A

STUDY OF A FLINT FLAKE AND THE ADAPTION OF IT TO THE MAKING OF ARTIFACTS.

Rather than an attempt to produce a triangulate piece of flint to look like the copy of an arrowhead, one first must be able to produce,at will, a flake of the desired thickness,or thinness, - the proper breadth and length. When this is mastered, most any primitive piece can be duplicated. In the past, the student of arrowpoint manufacture gave his attention to the shape of the point, rather than the flaking. The usual result, of course, was a piece of stone with no cutting edge - usually crushed and worthless as an implement. It must be borne in mind that the Indian made these pieces with a definite purpose - either to cut, perforate, or abraid.

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Therefore, of prime importance is how to produce the desire flake. To accomplish this, one must have complete contol of directing the flake, a knowledge of stresses and strains, as well as a complete understanding of the properties of the materials to be worked. Therefore, a study of materials under the polaride X-Ray, stroboscope, spark photography, Lapidary equipment, arrangements of mechanical contrivences to determine pressures and angles, and thermostatically operated ovens for thermal treatment, is of great help. This phase of the research would take more time and money than I have been able to provide, to date, but a brief summary of my work of the past is as follows:

MATERIALS

Choice of material cannot be stressed too much, as an artifact is only as good as the material itself. The Archaeologist's study of flint ~~working~~ like materials ~~has~~ will increased his admiration for the work ~~of the primative~~ Produced by our ancestors and his use of inferior materials in the absence of choice ~~specimens~~ material. No two materials are exactly alike, however, the principals of working ~~the point~~ them remain the same.

The workability of material cannot be determined by the outward appearance of the stone. ~~(Flint, of course, is a separate study.)~~ One must test for the micro-chrystalline structure, the cleavage planes, the hidden fractures and pent up stresses and strains. by removing a flake providing a window through the cortex & exterior surface so that the selected piece may be examined.
It is useless for me to attempt to make a classification of suitable stone. ~~Volumes~~ Much have been written, but in most cases they are based on theory. We have heard of the differences of freshly mined flint and surface flint that has been cured in water. One wonders how the writers base their conclusions.

I feel there is only one way to determine the value of the stone and that is to ~~try~~ test the material by Percussion & Pressure and examine the results. and to understand what is taking place. I firmly believe that this is why one will find so many discarded flakes ~~and chippings~~ at an old Indian quarry site campsite. The Indian Flaker chipped his piece of stone, his sensitive fingers feeling for stresses, strains and possible fracture, and then readily discarded the unsuitable material.

Flints LIKE Materials should be classified by microchrystalline structure if they are intended to be used for tools - not by color - as there are so many variations of flint. Such as, horne stone, jasper, agate, calcedony, carnelian, etc. In writing this paper, I have made a general classification of materials, calling them flints, obsidians, and opals. However, the three work quite differently, as they are of three different hardnesses. HOWEVER The mecha nical principals still remain the same.

The finer the chrystaline structure - the greater the flexibility. Long flakes cannot be detached from a granular material, as it does not have the strength to withstand the pressure, and the flake cannot stand the flexing. This material must be treated as an elastic. The courser the structure, the less the elastic. I will later describe the demonstration. By using the pressure method, the stone can be felt to bend and the flake can be easily guided. For an example I would like to point out the ripple flaking in which instance the flake follows the curve from one side to the other. over a curved surface

PRECUSSION.

Spalling by precussion. This method is used for the manufacture of blanks, cores, blades and projectile points, as well as for squaring cores for the making of flake knives. This method is usually used prior to all pressure retouch.

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For the manufacture of blanks after a nodule is cleaved or quartered, a suitable precussion tool is used - either horn or stone. The stone is then studied for flaws and imperfections. These, of course, are first removed - and here again we use the pressure method. The stone should be cubeoidial or cylindrical in shape. The top should be shaped perfectly flat to give the desired platform and all blows struck at a forty-five degree angle on the top. The under side of the stone is held in the palm of the left hand with middle finger extended along the area the flake is to be removed. The right hand is holding the hammer stone or horn. It takes a great deal of time and experimenting to develope accuracy in striking,and no appreciable results can be obtained until one can strike in exactly the place desired and with the desired and accurate amount of force to permit the follow thru. It takes much time, patience and material to become proficient. Each step and stage in the making of a tool was,no doubt, a definite vocation with some groups of primitive peoples.

Precussion is, no doubt, the earliest method of shaping stone. Direct and indirect. The direct method is fracture brought about by forceful contact of two like or unlike materials. Striking two pieces of flint together is likely to injure the flint worker as each of the stones would have the same amount of resilliency, and the only reason one will fracture the bother is because of the mass.

Therefore, the precussion tool used must be of a material satisfactory for the type of work to be accomplished - as for quarring a larger and heavy hammerstone while roughing out blades or projectile points a small stone such as a pebble.

The precussion tool should be of the following materials.

Stone	Basalts
Granite	Quartsites
Porphery	Deer horn
Sandstone	Elk Horn
	Hickory Ash
	Mountain mahogany
	Other resinous hard woods

My experience with the precussion method and the following hand tools for the fracturing of flint has been as follows:

The cleaving of a large nodule of flint is probably the first problem of flint working techniques. Much care must be used not to bruise the stone. One must bear in mind that one blow should cleave the stone - not repeated blows. This would cause a crushing effect and set up stresses and strains and microscopic fractures, later resulting in the ruination of an almost complete artifact.

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The same bruising is brought about by improper support. If the stone is too large to be supported by hand or on the thigh, it should be placed on sand or soft ground. If there is a non-resilient support used, as crushing effect will take place as there are two sources of force in opposite directions. It is difficult enough to guide one/

After one has properly supported the nodule, he must choose the proper precussion tool. For the cleaving of a large nodule, a hammer stone, of preferably a fine grained granite of one-half or a third the weight of the stone to be cleaved, is used. The precussion tool should be gobular or as a football in shape. A stone of this sort fits the hands and will stand many repeated blows without chipping or breaking.

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The nodule is struck at approximately a forty-five degree angle, with a long sweeping follow through blow. As the precussion tool contacts the nodule at the proper angle, a downward force is incurred, as if one were pulling off a section of stone. With practice, a stone can be halved or quartered with next to no curshing or shattering.

One should attempt to pick a projection or an irregularity on the nodule on which to seat the tool. By a careful study of the nodule and the platform, the stone can be cleaved as if with a knife. The length will depend on the outside surface of the flake to give sufficient strength to follow through. The width will depend on the amount of force and surface of the outside flake.

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MEDITATIONS, CONCLUSIONS AND DEDUCTIONS ON REVIVING A LOST ART.

Since finding my first arrowpoint many years ago, I have been much interested in the Aboriginal craft displayed in the working of materials harder than the finest steels of today with nothing more than the simplest tools. Usually no more than a dry piece of horn or bone and a pad of leather to protect the hand while detaching the flakes. For such was the method used by the Indian in making the beautiful specimens of arrowpoints, which have been found and are so highly prized that today they rest in musuems throughout the world. For centuries, white man has tried - without much success - to imitate and duplicate the arrowpoint.

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In questioning old timers as to methods used by the North American Indian, one would get a variety of answers. Such as the heating of the stone and applying wet buckskin, pine needles, etc. Another suggested that the thumb nail was used to scrape the stone leaving marks that cured by fire till it was hard as stone, which we know is impossible.

Instead, we find that the making of arrowpoints was an art attained only by much skill and practice. The flaking - not the shape - is the fingerprint by which we may judge the artist. Some poor - some masters.

/After carrying on my own flint knapping for the past ~~fifteen~~ 30 years, I have arrived at the conclusion that primitave man was not so primitave as many of us believe.

His knowledge of lithographic material for the manufacture of artifacts suitable for his culture exceeds that of our modern Geologists as well as the craftiest stone mason. He knew the heat treatment of various stones which would aid him in flaking the stone into many tools - much as the metalurgist induces a temper in fine steel. The worker of flint had no calibrated thermometer available, but attained his skill through keen observation and years of patient practice, which he passed on to his son until the displacemtn from flint tools to metal.

Unusual it is to find a deposit of stone suitable for artifacts which has not already been visited by the artisans of the past. Very desirable materials were transported more than a thousand miles as is the case of obsidian in the Western United States or Mexico carried by hand to be used by the high in rank of the Eastern mound builders. No doubt many thousands of miles were covered in the quest of suitable material, and there was much probing of alluvial deposits for gravels and nodules of the desirable qualities.

Material

Stone suitable for flaking is of the homogenious variety - non-chrystaline, free from flaws and cleavages, and large enough to spal off flakes suitable for tools. Materials used were obsidians of many colors and textures, agates, jaspers, quartsite, carnelian, opal, calcedony, flints, silicious limestones, quartz chrystals and many others. Agates, jaspers and calcodeny were usually heat-treated to make them easier to work. This method was not used to spal off flakes as so many believe, but only to establish a monecular ~~xxxxxxxxflakingxxxxxxxx~~ tension as these materials are too tough to do delicate manual pressure flaking untreated.

Material

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To make a word picture of the transformation of a rough lump of stone into a delicate ripple flaked arrowpoint is to me a very difficult problem - similar to a negro cook describing the making of a favorite dish and saying "take a jug o' lasses and pour out three "glugs" etc". As to giving specific directions to the layman for making flint tools - it would be far easier to describe for him on paper how to paint oil portraits - or engrave plates for the U.S. Mint. To begin with, a person must have sufficient strength as well as a delicate touch, accuracy, and precission, a knowledge of his material, etc., as obsidian and opal are worked far deifferently than agate or flint.