FLINTNAPPING
By Don E. Crabtree

(Ed. note: We have attempted to reduce a fairly complicated paper to one aspect of flintnapping an obsidian stone into an Indian artifact.)

Experiment and actual practice in the rudiments of stone flaking will soon make one aware of the physical properties of the material when subjected to force; the human factor involved in developing the obvious muscular motor habits; coordination of hands and mind; conscious control and planning, and the feel and perception of the causes and effects. Experiment also permits one, as it did the aboriginal, to devise and design ways and means of overcoming the ever-changing conditions encountered when reducing rough material to a finished artifact.

The writer would like to carry this interest in technology a step farther and make the inquirer aware that the completed artifact represents only the final stages of manufacture and that it is equally important to reconcile the beginning and intermediate stages of fabrication. These, too, are very important because there are multiple technological traits represented in these initial steps which furnish information for defining the manufacturing techniques. For this reason, the importance of a careful study and analysis of flake debitage should be continually stressed.

It is not my intention to make a flintnapper of every student and anthropologist, but it is hoped that these manufacturing steps will be read and studied in detail and even tried, to some extent, by those interested with lithnic technology. Just observing the final series of flake scars and the form of the artifact, or

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reading the description of manufacturing techniques is not enough for complete understanding because an integral part of fabrication is by "feel". There is no substitute for actual experiment. Contrary to popular belief, the act of removing a flake by percussion or pressure is not too difficult and the amount of force exerted is only relative to the width of the flake and the isolation of the platform area. The enigma and difficulty of both pressure and percussion flaking is learning to control the width, length, thickness, form, and termination of the flake. This text will attempt to explain how this control is attained.

Some Hohokam points are common, utilitarian, everyday hunting points derived from assorted flakes and materials. These points appear to be made from a flake by pressure alone. First, the flake is straightened, then retouched and notched, completing each point individually. The flake is hand-held and straightened by pressure flaking: 1) The bulbar part at the proximal end is removed from the ventral side of the flake. This is done by applying inward pressure from the outer margin of the flake diagonally toward the center of the flake. As the flake being detached nears is termination point, outward pressure is applied to dissipate the inward force and to step or hinge fracture the flake at the median line. 2) Then a flake is detached from the opposite margin to meet this step or hinge fracture, thereby thinning the proposed artifact. If the flakes are not terminated in this step or hinge fracture, then the bulbar part will not be thinned. 3) Finally, the dorsal side is made regular by pressure retouch and then the base is notched, completing each point individually.

Having only a small representative collection of these points and no flaking debris as a guide to replication, the primary stages of the manufacturing techniques must, of necessity, be inferred, for the actual technological traits remain with the manufacturing debitage flakes. The collection I have replicated serves only as a guide for the final stages of pressure flaking and notching techniques. However, my experiments are based on actual experiments--rejecting and accepting various stages of manufacture until simulation of the aboriginal artifact is acquired. The stages of developing the rough material from the first to the final phases of pressure flaking and notching will be described according to my experiments, but the primary stages are not necessarily aboriginal. However, if the finished product is a true replica, then it is safe to assume that the primary and intermediate stages are parallel to those of the aboriginal.

To make the core preform, an obsidian cobble slightly larger than the proposed artifact was selected. Before any work was begun the raw material was carefully examined to determine if it contained any imperfections or deeply bruised parts. If it appeared to be relatively free of flaws or inperfections, then it was tapped with a hard hammerstone to calculate its resonance. A dull thud, or hollow sound, indicates previously undetected planes of weakness, cracks, fissures, and general imperfections. When this happened, the stone was abandoned and a new piece was selected and tested. Good lithnic material should respond to the hammerstone's tap with a ringing sound, indicating that the vibrations of the hammerstone's contact are evenly transmitted throughout the raw material.

The nature and quality of the raw material will not only determine to a degree the techniques required, but also the type of percussion tools needed to reduce the material to a usable form. If the raw material occurs in large blocks, boulders, or other massive forms, it can be made portable by trimming pieces into blanks, preforming, or making cores for detaching flakes.

Persussion tools: Large hammerstones are used for the initial fractures and to remove non-homogenous parts and cortex. Hammerstones become progressively smaller as the objective piece is reduced in size and nears the preform stage. The size, weight, and texture of the hammerstone (or billet) must conform to the size, weight, and texture of the material being flaked. That is, highly vitreous materials require a relatively soft hammerstone, while less vitreous materials will respond well to the harder hammerstone.

Obsidian, because of its vitreous and brittle nature, is vulnerable to the induction of undue fatigue, platform collapse, and shattering by the percussor and, therefore, the hammerstone must be of a relatively soft yielding material such as sandstone, limestone, vesicular basalt, reconstituted tuff, or materials of similar texture. But materials like flint and chert are more resistant and, therefore, the hammerstone can be granite, quartzite, or other hard stone.

The form of the hammerstone can be ovoid or discoidal for, when one part becomes flattened by use, it can be rotated and a new striking area exposed. This is one reason why a well-used hammerstone is often spherical.

Initial blanking and preforming is by direct percussion with a hammerstone but it is better to change to an antler billet for the thinning of the preform. The antler billet permits the worker to increase the velocity of the blow with greater control; it imparts less shock to the material and lessens the risk of breakage. The billet can be a section of elk, caribou, reindeer, moose, or deer antler, or even a piece of very hard wood.

CONES: Flakes struck, or pressed, from the margins of an artifact are positive cone parts and their scars are the negative cone parts.

When a vertical blow is delivered to a flat surface well in from the margin, a complete cone is formed. When a rectangular piece is struck vertically at right angles on the margin, a half-cone is formed. If the vertical blow is delivered to the corner of a rectangular piece, a quarter cone is formed. The angle at which the force is directed will be manifest on both the negative and positive fracture plane of the cone when the force is percussion. Since the fracture plane of the cone is fairly constant, it is relatively simple to interpret the direction in which the blow was delivered.

FLAKE BLANKS: Using flakes as blanks is an economical method of utilizing material. A single core may furnish as many as a hundred blanks for small points whereas the core tool method uses a mass of material to produce a single point. Flakes blanks are selected for their straightness and form, and the proposed artifact is generally oriented longitudinally. Generally, thin flakes can be used for making smaller points by pressure alone, but they must be slightly thicker, longer, and wider than the proposed point.

To remove the curve from the distal end, blows are struck on the end from the dorsal toward the ventral side of the flake and the force is directed toward the proximal end (bulbar part). Flakes are removed from the blank in this manner until the ventral surface is flat from the distal end to midway of the flake.

The flake is then turned end-for-end and the bulbar part on the ventral side is removed. To do this, a platform must be established at the proximal end of the flake blank. This is done by striking on the ventral surface toward the dorsal to remove one corner at the base of the flake blank. This leaves a beveled edge on the corner of the flake blank which is used as the platform to strike off the bulbar swelling on the ventral side at the proximal end. Generally, after one or two flakes have been removed in this manner from the ventral side at the base, and the distal end has been worked as previously described, the flake blank will be sufficiently straight.

If the flake is of vitreous material and has the proper dimensions, it can serve as a blank, or preform, without modification. If the ultimate result is a small point, then it is entirely possible to eliminate the preforming stage, use the flake as is, and make the entire artifact by pressure alone. However, reducing the rough piece to the finished artifact by pressure alone requires a greater output of energy than when the worker uses percussion to reduce the surplus material.

BLADES: A blade is a specialized flake with parallel or sub-parallel lateral edges, the length being equal to, or more than, twice the width.

Blademaking is the most efficient way of utilizing the raw material for blanks, When good quality material is scarce, blades represent a frugal and economical means of conserving stone. Blades can serve a dual purpose. They may be used freshly struck from the core as good cutting implements and, when dulled, they may be modified into projectile points.

A blade large enough to serve as a blank for a projectile point can be removed from a core by either simple direct percussion, indirect percussion, or a combination of pressure and percussion. If properly designed, it has the outline of the proposed point, thereby requiring a minimum of flaking for its completion.

(To be continued next month)

(FLINTNAPPING continued from July)

For almost all flintnapping, a low seat is desirable for it has the advantage of raising the posterior above the level of the feet and enables the worker to use the thighs and knees for support. When doing percussion work, and for increased leverage during pressure work, the left knee or the top of the thing is used as a support for the wrist of the left hand holding the objective piece. The seated position also permits the worker to use the right thigh as a fulcrum and hinge for the right elbow, thereby increasing the accuracy of the blow. Also, as the blow is struck, the knees may be gradually brought together to increase the accuracy of the percussor's contact and deliver the blow at the correct angle to a predetermined point on the platform of the objective piece.

BLANK FORMATION: Using the above described position and method of striking, an initial flake is detached from one end of the cobble by striking with a hard hammerstone at a low angle. Then the cobble is turned and the second blow delivered on the plane surface left by the detached flake, and so on around the perimeter of the cobble. As the blow is struck on the margin of the objective piece, the left hand involuntarily responds to the subjected force of the percussor, causing the left hand to roll the objective piece upward, synchronizing the blow with the point of contact.

By turning the cobble and alternating the flake removal, the plane surface left by the previously detached flake serves as the platform for the next flake removal.

PREFORMING: The billet, or hammerstone, used for preforming is designed with a rounded working end to permit greater striking tolerance of the edge. Also, the rounded end gives the percussor a greater area of contact surface and therefore, a glancing blow can be delivered to the edge without striking too far into the body of the preform. The tolerance of the blow is th distance of the tangent of the arc of the rounded edge of the percussor. For precision flaking the rounded-end billet, or hammerstone, has a distinct advantage over the discoidal hammerstone--for the flatter discoidal surface limits its width of the contact area between the percussor and the objective stone.

All irregularities must be removed, the blank is straightened, thinned, narrowed, and shaped into the form of the proposed artifact.

To reduce breakage caused by shock, thinning is started on the platforms at the distal end of the blank. The percussor is directed at straight line to the platform, but at slightly less than a right angle to the long axis and angling toward the gravitational center of the objective piece. The striking angle will vary according to the desired thinness of the preforming. The thinner the preform, the flatter the striking angle; the thicker the preform, th steeper the striking angle.

After the first large irregularities are removed, the edge is prepared for the next series of flake removal. Edge beveling can be done by an alternate technique of turning the margin. The edge of the preform is pressed inward against the edge of a smooth anvil stone a right angles to the face of the proposed artifac When the bevel is approximately at a 45° angle, then the edge is rubbed forward and backward against the anvil stone in a cutting motion to remove any sharp, weak edges. After each margin has been flaked, the edge must be re-prepared for platform purposes in order to flake the apposite side from the opposite margin. The blank is percussion-flaked bifacially and bilaterally in this manner until it is preformed into the proposed shape of the finished point.

The percussion tool used in these experiments was a section of antler with the end rounded to transmit sufficient force to the marginal platform to detach a flake of the desired dimension without prematurely breaking the platform. Antler is semi-yielding and, therefore, prevents platform crushing of the brittle obsidian being worked.

When a more refined pressure technique is used to remove individual flakes, the tool is a piece of antler, bone, horn, shell, wood, or metal which is shaped to a blunt point at the working end. Pressure tool tips are rounded because a sharp, pointed tool would not have sufficient strength to remove a flake without breaking the pointed tip. The diameter and size of the tool will depend on the size of the flake removed. As the detached flakes become progressively smaller, a tool with a smaller tip is substituted.

Before the worker can start pressure flaking, the hand holding the objective piece (material being worked) should be protected with a pad of leather or other suitable material to prevent detached flakes from being driven into the flesh. If necessary, the objective piece may be rested on the padded thigh, or on rests of wood, stone, or any medium which will support the piece as it is held in place by the fingers or heel of the left hand.

If wood or stone is used for the rest, it should be covered with a thin layer of yielding material so the objective piece will be evenly supported, otherwise accidental fracture could occur.

(To be concluded in September issue)

(FLINTNAPPING continued)

FRACTURES: Should the irregularity be a step or hinge fracture, a short pressure tool with a flat thin tip is used to remove the balance of this flake.

A Step Fracture occurs when a flake terminates prematurely in a right angle break. The tip of the pressure tool is placed on the right angle of the step fracture and pressed downward as almost simultaneously outward force is applied to detach the mass from the face of the artifact. If the right angle break of the step fracture has enough bearing surface to withstand these two forces, then the balance of the broken flake will detach. If it does not detach, then the worker must establish a larger platform. To do this, the pressure tool is seated on the margin of the artifact directly above the right angle break and the worker deliberately terminates a second flake in a step fracture in the same place as the original break. This establishes a larger platform. The pressure tool is then seated on this platform and downward and outward force is applied to detach the unwanted mass.

Hinge Fracture: A hinge fracture terminates in a concave break rather than the right angle break of the step fracture. Removal of the hinge fracture is accomplished in the same manner as the step fracture.

TURNING THE EDGE: After the surface of the preform has been made uniform by removing the irregularities, step and hinge fractures, then the edges are made even and straight. The artifact is held on the pad in the palm of the left hand. A rodlike pressure tool--bone or antler tine--is placed parallel with the edge at a right angle to the longitudinal axis of the artifact. As the right hand presses the tool downward, it also applies inward pressure to the leading edge. A shearing motion results and the projections are removed in a straight line. This action is repeated bifacially and bilaterly until the preform has straight edges.

To detach flakes which will curve beyond the median line--or to the opposite margin--the left hand holding the objective piece is relaxed with the fingers exerting just enough pressure to support the artifact. This permits the artifact to roll slightly when pressure is applied, thereby detaching a curved flake. Excessive pressure of the left fingers will frequently cause the artifact to break when pressure is exerted by the right hand. The left hand must be protected by padding to fit the palm of the hand--either leather, cloth, fiber, shredded inner bark (sagebrush, cedar, etc.), a grooved piece of wood, or a padded stone. But the palm of the hand must be cupped to prevent the padding from touching the part of the surface of the artifact being flaked. This manner of padding and cupping the palm will allow clearance for the flake detachment and thereby avoid premature fracture. Different paddings offer different resistance to the objective piece and, therefore, will vary the flake character. By holding the left hand rigid and using a resistant pad, the applied pressure will detach flakes which terminate with a feathered edge. If the pad is soft, then the artifact will move and curved flakes will result.

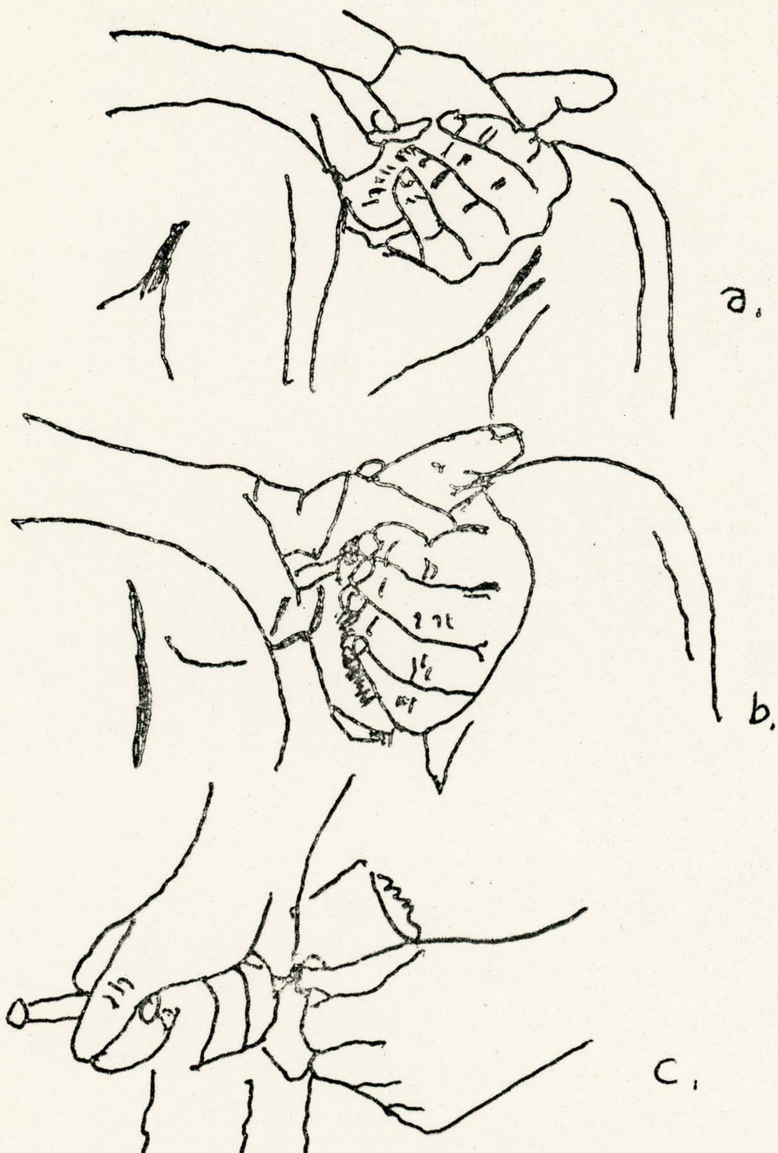
The order of flaking is a matter preference. One soon becomes accustomed to removing the flakes in a series along one edge from left to right (from the base to the tip) or vice versa, or by removing them alternately from the ame margin but from opposite faces.

To provide strength, the long, narrow, barbed Hohokam point must be left thick at the median line. The edges must be made thin so they can ultimately be deeply notched and some of the notches altered into barbs. This is achieved by detaching flakes which leave large bulbs on the margin and which are quite wide in relation to their length and terminated by feathering at the median line. This leaves the median line fairly thick and the edges slightly concave. The interval of placing the tool on the margin, the width of the tip of the pressure tool, and the amount of platform detached with the flake determines the width of the flake. If the tip of the tool is set far back on the platform, the detached flake will be wide and thick at that point, for the platform is adhering to the detached flake. If the tip of the tool is set near the edge of the platform, a thin flake will be detached with less platform adhering.

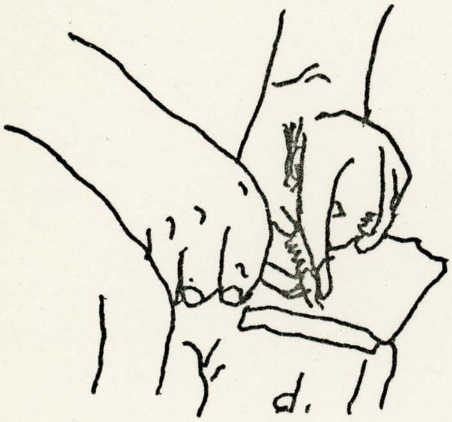
TIPPING: The distal ends of projectile points must be made sharp to allow penetration of both the artifact and the shaft.

The distal end of the projectile point is placed flat on a solid surface which has been previously covered with a single piece of leather or hide. This padding conforms with any slight irregularities in the artifact and supports and provides uniform resistance during the application of pressure. The compressor is a slightly rounded but semi-pointed piece of bone.

The point of the pressure tool is placed on the margin of the tip and downward pressure is applied vertical to the lateral edges. No inward pressure is applied. This single direction of vertical pressure to the edge causes the flakes to terminate at the median line of the tip, thereby forming a ridge down the center. The most common method of tipping is to fingerhold the tip of the point and press the flake off diagonally from the tip toward the base, leaving a chevron or herringbone pattern on both faces of the tip.



(a Position for method of turning edge to produce bevel, a stage of platform preparation; b) pressure flaking method using back of left hand supported against inside of left thigh, exerting greater force; collateral or diagonal flaking may be done in this position depending upon angle at which force is applied in relation to



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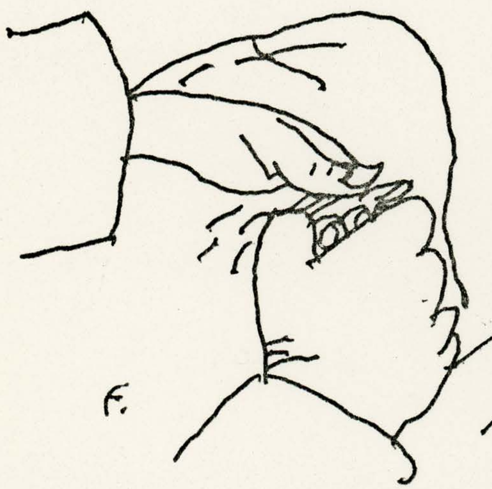

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lateralmargin of point; c) pressure flaking method used by Australian aborigines, with force applied away from worker, and method of support may vary; d) pressure flaking method with force exerted away from worker, use of wood as solid support shown, but softer support such as top of thigh may be used: e) simple freehand holding method used for notching and serrating points with thin margins not requiring removal of large flakes, with right thumb pressed against underside of middle finger, left hand, which locks two hands together for leverage and stability; f) pressure notching with left hand rested on inside of left thigh, knees may assist for additional force, interlocking right thumb and fingers of left hand provide further leverage and stability.