 1(2): 1978

flint and chert but have not used glue on other stones.

Happy savings to you,

J.B. Sollberger
8515 Forest Hills Blvd.
Dallas, Texas 75218

* * * *

MORE ON SYNTHETIC BILLET MATERIAL

Following our piece on "Synthetic Billet Material" in FE 1:9-10, we received requests for information on where to obtain phenolic resin rod. We wrote Synthane-Taylor and received the following response:

Dear Mr. Callahan:

Please refer to your recent letter concerning our Grade CE molded Synthane rod.

Let me explain that the plastic supply houses throughout the U.S. would be located in major cities, so that many of your colleagues will have to place mail orders. Secondly, these supply houses may not be interested in cutting a 12" length from a 48" long rod. An added hazard would be that inadvertently they would fill an order with a non-molded rod form.

Synthane-Taylor is not equipped to service small purchases of the type that "Flintknappers' Exchange" subscribers would make. As a result, I have arranged for a craft supply firm in Baltimore, Maryland to accept mail orders for the rods 12" long. The price for the 2" diameter will be $16.00 ea. and the 1" diameter $4.00 ea., both plus shipping costs to destination. Purchases from this firm will assure that the product is identical to that supplied for your evaluation and that worked well.

I won't go into the details that Mr. Doehler would impose on mail order business, but I am sure a bank check or a postal money order with nominal transportation charges included would expedite a shipment and avoid the delay caused by the time period for personal checks to clear. Personal checks would be accepted, but expect 7 to 10 days before shipment could be made. A 2" diameter tool would weight 2 lbs., and 1" diameter .5 lbs.

Lloyds Hobby Shop
1012 York Road
Towson, Maryland 21204

Mr. Joseph P. Doehler
301-821-6070

I trust this approach will be satisfactory to you.

Yours very truly,

Synthane-Taylor Corporation

Robert L. Cobb
Director of Engineering

* * * *

FURTHER COMMENTS ON HARD HAMMER PERCUSSION

In the section on Experimentation dealing with cushioned percussion, Bob Patten explains how a hard hammer percussor can be used to provide essentially the same kind of flaking characteristics and functions as soft hammer (billet) flaking.

Although the technique he describes seems both adequate and useful, I have some comments and contributions to include that I feel will give even more freedom and variability to the hard hammer flaking process.

For the past two (2) years I have been working on the specific aspects of hard hammer technologies here in the lower Delaware Valley of N.J., where it seems in the Archaic stage, this was the predominate method of stone tool reduction.

I base the above statement on the

Archaeological Record, the results of my research and products of experimentation.

Although flake morphology with hard hammer percussion can be equivalent to billet percussion techniques, the one characteristic that is a clue to the difference, is the degree of platform preparation required in each. Obviously because of the density and texture of rock hammers, platforms used with this type of flaking must be more carefully prepared and stronger. (Archaeological Record should bear this out.)

Another consideration is the material type used in this process. Personally I've found the same kind of variabilities and subleties that are required with billet flaking on different materials the general rule with hard hammer techniques.

My experimentation has produced several differences in cushioned percussion flaking that may be useful and significant. Instead of using your thigh as the cushion, insert a soft, reasonably durable material between the biface and your leg to act as the cushion. Initially, I used an old discarded wool throw rug about 1-1/2" thick that worked very well but was a little cumbersome and of course not in keeping with the reality of the aborigional situation. True to the situation, a small flaking pad (12" x 6") can be made of soft hide, stuffed with animal fur, hair or similar organic material to produce the necessary cushioning effect. Consult the editor, his is the model after which I made mine.

Other effective aspects of the hard hammer technique are the abrasive qualities of the stone in use, as well as the facets which are formed from the process. Any granular stone is a more efficient percussor because the surface is abrasive and provides a pulling action simultaneously as it transmits the force, as with billet flaking. Also facets provide a variability of surface shapes to use for the decision making process of flake removal.

Another technique that I use is to hold the hammerstone between the thumb, index and middle fingers. I suspect many of you utilize this in billet flaking but it works equally well with hard hammer percussors. (Credit goes to Errett Callahan for my knowledge of the above.)

If any of the subscribers, as well as Bob Patten, are doing research on hard hammer percussion, I would be interested in hearing about your techniques and especially the findings on the morphologies of flake attributes, hammerstones, and materials used.

Jack Cresson
40 E. 2nd Street
Moorestown, N.J. 08057

* * * *

HARD HAMMER-SOFT HAMMER: AN ALTERNATE EXPLANATION

In the past few years I have become increasingly dissatisfied with the use of the terminology hard and soft hammer percussion as infered from specific flake attributes. It seems to me that the effect has been well described but that the cause has been generally misinterpreted. It is my contention that the characteristics that we observe on flakes and interpret as "hard" hammer (pronounced bulb, large platform, etc.) or "soft" hammer (salient bulb, small platform, etc.) are the result of the placement of the area of applied stress in relation to the margin from which a flake is removed. When a flake is struck with a non-marginal area of applied stress (the area of contact is not intersected by a margin) then a flake that has "hard hammer" characteristics is produced. Conversely when a flake is struck that has a marginal area of applied stress (the area of contact is intersected by a margin) then "soft hammer" flake characteristics result. (See Figure 1 and Figure 2)

In recent studies many knappers have tried to point out that the nature of the

Figure 1

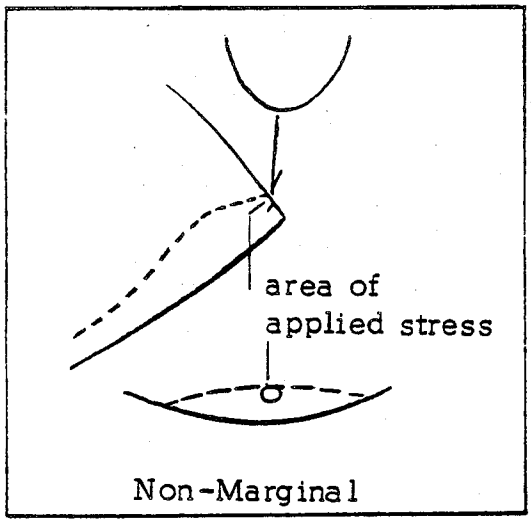
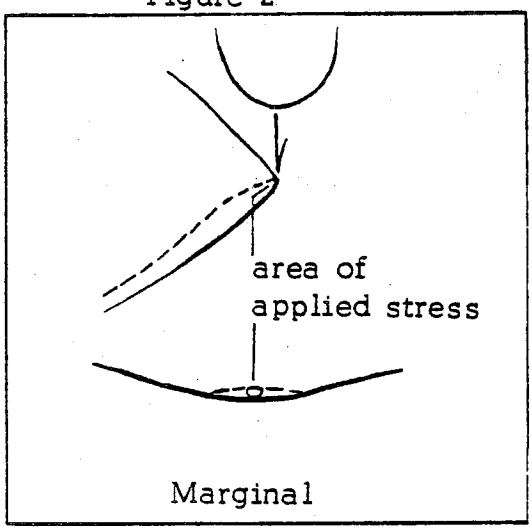


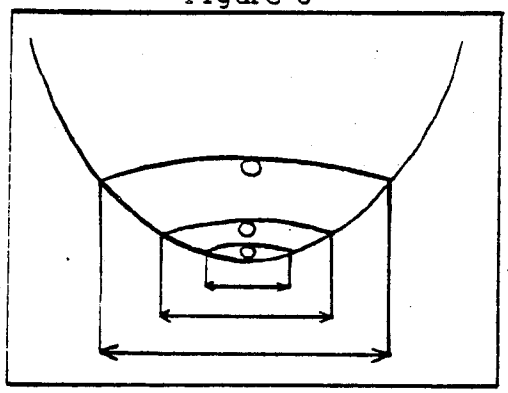
Figure 2



percussor (hard or soft) is not always possible to determine by looking at flake characteristics. Their experiments have indeed seemed to demonstrate this premise, however, they have failed to note the correlation between impact area and flake characteristics.

It seems to me that a disproportionately large amount of energy used in the production of a flake is consumed in the initiation of the fracture. In most cases the further back from a margin a flake fracture is initiated, the more energy is used in its initiation (because of the increased platform breadth.) (See Figure 3 below).

Figure 3

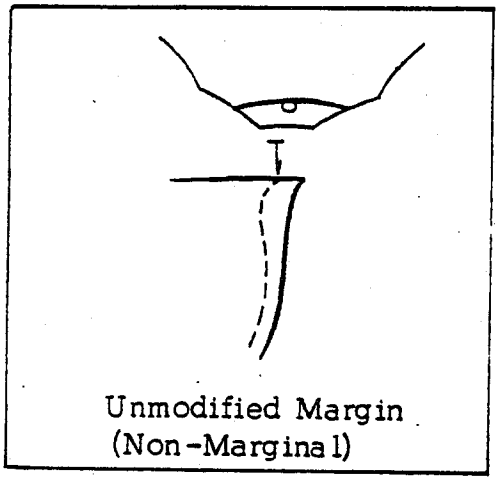


However, when the area of impact is intersected by the margin, fracture initiation uses very little of the applied energy.

It seems to me that this principle was increasingly understood during the transition from Middle to Upper Paleolithic flaking systems. Middle Paleolithic flaking generally exhibits non-marginal areas of impact (Levallois, disc core, and various blade production systems), whereas Upper Paleolithic flaking systems showed an increased use of marginal areas of applied stress (so called punch blade systems). I feel that this change, and not a shift from direct to indirect percussion, was instrumental in allowing an increased efficiency in flake (blade) production. By decreasing the amount of energy needed to initiate a given flake fracture, a proportionally greater

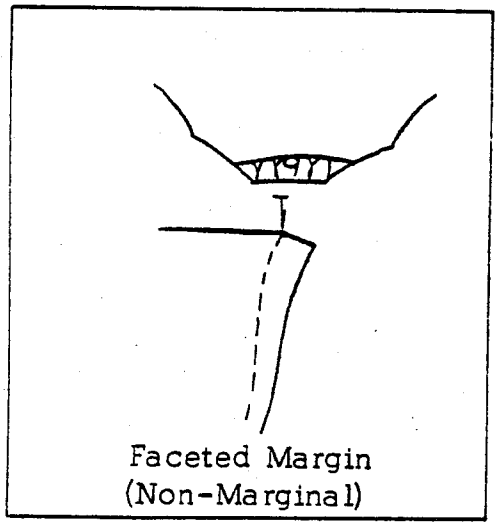
amount of energy was available for a continuation of the fracture plane. As the amount of energy needed to produce a flake (blade) of specific proportions is reduced, the knappers' accuracy and consistency can be increased. Because of this it became increasingly advantageous to develop platform preparation systems that would allow a maximum flake (blade) size with a minimum amount of energy application. This was accomplished through the development of the platform reduction method. (See Figures 4, 5 and 6)

Figure 4



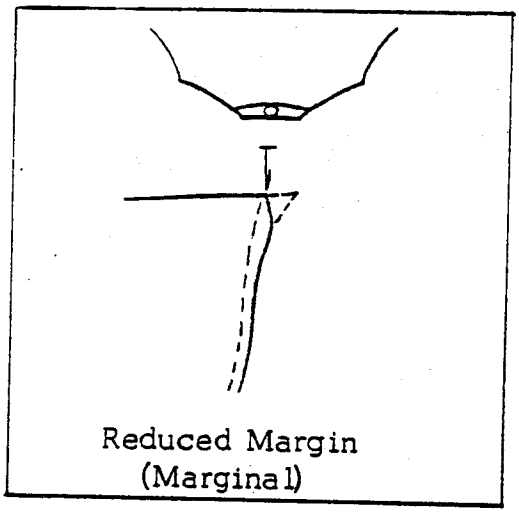
Unmodified Margin
(Non-Marginal)

Figure 5



Faceted Margin
(Non-Marginal)

Figure 6



Reduced Margin
(Marginal)

It should be noted that the areas of applied force in the above diagrams are in the same location in relation to the core face and general core mass. Only the relationship to the margin has been changed.

All of the above discussion does not negate the possible (and in most cases probable) correlation between the use of soft and hard percussors and the occurance of specific flake characteristics. Marginal flaking is normally most efficient when using a "soft" hammer and non-marginal flaking is most readily done with a "hard" hammer.

I would suggest that analysts of prehistoric materials refrain from applying hard hammer/soft hammer designations unless other supportive evidence is cited (ethnographical, archaeological, or experimental).

Bruce Bradley
P.O. Box 17330
Tucson, AZ 85710

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COMMENTS FOR NOVICE KNAPPERS

Many good articles have been published giving some specific details on experimental flint knapping. It has been my experience, however, that no complete guide exists. I would therefore like to offer some brief comments directed to the novice flintknapper.

In the final analysis, regardless of how much instruction is received, a person must learn by practicing himself.

WHY KNAP FLINT?

Some people knap flint for the satisfaction of becoming lithic craftsmen and making nice stone objects. The majority of would-be knappers, however, are simply students of archeology. Everyone who seriously studies archeological materials should have some experience in experimental lithic technology. This is essential to the understanding of the mechanics of stone tool making and the possible range of products and debitage. These concepts can be applied to many diverse cultural comparisons. Also, much of the conventional wisdom that is published is not correct. A person with a normal amount of skill in lithic manufacturing can verify many ideas himself. It is not necessary to become a master craftsman, although new insights are gained at each level of skill acquired. One should acquire all of the skill that available time permits.

MATERIAL SELECTION

Good quality materials should be selected for flint knapping. This is even more important for beginners who do not have the skill to handle coarse and tough materials. I obtain all of my flint supplies from a stream bed, in the form of whole flint nodules. This material varies from fine to very coarse chert, and it is not possible to judge quality because of heavy cortex covering most nodules. Material selection is not difficult if each nodule is tested, before taking it home, by striking off a few flakes with a large hammerstone.

HAMMERSTONE SELECTION

Flint knapping is a manual art, and adjustments must be made to suit the strength and coordination of each individual. This is apparent in examining the percussive tools used by skilled flint knappers. Everyone has favorite hammerstones and antler billets that they have learned to work with. I personally use a heavy quartzite hammerstone (800 grams) for initial shaping of large flint nodules, and smaller hammerstones (250 to 350 grams) for finishing bifaces and making dart points from thick flakes. Since force applied is a function of weight and velocity, each person finds percussors that fit his own abilities. Experiments should be made to find hammerstones best suited to the individual, and to the particular material being worked.

PROTECTIVE EQUIPMENT

Working safely is just a matter of common sense, and can maintain the confidence of the beginning knapper. I have never understood why so many flint knappers avoid protective equipment. I personally use leather work gloves and plastic safety glasses. No other leather pads are then necessary, and the hand is protected both from sharp flakes being generated and glancing hammerstone blows. Injuries experienced by the beginner can certainly dampen enthusiasm.

FORCE APPLICATION TECHNIQUES

In producing controlled lithic fractures, oblique force is applied to striking platform edges. Many beginners, including myself, have made the initial mistake of applying force into the mass, directly toward the desired fracture plane. In simple geometrical terms, a blow should be directed at about a right angle to the centerline of the edge-angle being worked. When considering this with the follow-through motion after impact, this can be described roughly as a glancing blow. If the acute angle core is being held with the edge in a horizontal position, the

percussor blow should be brought down vertically. Flint chipping can be described as simply applying the proper amount of force at the correct angle to the core edge. Velocity is very important in force application, and the novice should learn to strike as rapidly as individual control permits. A striking rhythm should be established, adjusted to percussor weight. Velocity and direction of blows will vary somewhat, depending on core edge thickness and size of flake removal desired.

EDGE PREPARATION

Although emphasized in published instructions, beginners tend to neglect maintaining properly prepared core edges. Good control of fracture is made possible by striking even, smoothed edges. Edges to be used for flaking are prepared by removing small flakes to obtain geometrical uniformity and then grinding to remove any feathered sharp edges. The rough surface of a quartzite hammerstone can be used for smoothing edges, as well as for force application. The casual observer generally does not appreciate how much edge preparation is being done when watching an expert knapper work rapidly.

LEARNING STRATEGY

Unless a person has a fulltime instructor, flint knapping is an individual learning experience. This need not be done in a random manner, as a simple plan can be helpful. My own plan for practice has been to start by making large bifaces (handaxes) from whole flint nodules. One can start by making crude bifaces, and as skill is acquired, thinner well-finished bifaces can be produced. Large by-product flakes are available when using this strategy, and can be used for making smaller bifaces, including dart points. I then learned techniques for producing shoulders and stems. I have had the advantage of receiving some very good written advice from J.B. Sollberger. One piece of advice that he gave me was that a person should practice making bifaces for about a year before attempting any super-thinning. Another thought of his was that "When a pleasing flake has been struck, the novice should stop work, place the flake back in its negative cavity, and then thoughtfully study the platform, striking angle, and flake scar." Relating results to work methods aids a person in obtaining consistent results. In my practice plan, no work was attempted for finishing bifaces with a softer antler billet until I felt comfortable with hammerstone techniques for hard percussion. The addition of soft percussion techniques proved to be fairly easy, as skill in striking accuracy had already been developed.

Like many other manual skills, basic flint knapping is not difficult if certain techniques are mastered. Becoming a master craftsman is then a matter of long practice. Both elementary and advanced proficiencies are well worth the effort in terms of improved analysis of archeological materials.

L.W. Patterson
418 Wycliffe
Houston, Texas 77079

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A GUIDE TO KNAPPING STRATEGY

The following paper is reprinted from APE #3 (Experimental Archeology Papers, no. 3), 1974:181-184 (Dept. of Soc/Anthro. Virginia Commonwealth University, Richmond. Errett Callahan, editor.)

It is important to realize when beginning that breakage is a part of flintknapping and its causes are accountable to certain logic involved in knapping. Therefore it is extremely beneficial to save faulty work, not only broken bifaces but also rejects

such as ones too small, too thick, etc. If a student can systematically account for the cause of breakage and rejects, he or she will find future work to be more successful.

The body of this paper will deal mostly with strategy. I have chosen a "question" and "answer" format merely as a convenience to deal directly with problems involved so as to be most helpful to a student beginning flintknapping.

Stage One

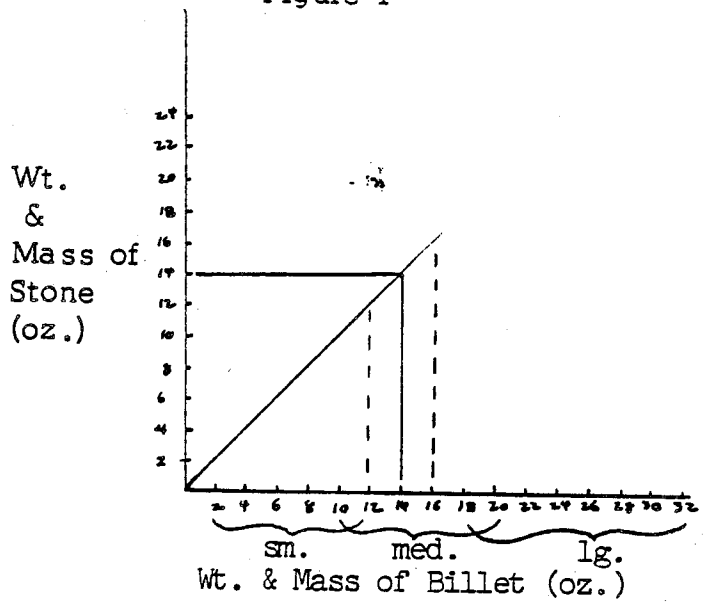
1. Obtain a flintlike material.

Stage Two

1. Go from an irregular shape to a regular one.
2. A plane is made mentally through the center of the stone. (see Figure 2)
3. It is basically edged, looks thick, has no distinct shape.

Tools: Hammerstone; heavy billet; gloves; possibly an abrader.

Figure 1



Example: If stone weighs 14 oz. then the billet should be about 12-16oz.

I. The Opening Strategy

Q. Where do I make the starting blow?

A. It is best to work from thin to thick edges; preferably from the ends as most of the mass is in this stage. This extra weight and thickness causes a reduced "wobble effect" in the center of the biface (this stage's highest cause of error).

Q. What tools should I use?

A. Tool use is all dependent on what stage of manufacture the stone is in. Generally weight and mass of the stone are your chief indices as to when to change tools.

Most work is started with heavy billet or hammerstone, proceeding to medium billet, then to light. The weight of the stone is in a parallel digression as the weight of the tool. The lighter or smaller the stone, the lighter the tool should be; the same is true for the reverse--the heavier the tool, the heavier the stone should be.

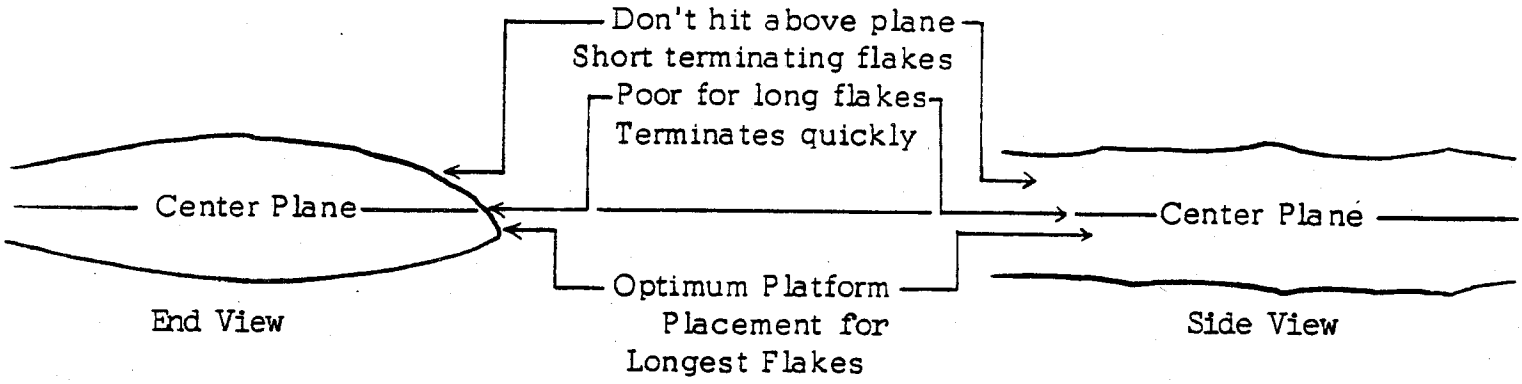
It should be kept in mind that this is a general statement, for many skilled knappers find they can go further in stages with heavier billets. This is in opposition to Figure 1 only because of variables in skill, armature, or of force.

Abrading is probably the most neglected aspect of knapping for the novice. The best way to offset this is to think if the edge is sharp enough to cut, the platform is too weak. Platforms must be dulled in order to survive impact without crushing. Dulling the platform creates more resistence from the stone, thus it survives crushing. This type of preparation can result in long thinning flakes.

Q. Where should I hit the stone and what is the optimum place to strike?

A. Make blows below center plane at all times.

Figure 2



The optimum place to hit is also dependent on stage of manufacture although this is a more subtle and finer point.

Best 2 stage work--alternating blows top and bottom well below center.

Best 3 stage work--blows closer to center.

Best 4 stage work--blows as close to center plane or just below it. (A personal idiosyncratic liking--this should not be taken as a truth for everyone.)

It is important to note that the better defined is the center plane the less breakage due to platforms above center plane. Try to figure mentally exactly where the center plane is before any blow.

Stage Three

1. From an edged biface to a thinned biface.
2. Extensive use of abrading stone.
3. Extensive platform preparation.

Tools: Heavy and medium billet; abrader; gloves; and knee-pad possibility.

II. The Middle Strategy

Q. What can be done to thin bifaces?

A. One answer could be not always to follow distinct steps such as stage two then stage three, etc. You can combine two stages many times. Thinning and edging can be done together by using a heavy billet instead of a hammerstone. Billets give longer flakes than hammerstones, so first consider your tools.

Another idea is what armature are you using? Will another holding position prove more comfortable or successful, such as against the knees for example? It should be kept in mind that the toolmaker should not withdraw force for fear of hurting oneself. Protection such as gloves, pads, or anything else should be used to eliminate this fault from entering biface replication.

The middle strategy to me is concerned mainly on thinning, not shaping, for doing this will expose the biface ends to lethal attacks prematurely with heavy tools.

Stage Four

1. Generalize shape.
2. Extensive platform preparation.

Tools: Medium and light billets; abrader; gloves; leather pads; and a tight armature.

III. The Ending Strategy

Q. At what tempo should work be done?

A. I believe in the notion that slow work cannot hurt and that fast work can. It appears after many observations that there is an infantile aggression we humans have in flintknapping, hit--hit--hit. Slow down and study each blow each time you make a "hit", for the problem

of solving certain logic in lithic replication changes.

Four Reasons For Fast Work:

1. ignorance
2. great availability in material
3. resources in time
4. experience, to be familiar with many problems

I find that an analogy to chess logic can help immensely once brought into perspective.

Defense----The material you are working with to create a tool.

Offense----You the flintknapper.

If taken in this light the knappers realize that the forces of defense are working to oppose faulty offensive maneuvers, then he or she can analyze the problem and deal with it successfully.

Offensive advantages are a recognition of problems encountered, such as step fractures, sharp edges, incorrect platforms, wrong tools, and poor holding positions, etc. Recognizing these defensive problems will insure higher quality and quantity work. It may appear trite, but to "win" the game is to make a tool and to lose is to make gravel or waste.

Q. How far should a knapper go in degree of refinement?

A. Go as far as your knowledge and experience can take you and no further. Reaching a level of competence first is most important, not what you almost had or would have had. The only way to progress is to know exactly what you are doing at a given point or predicament of defense.

If you cannot figure the defense, your offense will be futile or lucky. Either way, the resolution to it may not be known. The best way is to ask, find out what offensive maneuver that is needed to the defensive problem. If you guess, you may not know what made it work, and very few times, will it. The only exception to this notion is the possibility of a knapper unable to obtain knowledge to solve offensive problems. Here, trial and error will give this person the knowledge by collecting quantitative data on what was "good" or "bad" choices offensively. This position requires a resource in time and material, and should not be thought as the end-all. Secondary information such as work by other knappers should be read first--most people are too lazy to obtain it.

IV. The Things to Know and Try

1. Do not hit good material first; warm up on waste materials. Coordinate eye and hands on waste, not top material.
2. Make extensive use of abrading stone in platform preparation.
3. Practice by helping someone else solve defensive problems or correcting inferior work. "Easy knapping" will not help you later when you need experience and answers to problems.

Larry S. Cohen

[Editor's note: Would readers like to see more articles for beginning flintknappers? If so, we might consider a special issue on the topic.]

* * * * * *

NOTICES AND REVIEWS

This issue of Flintknappers' Exchange was addressed and stapled by students in the Henrico Developmental Center for the severely retarded/physically handicapped (Henrico Co., VA). This was made possible by Linda Abbey, Acting Director, and by Janet Woolsey Hill, permanent Director. The editors of FE are sincerely grateful for their assistance and we appreciate the opportunity to serve in return.

craftsman....

Our featured craftsman this issue is Robson Bonnichsen, Associate Professor of Anthropology and Quaternary Studies at the University of Maine in Orono. Born December the 3rd, 1940, he received his BA in Anthropology from Idaho State University in 1965 and his Ph.D. from the University of Alberta in 1973. The title of his dissertation is Models for Deriving Cultural Information from Stone Tools and is available in the Mercury Series from the Archaeological Survey of Canada, National Museum of Man, Ottawa, Canada. He has been published in Tebiwa (1964, 1969), The Newsletter of Lithic Technology (1972, 1974), World Archaeology (1973), Science (1974), Canadian Geographic Journal (1975), Current Anthropology (1975), Bulletin of the Maine Archaeological Society (1977), and elsewhere. (Note especially: "Integrating faunal analysis," Canadian Journal of Archaeology, 1977, Pleistocene Bone Technology in the Beringion Refugium. In press. Mercury Series (1978):109-133.) He is past editor of Western Canadian Journal of Anthropology (1969-1970) and he has made four video-tapes on primitive technology (Percussion Flaking; Pressure Flaking; Pebble, Cobble, and Boulder Technology; and Microcores and Microblades). The tapes are available from the Archaeological Survey of Canada, National Museum of Man, Ottawa K1A, 0M8, Canada.

Bonnichsen was Don Crabtree's first pupil, having studied under the master for a full year in 1968. He has been knapping since the seventh grade and has a young son, Sven, who has been knapping since he was 3½. Bonnichsen was a primary participant in a week-long elephant burchering experiment sponsored by the Smithsonian in March, 1978. For this he prepared a range of excellent replicas of the massive Anzick and Simon clovis bifaces and performed a variety of elephant bone flaking experiments. /See 31-32./

This is an interview with Rob Bonnichsen on the 29th of December 1977 at his home in Orono, Maine.

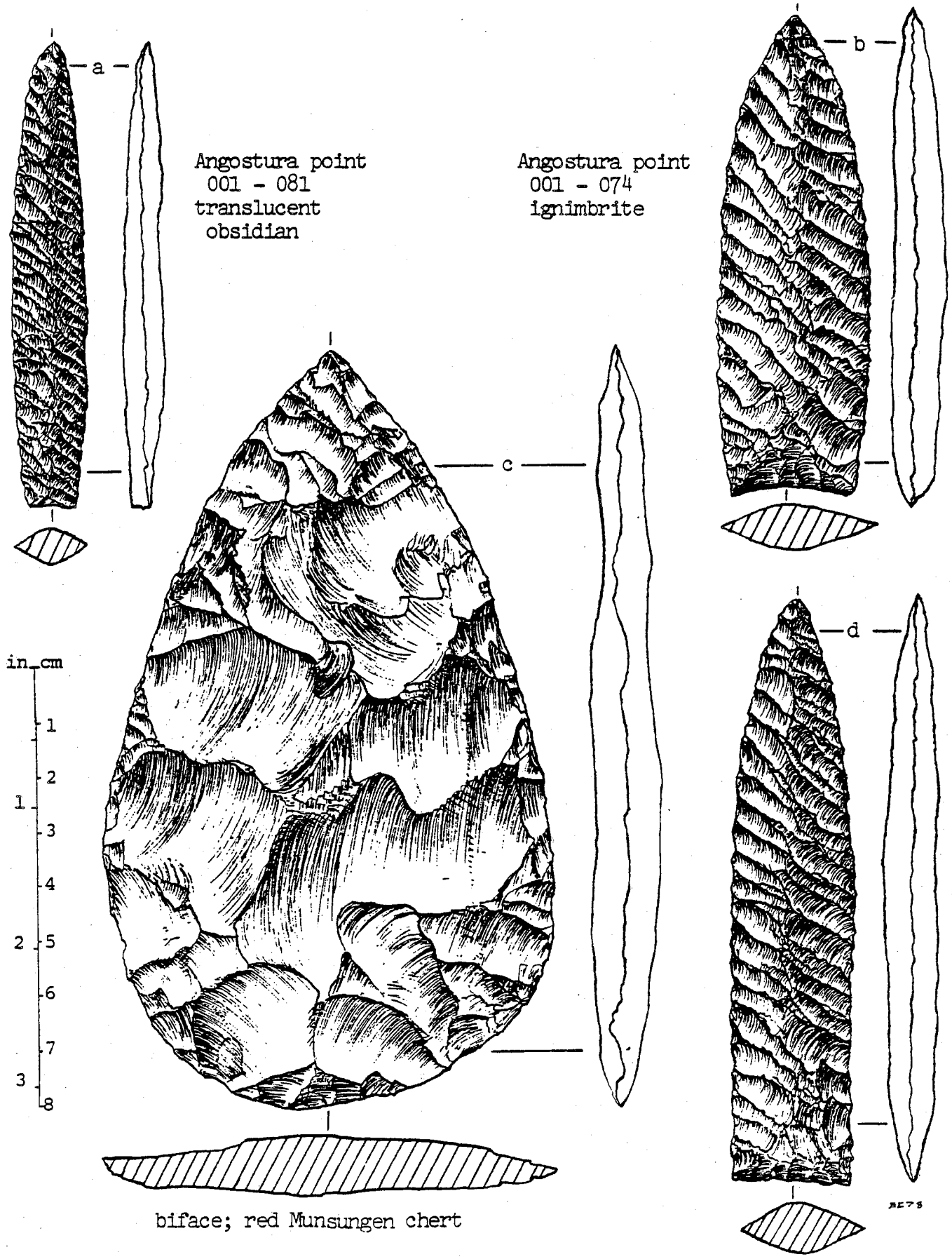
Q. The first question is when, where, why, and how did you start making stone tools? Who were your major influences, and what is your current area of research?

A. The reason I began making stone tools should be seen against the sort of background which I came out of. I became interested in archeology the day before I began the third grade when I found my first artifact. I'm sure I don't have a rational reason why I became so terribly interested in archeology but I decided then that I wanted to become an archeologist.

In reading Boys Life magazine in the seventh grade, I found an article that presented two ways to make arrowheads. One way suggested Indians heated the rocks up and used water on hot rocks to peel off flakes; the other way was to use a deer antler to press off flakes. My father helped me with my first experiment. We had some ignimbrite, which is very similar to obsidian and which occurs locally in southern Idaho. We took the ignimbrite and put it into the forge in out basement; we heated the ignimbrite up until it was red-hot and then took a straw and dripped water on the rock. As might be expected, the water turned to steam. So that left the other option open, to try to use the deer antler to flake with. So I began trying to make artifacts on the basis of a Boys Life article and pursued that avenue of attempting to make artifacts from the seventh grade into high school—through high school.

I had a friend who was an artifact collector by the name of Gary Baty and who worked on professional digs. We worked together on digs, in fact, when

Figure 1 REPLICAS BY ROB BONNICHSEN



I was still in high school, we collaborated in attempting to replicate (not replicate in the literal sense we use now) stone tools. We developed methods of using percussion and pressure flaking.

When I went to the university to pursue a career in archeology in 1959, it was not fashionable at that point in academic history to make artifacts—in fact, people sort of thought that it was foolish to attempt to make stone artifacts. So I dropped my interest in making artifacts—it wasn't fashionable, that isn't what archeologists did.

In 1962 I saw Don Crabtree perform at the first Point Typology Conference at Idaho State University. This was Crabtree's debut, in a sense, to the archeological profession. Earl Swanson, Jr. had asked Crabtree to come to this conference because Idaho State Museum at that time was a new museum with a new program. Idaho archeologists were just getting major research programs underway, and they were trying to figure out how to handle typology issues. Crabtree was asked to perform at the typology conference. Crabtree was a man of many years of tool-making experience and proved to be the highlight of the conference. That was a very historic and exciting meeting because Joe Ben Wheat, Marie Wormington, Alex Krieger, Carl Borden, and others were there, and that was the first time they had seen the likes of Crabtree perform. It was Crabtree's big break into the discipline, and that was sort of exciting. Students were still not encouraged to pursue their interests in lithic technology at that time tho; there was still no formal education vehicle for students interested in the experimental approach.

It wasn't until I got into graduate school and was confronted with an archeological-problem of analyzing Alberta cobble tools, which we found in the Cypress Hills. Traditional classification systems would not accomodate these tools. There seemed to be continuous variation, so I decided at that point that it would be really useful to learn a lot more about stone artifact production. I thought maybe technology would provide an avenue that would lead to a more meaningful classification approach than classifications that had focused almost exclusively on outline form.

In 1968, Dr. Alan Bryan, U. of Alberta, Edmonton, got a graduate research assistantship for me which permitted me to spend a year in southern Idaho working with the master craftsman, Donald E. Crabtree. I was the first student to work with Crabtree for an extended period. I probably have the honor of having worked with Crabtree longer than any other American student. This was a very interesting period of my life. Crabtree had not taught students before. His concept of education was a master-student relationship in which I sat and watched and tried to figure out what Don was doing. Then I'd go home and practice for hours and hours. Then I'd come back, about twice a week, go down to Don's shop, watch what Don was doing in terms of artifacts. So Don spent very little time watching me, but I spent a great deal of time watching and learning how Don made an artifact. That was really a tremendous experience. What I learned with Crabtree greatly expanded what I'd developed in my own right and influenced the direction I was going.

Aside from Crabtree, there are some other major influences that have been involved in my life. I went to work with Crabtree with an interest in relating the experimental appraoch to archeological classification problems and I'm still very much interested in that kind of an issue. This stimulated me to undertake an extensive literature search on the history of lithic technology, fracture theory, and ethnohistorical literature dealing with how native peoples make and use stone artifacts. I also became interested in questions of how human beings classified phenomena. This led me into association with Dr. David Young, a cognitive anthropologist, at the University of Alberta in Edmonton. Young has been very influential in my career because of his interest in how human beings classify phenomena. So I

guess I see several kinds of influences that converge to contribute to my present stance. I've always been interested in the experimental approach which Crabtree contributed to; I'm interested in material science theory; and then I'm interested in how human beings classify material remains. So this is the sort of gestalt I'm attempting to work with.

The other thing I can say is that probably only two other flintknappers have ever influenced me. Gene Titmus —I've worked with and watched him— from Hagerman, Idaho, a superb craftsman; and Errett Callahan--these are the only craftsmen I've ever worked with, who have influenced me. I've seen a lot of films. I've worked with Bordes, but I can't say that Bordes really influenced me. I've had the opportunity to talk with Tixier, seen Tixier's films, and I cannot think that Tixier really influenced me. I've had a lot of association with many people and there's no way you can really sort out how the whole thing fits together.

And there's a whole other side of me--the paleontology side. I worked my way through undergraduate school as a paleontological preparator. I realized early in graduate school that bones were being broken by man in a systematic way. When I worked with Crabtree I realized that bones could be shaped and manipulated by man, and that led me on to the examination of bones from the Beringia Refugium and the extension of principles from lithic technology being applied to bone technology. I've been on that track since 1966, quite a few years.

Q. How did you approach lithic reduction technology, in the beginning, in contrast to how you do it now?

A. I can give you some insights into the motor units I independently worked out versus what I do now. When I began, I used a pad on my left knee. I struck flakes off supporting the specimen on my knee. I also used my knee for support in pressure flaking, pushing flakes down onto a pad on my knee. I made a lot of pressure flaked specimens very early on, in the seventh and eight grade.

Q. Where did you get those ideas—for using a pad?

A. Developed them myself. After you give a certain amount of blood, the rock has something to tell you and you'd better listen. Now I have worked with several different kinds of reduction problems. I have a set of methods for reducing bifacially worked specimens that are strongly influenced by Crabtree, there is no doubt in my mind about that. But I worked out a lot things on boulder technology, pebble tool technology, strictly my own; I worked on a lot of microblade technology problems in conjunction with Richard Morlan, National Museum of Man, Ottawa. The bone technology again is something I worked out on my own, with extension of principles derived from lithic technology.

Q. Would you like to elaborate on your maturation as a flintworker, and the influences behind that maturation?

A. I'm primarily interested in experimental technology, not from a crafts point of view but from what it can do for me as an archeologist. I'm first and foremost an archeologist, and I'm interested in lithic and/or bone technology as a vehicle for doing better archeology—that's where my genuine interest lies. The year I spent with Crabtree was the year that I made the greatest progress, but I don't feel that I'll ever mature. The interesting thing about experimental technology you have the capability of continually getting better and learning more and more. The more horizons and the more areas you expand into, the more ramifications there are for what you've been doing all along. From my point of view, I've got a long way to go yet.

Q. What would you reckon your total production to be to date? You can define that any way you'd like, bifacial production...

A. I haven't the foggiest, just no real way...

Q. Dozens, hundreds, thousands?

A. Into the tens of thousands of specimens. The year I was most productive was the year I worked with Crabtree. I worked on the average of two to three hours a day. I work in spurts. Once I worked 3 days and pushed off 600 microblades. My work style is to tackle a problem and stick with it until I work through all the parameters. One may generate an awful lot of flakes, if you count flakes...

Q. No, no just bifaces

A. At this point, thousands. My production rate now is lower than it was just because there are so many academic duties—I can't give a very good answer because my production rate is varied. When I was in graduate school, I had more time. I don't do nearly as much as I want to do.

Q. Could you calculate your production annually when you were doing more work as opposed to now?

A. For many years I worked every day, for an hour or two hours every day just to keep in tune. My belief is flintknapping is just like playing the piano, you lose your touch if you don't stick with it. You could say, at a bare minimum I've produced 300 to 400 pieces a year, and some years I've produced a lot more.

Q. How many years do you figure you've been working?

A. That is difficult to answer. When I was an undergraduate there were 4-5 years I didn't work. I began in the mid-50's, I quit in the 60's, then I started again. There was probably a lapse time of about 8 years from the time I entered undergraduate school to the time I got to work with Crabtree. Since I worked with Crabtree, I've worked nine years fairly solid; before that I worked quite a few years—six or seven years when I was in Jr. High School.

Q. How much raw material do you go through in a year to get those 300-400 pieces?

A. You mean pounds? I probably bring in two tons of material a year. I probably don't use that much so I have a growing supply of rock. It's really a gross estimate, but I would say since I've been working with felsites and big bifaces a lot the last 2-3 years, it would be very easy for me to go through 700-1000 pounds in a year. That may be too much. Probably is too much.

Q. What lithic materials have you concentrated on in the past and how have such materials helped, hindered, or modified your replicative progress?

A. Historically, I began to work with ignimbrite, which is a welded tuff which occurs in southern Idaho and which is readily available and works very much like obsidian. I think that material was instrumental in terms of how I learned some of my motor units and how I learned how to think about rocks. It's a very brittle material. After watching Errett Callahan work on both Georgetown flint and Maine felsite I feel, at least in the past, I've used a lot more pressure rather than percussion, whereas Errett uses more percussion. I think this is related to the fact that I first learned how to flake on very brittle materials, and I reduced my breakage rates considerably by using pressure. The early use of very brittle material gave me a very conservative approach to percussion.

I have used other kinds of materials. I've worked a lot with quartzite, pebbles and boulders—which is a totally different kind of media. This kind of material taught me about bedding planes, and working in relationship to the inherent structure of the rock. I've worked also with a lot of Idaho basalt. Basalt taught me about working with flow structure in rocks, which is sort of similar to bedding planes but not identical. It's treacherous material to work with. When I came to Maine, I began working with felsite; felsite has

some special lessons--it is a very tough material to work. The other material I've worked with is bone.

Q. How do you locate, quarry, and process your lithic materials?

A. Those are two complicated questtions. I use a multi-faceted approach to locate quarries. I'm very interested in quarry sites. I've visited a lot of quarry sites in the U.S. and Canada. I think the quarry sites are some of the most significant and underresearched kinds of archeological sites that exist. The majority of the lithic reduction process occurs at quarry sites. Therefore they provide the most complete record of how artifacts are produced. How I locate them? I ask amateurs and professionals. In Maine I have developed a strategy of working with the university geologist working with bedrock maps of the state, and finding places where potentially good lithic sources intercept waterways. Quarry and workshop sites tend to cluster along the edges of lakes and streams. In other parts of the country I've used other kinds of strategies but you've got to get into the archeology of the area to understand the nature of patterning. In some areas, streambeds are good places to look for quarry work. I frequently look for outcrop areas. There's not a simple straightforward answer: I've used a lot of tactics. In Oregon you can find obsidian on alluvial fan surfaces. You can look from the hilltop ½ a mile away and you can see the glitter on the surface where Indians were camping. It depends on what the native people were doing. Once you see one set of situations, like an alluvial fan with a glitter on it, you start for other alluvial fans with glitter. In Idaho, ignimbrite nodules occur on hilltops and at the head of springs up in the hills. There's frequently a lot of quarry activity up around spring heads. The famous Brown's Bench site, which is probably a pre-Clovis site in southern Idaho is a site of that nature. There is another kind of situation of interest. In northern Oklahoma, chert nodules outcrop on the edges of bluffs--major sites occur on the edges of bluffs and up on top--a very interesting situation. In Alaska, we found a strike of cherts crossing a valley to the outlet of a lake, we found 50 workshops clustered around on gravel knolls. Prehistoric people were getting a rock and going out and camping on little knolls. There are so many ways to find quarry sites, but it's clear an understanding of local geology is very important.

Q. Once you've located a quarry, say for instance the Kineo Felsite quarry, how would you quarry the rock—extract it--and what do you do to it prior to bringing it home?

A. My policy at quarries has been not to pick up the artifacts and not to disturb the area in any way. At Kineo, I got felsite that was tumbled off a cliff into the water and that had never been worked by man. I did no quarry work. I don't do quarry work at aboriginal sites because it leads to proliferation of flakes that somebody may someday mistake for archeological artifacts. There's an ethic here. It's a serious mistake, I believe, to do flintknapping in an aboriginal workshop. I taught a field school in Alaska at Landmark Gap, where we did work at a quarry site and I did lithic demonstrations. All the flakes that I produced were caught in tarps and we buried the flakes at the bottom of the outhouse hole at the end of the summer.

Q. How do you process it, once you have a chunk of rock from any source?

A. In the past, I have not processed the rock; I bring it home intact. If there's slab rock, like in roadcuts, I've been known to use a crowbar to break the rock out. I split rock along joint planes with metal bars. I have ½ size burlap bags in which I stuff the rock at home. I have metal wire baskets. Each rock from an independent source is put into an independent wire basket, and the rock is kept outside. Then hand

samples are taken to the university and accessioned by location, township section, range, geologic source. That's the extent of what we do, we don't do any field processing.

Q. What place do copper and other similar non-aboriginal knapping tools have in your tool kit—in the past if not now?

A. When I first started pressure flaking with Don Crabtree, I used a lot of copper. Copper's good to learn pressure flaking with. It's good, durable and holds up. But at this point everything I use is made of natural material. I sometimes use metal tools to shape my knapping implements with—I don't have to do that, I cheat in that regard. I guess the other ting I use on occasion is a sledge hammer because I bring big rocks home, especially felsite boulders that may weigh 80 poinds—it takes an awful big hammerstone to break those. So I've been known to use a 10 pound sledge to break a rock off (for students and so forth). Generally I try to stay away from modern tools; I try not to mix my technologies.

Q. What problems and solutions have you had in obtaining stone tool making materials, such as billets.

A. I really haven't had any problems. I've been very fortunate. When I was in Alberta, Alaska, and the Yukon, I collected antlers every place I went. So I kept materials. I've had problems getting elephant bones to do my bone working with, real problems.

Q. To what extent have you used your stone tool replications functionally?

A. I've done various things. I haven't done as much functional work as I would have liked to do. I plan to do a lot more in the future. I've used stone tools on a lot of ad hoc, poorly controlled experiments. Experiments of this nature are useful for determining how tough and durable tool edges are. And, you know, I've done various kinds of functional experiments for other people. For example, I made a tool kit for a friend of mine and he went out and he used one blade to butcher two deer before the edges wore out.

I've done a lot of fooling around in the functional area—I bought my own microscope so I could study use-wear, but I've never published very much in this area. I have decided to get my analytical framework under control before I jump into the use-wear game. I think this research area is terribly complicated. It is very important to understand technology because that conditions the shapes of the edges that are modified by use-wear.

Q. You've had some things to say in the past about use-wear analyses that have been made by people who really weren't ready to do so. Do you want to elaborate on that?

A. I believe use-wear interpretation is really super-complicated. The kinds of modifications that result from use-wear —especially micro-flaking, edge damage, and edge rounding—can also be produced by technology. I think there are some real problems in sorting out which processes are responsible for which kinds of morphological configurations that are recorded on the surface of artifacts. I don't think it is adequate to just study use-wear; one needs to study technology and use-wear. It's the relationship between the two that's important. A lot of the analytical work that's been undertaken in American archeology has been done by students who lack a background in technology. The other thing that's important when conducting use-wear studies is to relate wear pattern to the artifact shape. Use-wear typologies which are not related to artifact shape are indeed difficult to interpret. Another use-wear issue is what is reality?: 5 magnification, 10, 50, and 200? I spent half a day looking at the end of an endscraper. My microscope has the capability of going up to 300 power. Every time I changed lighting conditions, I saw new patterning

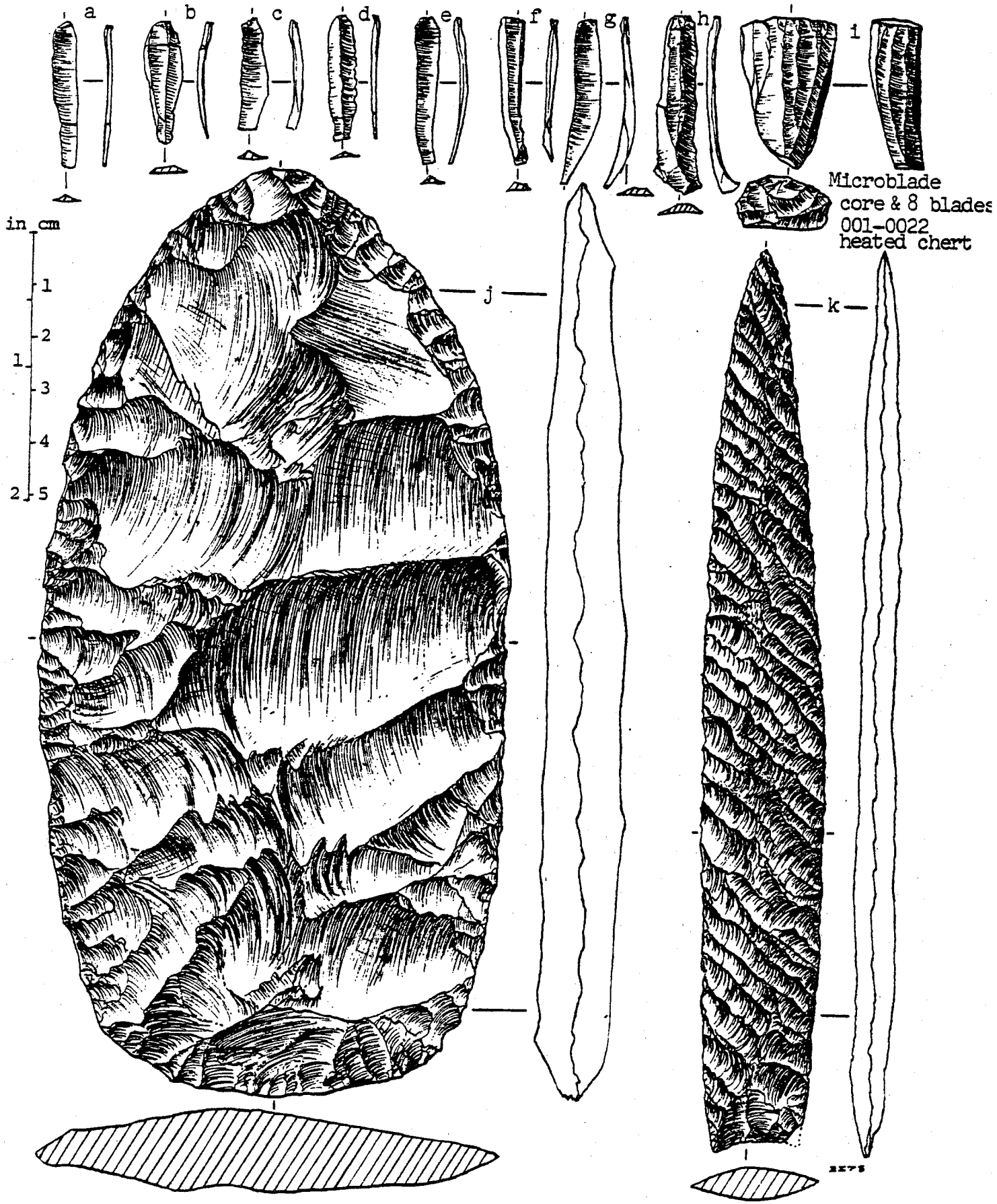
in the nature of use-wear alterations. What is it we are trying to say? Many workers are not stating how they're orienting the specimens under the microscope. Their lighting conditions and maginfication frequently are not stated. Lots of methodological kinds of problems exist. Also there is the lack of experimental control work that could be used to interpret the morphological patterns.

Q. Briefly, is there anything you'd like to add as to your main discouragements or enjoyments in flintworking at present?

A. I'm always an optimist when it comes to lithic technology. In my mind Don Crabtree started a movement in archeology that was long overdue —the time was right. He was the right man. I really think there's a great deal to be learned about lithic morphologies. I think there's a bright future in this area. Through the use of the experimental approach, lithic studies are going to be one of the key kinds of materials in archeology that will lead the way to advances in the interpretation of material culture. This is the area where we have a chance of developing some real theoretical insights into man's use of materials through time and across space. Its clearly important material because it has such a long record, so I think that with lithics—because its so predominant in the record, and because we are moving into a period of carefully controlled, well-conceived experiments, we have a real chance of developing a much better theoretical approach than we now have. So I'm an optimist for the future of lithic studies.

Figure 2

REPLICAS BY ROB BONNICHSEN



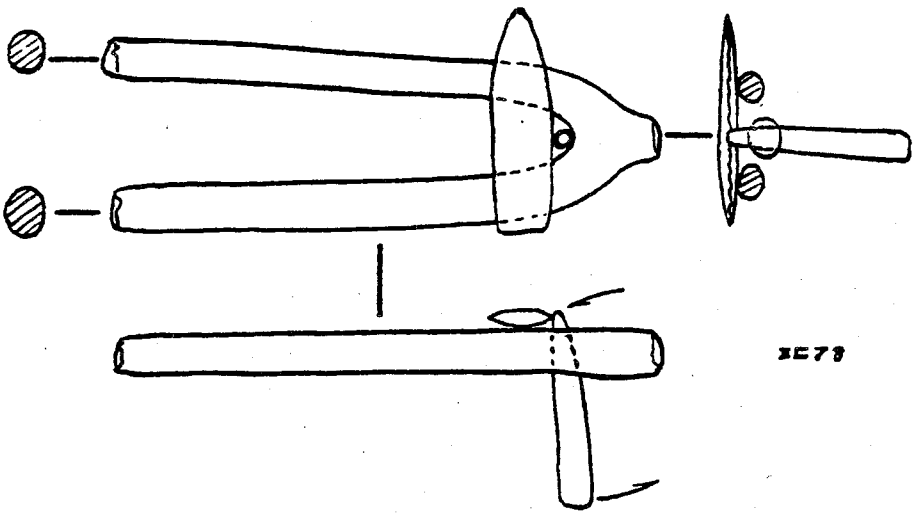
Anzick biface; obsidian

Angostura point
001 - 0026
ignimbrite

problems / solutions

Several readers complained they had problems visualizing the technique of lever flaking described by J.B. Sollberger in the last issue (1:1:7). Here is the solution to that:

Illustration of a Sollberger Lever Fork



A STAGING PROBLEM

Variability is really an underlying theme in this issue. Rob Bonnichsen discusses how his greater use of pressure (as contrasted with Callahan's greater use of percussion) is related to the brittle material he learned on. Sollberger discusses differences he observes in the Paleo American lithic reduction strategy. Both Patten and Callahan discuss "resolution" of variability.

I would like some solutions to a problem of variability that I have. Do readers think that staging--working in defined stages in a lithic reduction sequence--exists to some degree in the mind of every flintworker? Is it uniformly visible in the archeological record?

Callahan works in defined stages. Patten does not. This difference is very important so far as archeologists are concerned. One can find certain patterns, make certain predictions about Callahan's debitage. Bob's approach is less a "how to do it" and more an image of what the final artifact should look like. As an example, one could contrast the Sandia cast and Bob's replica. The flake scars on the Sandia are typical of Errett's last stage, that is, many of them are approximately the same size. This, in Errett's work, usually represents a great reduction in variability over preceding stages (as expressed by the coefficient of variation), and further, the repeated flake sizes, may occur only once--if at all--in earlier stages. Bob, on the other hand, produces any flake size at any point in the reduction continuum. This is apparent on his replicated artifact. Which is ethnographic reality? Both? More on these contrasts in the next issue. We plan to devote a great deal of space to staging. Please send solutions, archeological, cognitive, practical.

Jacqueline Nichols

J.B. Sollberger poses an unusual solution to a puzzling observation, and invites comment and alternate analyses.

PERCUSSION WITH A FLAKE?

Today is cold, gloomy and threatening rain. I'm sticking close to the kitchen and coffeepot.

I recently studied the lithic inventory recovered from the Mahaffey site in Oklahoma by Greg Perino. I have also been studying the inventory from a huge Angostura Plainview Archaic site.

Based on these, it is quite certain that the core reduction strategy practiced in the past was different from that which Bradley, Callahan, myself and others, practice today. The prehistoric hammerstones made extremely small diameter ring cracks. When the flakes come out of the core, the negative platform and core face show a sharp "v" (Figure 1). When we moderns do it, it's an open "u" (Figure 2). It makes me think they used sharp edged heavy flakes as percussers, either directly or as punches. In the middle stages of bifacing and final thinning, prehistorics used the billet far less than we do. I see this because the debitage and bifaces indicate they worked on sharper edged platforms than we do. I find no trace of edge beveling or grinding as we do it. Rather, it appears they rolled the edges to make a flat seat for a punch. Our predecessors seem to abhor a thick bifacing flake. They made some which are quite long, or wide--but thin!

The globular spherical hammerstones we get from sites were used only to get large flake blanks for bifacing. They did not use them for bifacing that flake. Their core biface rejects show lots of snap fractures--the flakes broke off. The platform's tight "v" (Figure 1) shows that a hammerstone or horn billet was not the flaking tool. This central Texas debitage shows those "Angostura" Indians knew something I plainly don't know. I do know they did a lot of heat treating. Some pieces have gorgeous colors. Their biface edges--from any stage, thick or thin--are always very sharp. There are no signs of dulling, beveling, grinding, or platform preparation of any kind: it baffles me. Yet, all stages are in the collection.

I don't say the above pertains to all of our lithic traditions. I suggest it pertains to those who worked large numbers of cores into various sized bifaces. It appears that when a large flake, occasionally, was bifaced, this same technique of percussion was used: that is, a flint-edged punch or something with a small contact diameter harder than antler or bone. The resulting flakes generally have no ventral face convexity. They are thin, straight, and the platform remnant is a tight small "v". The Foliate, or smaller bifaces, have extremely thin sharp edges inward before the thickness expands to a normal biconvexity. It seems that edge crushing--follow through from a billet or hammerstone--is never present. This reference is to preform stages just prior to final edge trimming, shaping, and notching. Seems to me for this to be accomplished, the preform had to be held in a non-yielding clamp. Perhaps cushioned in leather but the face being flaked, exposed or free.

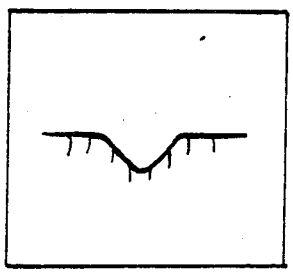


Figure 1

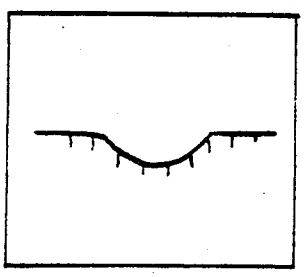


Figure 2

The above paragraphs refer to the foliates or bifaces more than 4" long which appear to be the product of hard hammerstones--the way Bradley or I would do it. On smaller ones, the punched in and clamp evidence seems to be predominant. Some examples that are clearly dart point types that have a large knot on one face showing flakes that snapped off (several layers of thinning reduction), have thick, squared, punch platforms for the flaking. These flakes could not be pressure flakes or billet flakes and hand-holding the preform would have resulted in too much yielding (deflection) to get that style of negative cavities. I'd appreciate a comment on this.

J.B. Sollberger

* *

NOTICES AND REVIEWS

The Hunter-Gatherer

The Hunter-Gatherer is a new publication published by the Stone Age Culture Special Interest Group of Mensa as a medium for the exchange of ideas and information on the continuation of the hunting and gathering way of life. Formerly published as Aborigine, subscription is free, though a dollar or so is requested to cover costs. Information and input is solicited. Contact Roy D. Johnson, 1529 Jack Street, Fairbanks, Ak 99701.

Lithic Technology

Formerly the Newsletter of Lithic Technology, this publication is a must for all serious flintworkers. The contents are professional and the emphasis is on structured analysis of experimental and archeological lithic data, with an occasional piece on replication. Started by Ruthann Knudson in 1972, NLT/LT is in its 7th year. For subscription information, contact Suzanna Katz, Center for Archeological Research, University of Texas at San Antonio, San Antonio, Tx 78285.

Paleo Points: An Illustrated Chronology of Projectile Points

Paleo Points is a booklet by George Bradford (published by the writer, R.R. 2, Preston, Ontario N3H 4R7, Canada. 48 pages, profusely illustrated, $4.00). Bradford is a professional illustrator, and this guide to projectile points is the most competently illustrated work of its kind. Bradford is also a knowledgeable flintworker and this is apparent throughout. There is a section on flintknapping techniques and tools with diagrams of the basic steps in Clovis reduction as applied to the well-known Blackwater Draw Clovis Point. A section is also included on the hafting of various paleo points, although I would question some of his postulated solutions. A brief bibliography is also included.

Bradford stipples in the estimated distribution of each kind of point on U.S. maps. This is by far the best way to illustrate distribution and density, as there are no hard and fast borders to deal with. Stippling is also his forte in illustration, though he seems to have hit upon it rather late in his work. His line drawings are a little heavy handed at times and fine edge retouch is missing. Though it is stated that the illustrations are of actual size, I found a few that were not.

Some of Bradford's technological and cultural information may be debated a bit but still I would give it a strong recommendation as a concise, basic field guide.

Errett Callahan

the Denver series

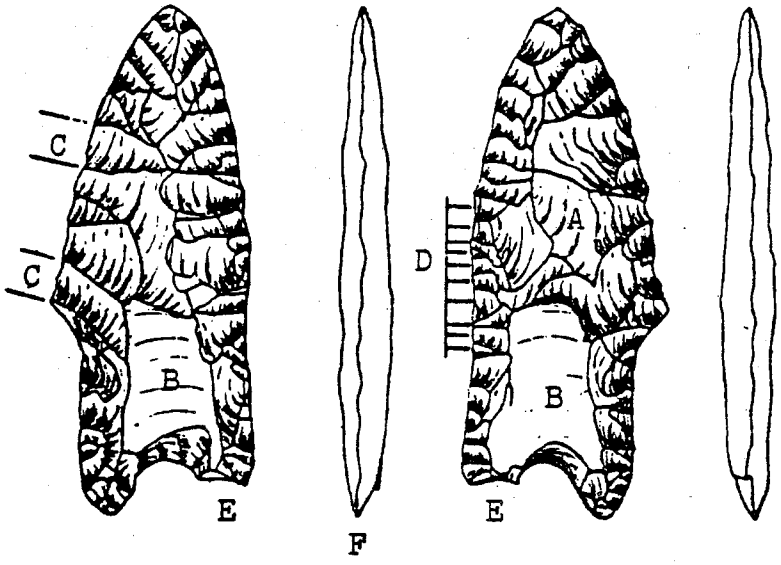
This article is one of a series of technological descriptions of projectile points available in facsimile from the Denver Museum of Natural History (Publications Department, City Park, Denver, Colorado 80206). The casts are widely available in universities and museums, and were chosen so that interested readers might study identical samples.

Bob Patten continues the series, describing #3, the fluted Sandia, in terms of geometrical-technological-mechanical relations and suggests "hopefully from these descriptions an integrated methodology of artifact description will emerge which is capable of dealing in several aspects at once."

POINT # 3: FLUTED SANDIA

Lucy Site, New Mexico

A - Prior Stage
B - Flutes
C - Wide separations
D - Retouch flakes
E - Damaged ear
F - Tang edge



Prior Stage:

One face retains a remnant of a large flake (A) with heavy undulations in a plane considerably different from the final face indicating an initial form thicker, or, at least, wider than the resultant point. After fluting, the preform was further thinned and shaped as indicated by intrusion on the flute by flake scars on every side.

Flake Removal:

Lack of damage from collapsed edges in the form of step flakes indicate some form of platform preparation, probably grinding. Wide, flat flakes in rising undulations suggest use of percussion.

Dominant Mechanics

The large flakes have wide, plane trajectories which fail to carry over the high point. Fluting (B) has a flat trajectory without excessive undulations except for the termination which exhibits a strong rise. At the edge, separations (C) are wide even when flakes expand. These characteristics are usual in percussion but not in pressure flaking.

Organization

An unrefined percussion preform was fluted by unrestrained percussion and then shaping and further thinning was accomplished by light percussion. Flake spacing appears to have been chosen to correspond with flake width so as to avoid leaving high ridges and therefore is erratic. Direction of the blows is consistently perpendicular to the edge.

Retouch

Interpretation is mostly subjective but the somewhat irregular edge, small flakes with the same character as the big flakes, and lack of fineness all point to light percussion.

Damage

One broken ear appears to be accidental and not use related. (E)

Edge Treatment

Light nipping blows were used to form the base and shape the edge opposite the tang. Fine control of knapping is evidenced by the edge which is constrained to a flat plane.

Hafting

Parallel sides nearly in line with the tip and a deep basal inset are consistent with other paleo point style traditions. The flute rises evenly to termination at the thickest part of the point.

W/T Ratio

For percussion on this small a point, the W/T of 3.8 at maximum width is quite flat.

Functional Aspects

Asymetry by design does not preclude projectile use but use as a knife might seem more understandable. Harpoon design similarities might suggest a possible ancestral correlation.

Bob Patten
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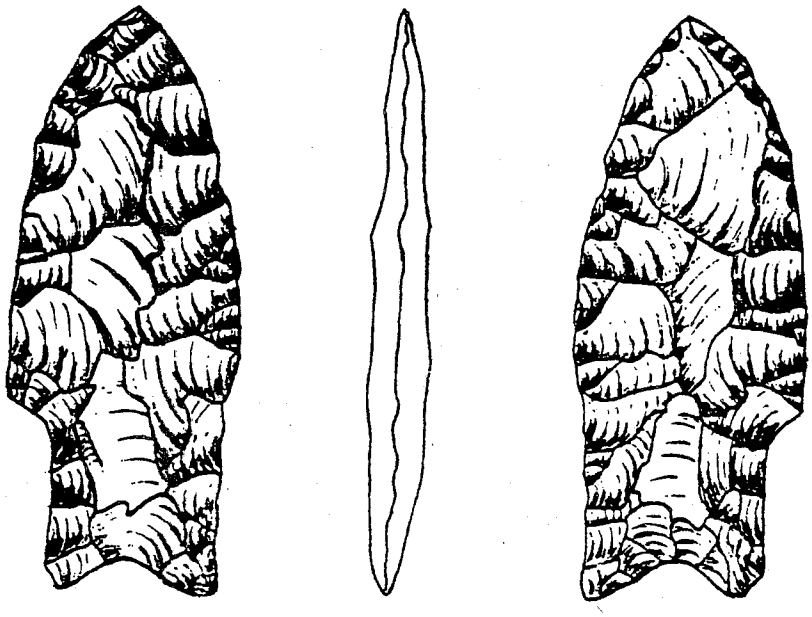


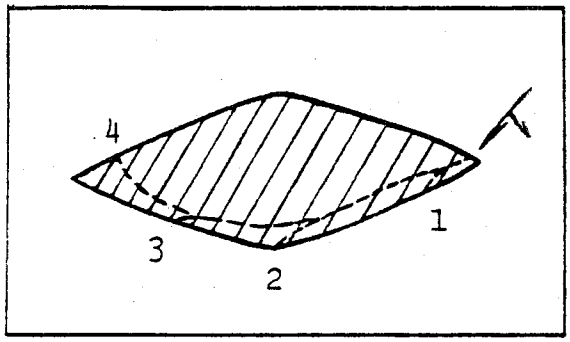
REPLICA OF SANDIA by Bob Patten

COMMENT ON POINT #13: EDEN
(FE 1:1, 18-20)

RE: Patten on point

Patten, in describing the flake removals and their negative flake scars notes "most important--the flake scars do not curve at their termination", and the means to achieve this straight termination is a chipping block. Patten's illustration elevates the point so that the ridge line of termination is a free-face. My observation of Bradley's block technique is that the block closes the free face by contacting the ridge-line. Contact there closes tension--therefore fracture--by causing "long flakes" to snap break at the contact-line. Flakes from the opposite margin are then required to remove this step or snap fracture--if such are present.

The block is a great aide, not always necessary, and does not explain the physics of the straight fracture nor the non-widening of the flake scars. The width of a flake, as on polyhedral blade cones, is determined by pre-established surface geometry. The ventral face length is determined by the degree of secondary compression generated by bending on the flake's dorsal face. Said differently, it is the ratio of the degree of downward particle compression at the fracture front, to the degree of outward pull on the flaking platform resulting in bending the flake.



1. Insufficient primary loading allows the outward force component to pull the fracture short - at 1.

2. A stronger primary force balanced to the outward component, terminates the fracture at the median ridge (the block helps) at 2.

3. Reduce the outward component, while maintaining a strong primary compression as the flake bends outward from its flaking platform will give terminations at 3.

4. If the primary force of 3, is excessive, over-shot fracture is likely at termination 4. Controlling secondary compression is the key to understanding flake length.

J.B. Sollberger

* * * *

This is quite well covered by Dennis' section but I would also like to point out that the curved stick support illustration (which idea is attributed to me--if not the illustration) is absolutely absurd--the point would be quite thoroughly snapped!

Bruce Bradley

* * * *

...both Sollberger and Stanford describe Bradley's Block as squeezing off the tension by contact of the ridge against the block. The result of Bradley's technique is a snap fracture which comes off when the opposite edge is worked. My explanation of the mechanics would be that the flake terminates due to bending as tension can't be squeezed--it is a force condition rather than a particle of matter....The difficulties we knappers have in communicating point out the need for better proven theories but, by the same token, force us

to break out of our mini-domains and look at things from a different perspective. F.E. has paid off!

Bob Patten

From my knowledge of, and experience with, Bradley's block, I would say this debate is not yet over. Stay tuned.

Errett Callahan

* *

NOTICES AND REVIEWS

THE GINSBURG EXPERIENCE: A MAMMOTH TASK

From March 8-15, Dennis Stanford, Curator of Archeology at the Smithsonian Museum of Natural History, led a team of 10 experimental researchers in the butchering of a 6000 lb. African elephant using only stone and bone tools. The elephant, which died of accidental causes in Boston's Franklin Park Zoo, had been, as an infant, a star in the John Wayne film, "Hatari". She was butchered on a mountain top at the Smithsonian's Conservation Research Center near Front Royal, Va.

A wide variety of experiments were performed, all under tightly controlled conditions. The week-long experiment was conducted under Paleo-like conditions with four inches of new snow inaugrating the first day. For the operations, Rob Bonnichsen, Dept. of Anthropology/Institute for Quaternary Research at University of Maine at Orono, Maine, made up a number of replications of the massive Clovis bifaces from the Anzick and Simon sites. Dennis Stanford had these hafted on a variety of handles modeled more or less after Eskimo butchering tools. These were then used for the majority of the butchering. However, Acheulean handaxes, shell and cane knives, and tools of other industries were tested as well. Tommy Fulgham, Dept. of Anthro, Smithsonian, devised an X-Y plotter (Transducer) into an EBD (elephant butchering device) which electronically measured all variations of horizontal, vertical, and twist movement of the tool in use. Smithsonian personnel recorded the process on reams of notepaper and audio tape. Over 10,000 slides and a 16mm film were taken to document the process.

During "ritual killing" operations, Errett Callahan tested out a wide variety of Clovis hafting systems--as part of his PhD dissertation on fluting--, achieving 8-10" penetration in non-frozen and non-bony areas. (This included 1-2cm of hide.) He also tested out Clovis bifaces in all stages of manufacture during skinning and butchering. Hafted Clovis points proved to be among the most efficient of all butchering tools used during the project.

Once the skin and muscle masses were removed, area by area, Rob Bonnichsen and Richard Morlan, Director of Archeology, National Museums of Canada, Ottawa, Ontario, performed bone fracturing experiments. The resultant, spirally fractured bone fragments and flakes derived therefrom (amazingly similar to flint flakes and diagnostic of human activity) were then used for continued butchering of the elephant. The bone tools which Bonnichsen and Morlan made duplicated the tools they have found at Old Crow Flats in the Yukon (dating older than 30,000 years) and which Stanford is finding at his Dutton/Selby sites in Colorado (dated at 17,000 minimum, well beneath Clovis levels).

Whereas the bone tools did indicate that it is possible, with the aid of fire, to penetrate, skin, and butcher an elephant without resort to stone tools, the stone

tools were many times more efficient. A few flint flakes would have been an enormous boost to a predominantly bone tool kit. Nevertheless, even with stone tools, butchering an elephant is an enormously difficult task. (It may actually have been easier with a thinner skinned mammoth or mastodon.)

A number of publications will result from the Ginsburg Experience. In addition to the 16mm film, an announcement in the May 1978 Anthropology Newsletter, a possible announcement in Science, a portion of this writer's thesis and dissertation, and a co-authored monograph in the Smithsonian Contributions to Anthropology series are expected. Articles appeared in The New York Times (20 Mar 78: B-1) and The Washington Star (13 Mar 78), while a feature article is scheduled for an upcoming issue of Smithsonian Magazine and National Geographic.

Not content with spearing a dead elephant ("ritual killing") and butchering the carcass, the participants had a color photo taken (mostly red), spears and bifaces in hand, for the purpose of making up a "Ginsburg Experience" T-shirt. Proceeds will go toward funding a portion of the Project. Anyone interested in obtaining an official Ginsburg T-shirt may contact Flintknappers' Exchange for details.

Errett Callahan

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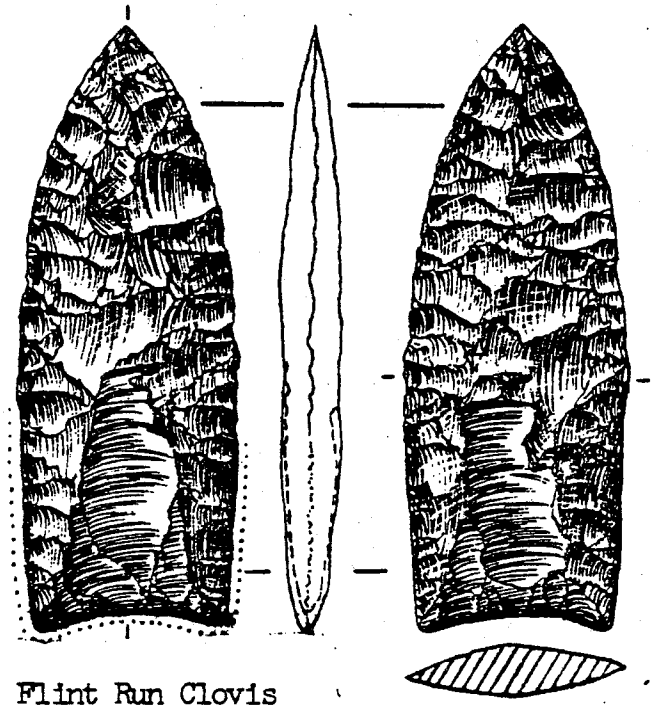

Flint Run Clovis
78EC59C
Flint Run Jasper
7.71 x 2.96 x .71cm; 21.4g
Replica by Errett Callahan
for Thunderbird Museum
(Rt. 1, Box 212-D, Front Royal, VA 22630),
who offer casts of this and of the
excavated artifact model
(broken in manufacture)