

After much studying of the flint cores from Mexico and after many trials and much discouragement I have been able to duplicate the work of the Mayans in making a core and feel that I have achieved a perfect duplicate of their work. I now know that it must have taken even ancient man years of trial and error method before he, too, achieved perfection in removing flaked knives from a block of obsidian.

In reading my research about this ancient art I would like to recall to you a very interesting article about this art. This article states that early man made many things with his hands, which, because of their destructable nature, have not survived, but it is doubtful if he did anything that required a higher type of cerebration than does the preparation of fine flint instruments. The anthropologist, Leichy, had to spend ~~had to spend~~ several years in experimentation before he could chip a flint ax equal to workmanship of men turned out in the late paleolithic.

He found that success depended on the knowledge of the cleavage planes in the rough stone and on the ability to strike a blow with just the right amount of force and at just the right angle and at the proper point. He found it also important that the maker of the knife select the proper striking tool. It would seem that by random pounding a man might learn the relative hardness of various ~~xxxxxxx~~ stone, and thus come to choose flint in preference to softer material for his weapons, but it is inconceivable ~~xxxxxxx~~ that, without instruments, he could, in the space of a single lifetime discover how to chip flints equal to the neolithic scrapers. Actually the art of developing flint chipping spread over nearly a million years and this in spite of

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the fact that no animal is more curious, more impelled to feel things, handle them, bite them, tear them to pieces, pound them and to experiment with them in every conceivable way than apes and young children. Curiosity and manual restlessness have been the chief forces that have impelled man exploitation of the world and ultimately enable him to win what control he has of it. It is interesting to note how long it took man to come into his own in the prolog of "Man and His Gods" by Homer W. Smith.

Mr. Smith has been trying to duplicate the flintworking process of the ancient man, just as I have been studying and experimenting since childhood. But it has just been since I have accomplished the art of duplicating the flaked knives and the resulting core therefrom that I have felt I was really getting a good working knowledge of the art of stonechipping. Flaked knives, of course are the single prisms that are removed from the resulting core. There are so many factors involved in producing one of these knives ~~and~~ and one of the most important is choice of material in getting a piece of stone without flaws and as near perfect a piece as one can find.

The next important step is proper blocking of the stone in preparing for removing the knives. The block should be squared up or at least have a perfect right angle side established for the initial removal of stone. This is the most important flake and must be removed correctly to assure removal of further knives and an ultimately perfect core. When removing this flake the angle must be perfect and cannot vary even one degree or the flake will "kick-out" or break out short. Of course if this happens one must start all over again. If the first flake is properly taken and you have followed the right angle from the top of the core base you will have established a guiding ridge to follow in removing the next flake. If at any time one fails to remove

the flake the entire length of the piece of stone being worked, and the flake should break off or hinge, then one must start over for one cannot remove the chip other than from the top of the stone being worked. Once the hinge has occurred or the breaking off of the ^{FLAKE} stone, there is not sufficient material left at top to where you apply your pressure ~~to bear the strength necessary~~ to bear the strength necessary to break the stone the full length of the flake. When for applying the pressure at the top of the stone you must have a platform or you must have a surface which will hold this pressure. The small area on which you apply the pressure is many times ^{SMALLER} greater than the actual amount of stone broken. Therefore your tool and the placement of your tool is important. If you try to remove too ^{that} ~~thick~~ a flake your tool will probably slip or kick out and if it does slip it will splinter the edge which would give the same problem as if you had broken a flake off short. This judgement of platform size and the grinding and roughing up of the platform does have a tendency to relieve it and start it tearing thru. You might compare it to tearing a telephone book in two. You actually only tear one page at a time, although it would seem all pages are torn at the same time. Removing a flake works in very much the same way and your material having a certain amount of flexibility one must pull away from the stone at the top for guiding the flake. It is actually peeling the material off with a direct thrust. This thrust is carried all the way through, it is not stopped. You can feel it go and you have to follow it right on thru all the way. Otherwise it will flex and will break off short before you have completed the full flake.

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Holding your material to be worked presents another problem and one must have them supported properly. For the support, the ancient man, no doubt, used a piece of log. He probably split it at one end and placed the stone in the split portion or drove wedges in and removed the wedges and then used a rack stick with perhaps leather thongs similar to a tourniquet. He used this type of holding device for ~~xxxxing~~ twisting the stone tight and at the same time be able to take it loose to keep turning the block of stone he was working, for you must have ~~your~~ the working surface of the stone towards the outer edge. The ancient man probably chose a site where there was sand or soft dirt to catch his knives as they were removed, as they come loose from the working stone with considerable force and when they fall they would shatter and break unless they would fall on soft ground. Ancient man might even have used wadded up buckskin or brush for catching the knives as they were removed.

When applying pressure it is important to know just how much pressure to use in order to determine how to set the tool on the leading ~~xxx~~ edge after one has established a platform.

In establishing the platform, one must free the outer edged for each flake that is removed. This is done with a piece of horn or some hard pointed instrument and the flake must be removed to the right and to the left of where the pressure is going to be applied, yet it must be over a ridge that has been previously established. When the pressure is to be applied, one must be able to determine how much pressure is necessary to remove the size of flake he has prepared to take. One must apply both outward and downward pressure. First apply the downward pressure and then the outward pressure and as you apply the outward pressure you must at the same time increase the downward pressure and as soon as you feel the flake giving at the top from the outward

pressure you will feel the flake follow thru. This, of course, happens very rapidly, but, after you have become accustomed to working the stone you can actually feel this happen as the flake is being removed. Flakes will be removed all around the surface of the stone. If the stone is a square or rectangular piece, then once must first remove the four corners. If you fail to remove the corners it is useless to carry on further. They must be re-chipped, reflaked, resquared in order to get a sharp ridge that is true and symmetrical the full length of the working piece of stone. The stone might be bruised and still fairly irregular on the sides so one takes off the first flake, reshapes the platform again and then ~~xxx~~ take off the next flake parallel to that one and continue this on both sides of your first corner until you reach the center and then you will remove the other corner and work back until eventually you will end up with a fairly circular piece of stone. Continue this method of removing flakes, going around and around the working stone until you make a mistake and if you do you just start on another block of stone or if there is enough material left in the stone you have been working on you can strike this off and establish a new line or ridge running the full length of the stone.

To prepare the original piece of stone so it will be a workable piece is, in itself, a difficult operation. When making flaked knives, one cannot use a piece of stone that has a big block of stone sticking out someplace on your working piece down the center of the core because, at the top, where you apply the pressure there just isn't enough stone to withstand the pressure necessary to carry thru an irregular chunk someplace ~~xxxx~~ further down towards

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the middle of the core. The ideal type of flake and the one that the ancient man seemed to prefer was one that was beveled on both edges and flat on the surface. If the flake is removed properly it will be similar to a ~~new~~ hollow ground razor blade. It has a concave surface to the leading edge. If the flake, or knife, is properly made it will have a very sharpe edge and will cut thru leather etc. as easy as one cuts butter. No steel razor blade seems to be as sharp as an obsidian flaked knife. These were, indeed, satisfactory tools for ancient man. These knives, or flakes, can be hafted and used as knives, spears, or for any type of cutting instrument.

HOLDING THE STONE TO BE WORKED
Supporting the wrking stone is very important. The stone is supported in a clamp or wooden vise for holding it perfectly still for flaking. The s tone cannot rest on any solid object or it will cause a compression of the stone and when your pressure was applied it would give pressure in two ways, both up and down. The stone should be held in the vise tightly, but resting on nothing and the side of the stone being worked should protrude from the vise so the flake can run off free on the working side. If the working stone *TO BE WORKED* is supported against the ground or any solid object all your would be doing when the pressure was applied would be to cause a compression and the flake would not be removed and all you would accomplish is crush a portion of the stone and the flake would break off short and one could never remove the falke in its entirety.

Ancient man no doubt supported himself against a tree or ledge and held the wooden log vise between both feet when removing the flaked knives. Since ancient man's wooden log vises have long since disappeared, we must guess at his method of stone holding and position, but my experience in making the knives leads me to believe that such was his method.

~~xx~~ greater degree of skill, he apparently degenerated in the art, for the acme of all flintworking is the Folsom point.

Folsom man removed one of these flaked knives, you might say, from each side of their previously chipped projectil point.

Folsom man had to establish, not only his ridge down the

center of his point, ^{TO GUIDE THE FLAKE} but also had to establish his platform

for removing the large flake and he only had a thin piece of

material on which to do this, for he had already made a shaped

and ~~chipped~~ flaked point. He had to remove this broad flake and

do so without hinging or snipping the end off his point. For as

the flake being removed spreads to the outer edge it will,

like a coincoidal fracture, have a tendency to make a cone,

and as the flake moves out it will spread and have a tendency

to ~~xxxxxxx~~ CLEAVE the point in half, To guide the flake

and leave the hollow ground effect that one finds in ancient points

and carry the flake thru to the point, and most flakes have a

flight curve, and at the same time support the working stone

so the flake will not crush, one can put a tremendous amount of

pressure on the big block of stone. But in removing a large

flake, such as the folsom point has, from a single artifact

and at the same time hold the single blade securely enough to

withstand the pressure and at the same time control and guide

the pressure shows a great deal more skill than the removal

of flaked knives from a core. Yet these two operations are

very closely related.

In trying to make Folsom points I work first with flaked knives

from a core and then try doing the same thing on a chipped point.

Although they are closely related there is a very definite

difference and problem for with the Folsom point I am working

with such a small thin piece of stone. Whether it is a specific tough or a little different holding problem, I have not as yet

determined, but I do find the tops of my folsom points will crush.

I have tried to abraid the top of the folsom ~~xx~~ point to free the flake, but this will weaken it too much and cause crushing.

It seems like it takes a lot more force to remove a flake from a thin flexible piece of stone like the projectile point and if you are successful in fluting one side you have so weakened your stone by taking off, perhaps, a third of it that you will break the point when you start to remove the flake from the opposite side. Yet Folsom man was able to do this repeatedly with a great deal of precision and all I am trying to do is make a replica or copy of Folsom point and learn their technique. The more I learn about this method, the more I feel that Modern man is really just a "Copy Cat" and did not really develop anything on his own. I have made some folsom points as good as some of the folsom points found, but I have never achieved the classic style of many of the points found showing superior workmanship. Folsom points had a polished edge and they were polished for the purpose of holding them in their clamps or vises. A polished piece will stand the pressure and it won't chip and will not set-up internal strains if there is some sharp projecting point on the edge or somewhat of a saw effect from the fresh flaking. Unless that is removed, it will set up internal strains and when you apply the pressure at the top and these strains are present and your longitudinal flake will never come off in one piece, in fact your point will nearly always break. When working a piece, if I break a point I keep right on breaking them in the same way until I am sure that what I am doing is wrong and that it is not just an accident or some imperfection in the stone. Sometime by this process of elimination I hope to learn their exact technique and understand better how they were able to free these flakes from the Folsom point. A Folsom point has certain characteristics that I have not been

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able to $\frac{1}{2}$ interpret properly, for one would have to have both the detached flake and the point to determine just what did happen. When one has only the flake or only the point he can just guess at what happened. And that is what I am doing now - guessing and guessing. I have been ~~explaining~~ doing this for many years and some time I hope to be able to guess as well as they did.

I saw some of the flakes that Dr. H.H. Roberts excavated from the Lindenmeyer site in Colorado. These flakes had a polished surface and indicated that they were removed from the original projectile by pressure. If they had been removed by percussion and struck, it would have had ripple marks and percussion would also have knocked the far end of the point off because the operation works on the same principal as a teter board. If you strike on one end, the other end receives the same amount of shock. So the Folsom point was made by pressure and was held in some sort of a vise arrangement and there was a prepared platform which was a $\frac{1}{2}$ polished surface to withstand the pressure. and they had a method of figuring the angle which enable them to ^{REMOVE} kick the flake out at the bottom rather than having it turn back under. ^{WHICH IS} The natural tendency of a flake is to curve towards the one applying pressure or towards the working piece of stone.

It is a cone and it has a tendency to spread out and become cone-like in shape and even though you carry the flake the full length it still has that tendency to pull back underneath/ There is a certain amount of tearing as a flake is removed and it must be remember that obsidian is a somewhat flexible material. Obsidian will do a lot of bending before it breaks. Ancient man was able to bend the material and when the folsom point was finished they had a perfect concave effect similar to a lens. If you run your fingers the full length of the fluts on both sides you will find that it swells and comes back in fairly close towards the basal

portion of where the pressure was applied. They were able to remove this bulb when they polished this little projection at the top of their point or at the basal portion of it. That established a portion of this which you might say would be the bulb or the cone. And with this cone they were able to hold it in fairly close. And by making this close enough, it kept it from spreading out and they were also able to guide this with a little more precision and accuracy. There is no apparent way of placing it on the ground if it was or put it in the sand or put your foot on it or something like that for removing this flake because if you do with the amount of stone that is broken it would completely shatter the point.

There are times when I have applied pressure on these that a flake will run the full length of it and it will come to the surface there will be almost no outward pressure. and I will attempt to do the same thing again and it will just crush, it will break off short and kick out. And yet as near as I can tell my method of doing this are exactly the same, my stone is the same all conditions apparently are the same but there is something lacking in my technique. I shall continue my practice until I someday understand exactly what is happening. After I understand it, I might find that it is even a simpler process than I am now using but there are certain mechanics and laws of physics in these materials that will always remain the same. If the stone is the same, the laws will remain the same, ~~xxxx~~ Ancient man had a knowledge and understanding of these materials that we today, even with all our skills and chemistry, cannot match. There were some ancient man that were not just workman making a tool, but were actually artists in their skill. There were even tribal characteristics that definitely show in some points. You will also find carelessly made ~~xxx~~ points. Some of the

THE FLAKE

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ancient men took pride in the making of their points, while others were not so adept and not so particular. Some of these men developed a skill in making these points that we cannot understand today. Even our Plains Indians and recent Indians were not able to do this fluting and making of the ~~fl~~ flaked knives. Even as high a developed culture as the Hopewellian peoples and the Mount buildinger of Ohio could not do this type of work. They made some little flaked knives - very tiny and very simple things compared with the Aztecs and the Myans and the Myans did very simple work compared to the Folsom man. To understand why the art of flintworking degenerated instead of improving is hard to understand. Maybe in Folsom time the game was more plentiful and man had a lot of time on his hands and some of his work was done for arts sake as well as utilitarian.

The Folsom point was a very satisfactory tool. When it was hafted it held very firmly and he could use it as an adde adde or a spear and he was able to kill sabre toothed tigrs and we know that he killed elephants and giant bison, a now extinct bison much larger than anything that lives today. Piles of bone containing as many as hundred of these animals have been found that were killed by Folsom man and his Folsom point. This point was his only weapon against these high beasts and it was very adequate. This was apparently used for many many years until the coming of the bow and arrow and the Plains Indians