1st Tape

CONES

I am going to attempt to explain some of the behaviors of lithic materials in relation to the aboriginals stoneworking. We found that the cone has become an integral part of the flintworking industry. It is as important as a sentence is to a composition. If we have a better understanding of the mechanics of lithic materials I feel that we will be able to better understand flake assemblages and debitage left by the aboriginals. The material that we are going to be concerned with is commonly called flint, silex numerous other names but it is a solid that has the qualities of a liquid, and the more viscous liquid or the more viscous the solid is the more granular the solid. The glassier more vitreous the solid ~~why~~ the the finer crystalization. It is of a less viscosity, less viscous, so in applying force to these materials we have certain wave patterns that develop certain very definite forms and mechanics that are involved that appear to be constant. ~~So~~ We are assuming that ~~the cone,~~ the angles of the cone~~,~~ are going to be constant at all times. So with this experiment we have applied force directly on the face of ~~a~~ this transparent block of glass. ~~We have made this transparent so we are able~~ in order to see through this to see what does happen. As the force is applied from the top it's ~~extended~~ distended in both directions at fixed angles, but since the material has these ~~plastic~~ elastic qualities we get certain curvatures at the distal end. We also get a pulling away from the cohesion the molecular attraction of the material so we don't get actually straight lines. Normally there has been the conception that everything is calculated in straight line movement in the removing of flakes from tools or of blades from cores. It is shown by these experiments that one must relate the direction of force by terminating the direction of force in an angle. The angle is going to be triangulate, it's going to be like that ~~if~~ you ~~were~~ are shooting a cue ball with a forked cue stick. The single cone in the center or striking this in the center ~~was~~ is going to result in the base of it being perfectly round. If this same force is applied on the edge, we will have a half of a cone. If it is applied to the corner, we will develop a quarter of a cone. The problems that this brings out is how are we going to get a parallel sided flake from this corner? This will be shown further in the experiments as to how one is going to control the behavior of a cone if one is going to be able to take a part of a cone and be able to make it in any

referring to drawing on chalkboard

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dimension. Both thickness, length and width then we can make any artifact type ~~like~~ by incorporating the various cone types to the artifact. This is a single cone showing the truncation at the top portion of the cone. This truncation is the portion that receives either the impact or the force. For instance, with a truncation such as this at the top surface of the glass block, if it was struck by a hammerstone this apex of the cone would be the contacting part of the hammerstone, directly downward, and radiating out in all directions creating the cone.

Aboriginal man in his first work which he used sharp flakes and in order to strike these why he most certainly started with just rough cobble rocks or natural material and he was interested in a flake with a sharp cutting edge. With that ~~it~~ he could accomplish~~ed~~ many things.

This drawing shows the direction of the blow in order to remove a flake from a cobble, not directly down. From a rounded surface you can see how unlikely ~~that~~ it could ever be that you could direct ~~a~~ the force in this angle and remove a cone from ~~this part~~ the end of the cobble. This is most impossible to shear one using this manner. If it's struck straight down then part of your cone is going to go this way into the body of the cobble this is the type of flake you will get showing the same thing on this side. This is just a diagrammatic sketch of a cone. actually your flake will be removed from this portion here the end of the cobble having some of the cortex, if it sets slightly at an angle you have a very satisfactory knife that is useful for ~~almost~~ most anything. We can move over and show some different cone types and the behavior of other forces in determining what types of cones and what techniques were used to remove certain types of flakes. This is a conical type of core, this can be biconical as well with the forces being directed both directions. This ~~type ngt~~ drawing shows the type of blade removal by the use of a straight downward force, the point of impact will be near the platform which received the impact. Since you will want this flake to spread you will have to have a wider contact surface. This can be prepared either by flaking or specially devised implements to provide the force. These are directed all down. This will be the angle of your platform on the resultant blade. This is the ~~depositing~~ positive, your blade will be the negative side, this will have show the negative scar. We normally have only the flake scars to show the techniques unless we have collected a flake assemblage to make the final

blackboard drawings

interpretation. Another way to direct the force is to direct it at an angle but to take a straight blade off of the side, ~~this~~ the platform must be prepared at an angle so the force may be directed without ricocheting off the edge. And this is what happens is the sliding, if you use a flat surface a right angled surface, ~~this~~ the platform must be less than the right angled surface in order to remove these blades. So the platform of ~~thax~~ this Hopewellian core is not going to be like this conical core. They will be different. This drawing shows ~~is~~ the cone which is turned on edge by changing the platform here in order to remove blades ~~such as this~~ from this type of a core. Now there is one that is considerably more complex and that is the core types from the Valley of Mexico. These are ~~only~~ normally done in obsidian. They are very ~~xtxixkg~~ straight sided, they're polygons, polyhedral cores because of the multiple facets around the cylinder. These are somewhat submarine shaped and it's a common conception that these blades are just merely struck off using direct downward pressure. This is, however, not the case as our experiments have shown. When just straight downward pressure is applied to a platform on the corner of the core, a flake or a cone such as in the conical core ~~this~~ will come off. The distal end of the core will be severed, but by applying outward pressure simultaneously with the downward pressure, the cone ~~that is shaped like this or like this~~ is going to be turned up ~~and~~ as the outward pressure is applied. These forces must be coordinated in such a manner that this is going to be the angle. Your angle of the cone is going to change ~~xx~~ so it adapts itself to this lateral face of the polyhedral core. Then in order to create even parallel sided blades with certain dimensions, some trapezoidal, some triangular in section you must preplan and create a surface which will hold together your forces without allowing them to dissipate and create a shell-like ~~fax~~ fracture. So by having these ridges on the lateral face the forces are so contained that the sides of the blades will be parallel as they are removed. Another thing is the termination of the forces ~~to the point between this point and this point~~ from the proximal to the distal end is so critical that any miscalculation can cause the core, the distal end, to be severed because the material has these qualities of a plastic and it does bend and as ~~it~~ the force comes to the distal end ~~it~~ and moves outward it will snip the distal end of the core off, while if ~~it~~ the tip of the tool is set back the other way away from the edge slightly, it will terminate too short and the distal end of the core will become very

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large. AT the ~~base~~ top or platform of the core there is an indentation called bulb of percussion, bulb of pressure or merely a bulb of force. These little overhangs must be removed each time so a true cone part can be designed in placing the tool and creating platfomms for the additional flakes. The material as it is removed, this drawing shows the last blade being removed showing these little lines along the sides on both edges here. These are evenly spaced, they're extremely close together - most of them are the same length they have a slight sweep generally upward towards the point that the force was applied. But these little marks on the edges of a blade are very useful to show the order in which the blades were detached. There has been a fissuring. We might call these fissures along the edge and is similar to glaciation of ice moving down a valley, as it is moving down the valley these hang up on the edges causing these fissures to be directed back up to the point of force. There are also these little ripples showing compression in the center as it is being removed. By intersecting the radius of these little ripples or these slight arcs and projecting ~~the~~ a line directly at right angles with the tangent, ~~it~~ will show also the point that force was applied. So there are two ways to determine that one axis or one direction that force was applied, but it doesn't show the outward pressure or the angle at which the force was struck. But it does show the vertical angle as to how the force was applied. This is most ~~usual~~ useful for flake parts and intersecting flakes, is to study these little lines to determine what the sequence was, what stage and phase in the production of an artifact did this particular broken piece of stone play.] I might show you some of the experiments that we have done. This is a cone that has been removed from a piece of glass, this one with the cone still being attached. This part of the cone the upper surface of the cone the angle seems to remain consistent with numerous experiments that have been done, we have removed many hundreds of cones. We find ~~that~~ by increasing the velocity the cone is merely shattered. Sometimes the lips are pulled apart, sometimes it explodes by increasing the velocity, but the forces seem to be radiating outward equally in ~~both~~ all directions. This ~~one~~ cone wasn't struck exactly in the center causing it to be malformed slightly. This one fits in the side here but the direction of force was directed slightly in this angle rather than exactly vertical causing it to be slightly distorted. This one shows where it has been, it's exactly ~~spherical~~ Round, if ~~you~~ I

Is it really similar to glaciation?

blackboard drawings

showing actual specimen

can hold something behind this glass, it might show the cone type, the ~~sphere~~ circle formed by the bottom of the cone. This will be the edge view showing the angles of the cone. This ~~one~~ shows another ~~type of a~~ cone, look at the edge view showing the compression rings around the top of the cone as the material was compressed, this was the same as tossing a pebble into a still pool of water and the faster that it is thrown into the pool the greater the splash, so the slower that we can apply the pressure the fewer of these rings, of compression rings, that one is going to find. ~~Also showing~~ This glass block shows the half cone on this edge and see as force was directed directly downward against ~~this~~ the leading edge you see the spreading of the cone underneath. I might set a cone against the flake scar to show ~~to show one, this approximately~~ the position ~~in~~ and the spreading. This is the type of flake that results (delete? from this type of a blow.) You have the flake scar, if you don't have the flake ~~but~~ you can reconstruct it or if you have the flake you can reconstruct the scar on the tool. But these are bi-pointed flakes they're most useful with certain cultures. ~~is that a~~ Flakes such as this we call them ~~a~~ side struck flakes and they are bi-pointed. This same glass block shows the corner or the quarter of a ~~core~~ cone, on this edge it's a little difficult to see here if I can get a proper background showing ~~this~~ the type of ~~a core~~ flake taken from here. This particular block shows a series of flakes or half cones being taken from the edge with a slight overlapping **showing** the usefulness of the cone in relating aboriginal work to various cone types and designing flakes. We ~~are trying~~ have tried to making a cone to show on a block of actual stone material, this is a piece of obsidian. Before this flake was removed we've taken a hammerstone and struck directly down on the face to produce a cone inside. There's no apparent fracture from the outside, there's a white mark of the shattering of the hammerstone right in this position here. But underneath this we will find a cone and by removing this blade we see the ~~remnant~~ Remanent of the cone inside of the piece of stone. The truncation at the top is the ~~amount~~ area of impact that was on the top of the cone. Now this of course relates back to the cobbles in order to remove flakes and to guide them since this surface was fairly flat and a blow was struck on the top of this we get a usable flake that can be modified into many different styles of tools and cutting implements, scrapers all sorts of things. This is the point of impact. This is another flake and is a ~~the~~ portion of a cone, this is a half a cone , you see that the undulations the ripples on here when these are intersected in a line projected to the top at right angles ~~due~~ to the tangency of the arc will show the point that received the force. Should you find a fragment of this flake and you see these lines you can still interpret the direction of the force although you might not be too accurate in determining the entire dimension of the flake, but at least it will give you a good idea ~~of~~ as to what the direction was and what part it did play in the tool manufacturing.

This one ~~is to~~ shows this particular core a conical core, it's done by percussion. It has a flake surface on the top, there are many different styles of creating a surface, some of them being a natural cortex to prevent the tool from sliding. But this one was done by striking directly downward on the edge, which results in a conical type of core. These little bladelets on the side most useful as tools and cutting implements. But you can see the compression ~~that~~ which in many cases indicates that it was removed by percussion because of the splashing and excessive rippling that you will see in this material, ~~But~~ that you don't find, in pressure work, it's not nearly as obvious, much of it is very smooth. See the truncation of the cone, this is, of course, the flake scar. The cone had gone with the flake. The part of the cone always goes with the flake and the truncated part of the cone is also accompanying the flake. I might show here in this diagram here we could do an overlay, it's a little ~~scheme~~ Steep. This will be the cone be cut off at the top will be truncated and this will be your bulb underneath the top/at the ~~distal~~ proximal end of the ~~cone~~ core. This one represents the Hopwellian style and a change of an angle less than a right angle or 90 degrees. This is an ~~original~~ aboriginal core. We might show the other one which is experimental glass material, the angle is slightly steeper on that ~~side~~ platform showing the flakes, little blades that they have removed. This one the glass core also shows where we have made use of a corner for our first blade~~s~~ to guide additional blades. Now this Hopewellian type core one doesn't take nearly the outward pressure that a flat surfaced ~~cone~~ core would, but you must still compensate in the same manner in removing blades from this but each angle that you have here you must compensate for differently with your downward and outward forces in order to get a blade removed from the proximal to the distal end of the core. This is one of the polyhedral core~~s~~ made in our experiments, here we may position this one along side the ~~other~~ drawing of one. This ~~one~~ core shows a right angled surface on the top, with portions of the cones. And this was done by both the use of downward and outward forces in order to make a ~~cone~~ core such as this.

~~Here~~ If we ~~have~~ had a greater magnification you ~~can~~ could see these little fissurings you could ~~can~~ also see the little waves but the waves are not nearly as prominent on a core such as this, as they are in those that were removed by direct percussion. This is a ~~singular~~ rectangular core showing the initial work, ~~it~~ was abandoned ~~by~~ because of miscalculations and crushing of the top. This crushing at the top was caused by too much outward pressure as you can see this fissuring once its been or ruined ~~lost~~ then the whole top of the core must be rejuvenated at a line below where the crushed area is before additional blades maybe removed from the core. As you will note on this core there are little imperfections within the stone probably as it was released from the volcano it was at a temperature greater than some of the finer ~~grade~~ grained obsidians. This particular piece is from Iceland, it has little amygdaloids of crystobolite, As the force is being applied down the side and it strikes one of these amygdaloid areas or these little imperfections it causes little gull wings to appear these are like eddies as the material is moving ahead it leaves a mark just like the breast of the gull and it is inverted toward the direction of the force which is another way of determining the direction of force is by these little gull wings or these little eddies with the breast of the sea gull pointed towards the proximal end of the core. If the angle is too much downward we get another type of a break.

This shows the ~~is~~ severing of the distal end of the core a polyhedral core, I'll put ~~these~~ this blade back on. The downward force has been too great and you can see what has happened you can see this great undulation as the material is weakening ~~and section of a point here to this portion~~. We get quite a wave in this area here at the distal end of the core before it actually severs the core. This core is still usable but it will make much shorter blades. This was an experiment done in glass to study bifringance but it works very well for our experiments because the texture is uniform and can be depended on and so that's why some of the material has been done in glass so that we have a uniformity and consistency in materials.

This is a blade removed from a polyhedral core, notice the dimensions of this one it's approximately 8 inches long and shows the curvature as a small amount of the material at the distal end of the core is released or the distal end of the core is severed. The slightest miscalculation will cause this to happen. What one normally wants is a fine termination at the end of each blade which is uniform. Another example here is where the force was dissipated before it had arrived at the end with too much outward pressure and not enough downward pressure. You can see the face of this, this is ~~most interesting are these~~ a hinge fracture. I'll turn this ~~over~~ sideways so one may see this hinge fracture. You can see the face recurves clear back up toward the base, I mean towards the ~~base~~ platform it makes a complete sweep almost a 180 degree break as the material is pulled out and downward, this is quite typical of the distal ends of burins, and burin~~s~~ cores. They of course are made on much thinner flakes or tabular pieces of stone and they took advantage of this type of break and were able to design this type of break for their particular needs. As the platform ~~was~~ is being prepared each time, one removes the overhang so that the tool is positioned very correctly and it must be placed exactly in line with the ridges depending on the type of ~~bla~~ blade that you want. If you want a trapezoidal blade it's placed directly between the two ridges. If you want a triangulate blade it's placed directly above the ridges, then these will follow down the ridges and they will hold the material together and also guide the forces, and they will go/~~to~~ towards the points of least resistance and by creating these ridges those are the areas of least resistance so in that one a blade may be removed. You notice the ~~extending~~ distending quality ~~of~~ at the distal end of this core. There have been probably several hundred bladelets removed from this core and this is the last ~~remnant~~ Remanent of it. And your curvature becomes greater as more material is taken from the proximal end of the core, and as more blades are removed, why the ~~curve~~ curvature becomes much greater. The first flakes or blades are much flatter than the subsequent blades.

The core preparation is quite interesting as to how you create these ridges where they're not already there. Once you have all of the outside removed you have a nice polyhedral core, it's not any particular problem to take off repeated blades all around the perimeter of the core, but it's to prepare the core and arrange it so that blades may be taken off of it. It creates many problems. This is how some of them are overcome. A straight ridge was created here by removing these flakes from the outside and by removing flakes from this side. This will be the platform ~~that the~~ from which the first blade will be taken off. This doesn't look a great deal like a blade because it's flaked from both sides, from both directions but it's from the center and not from the ~~later~~ LATERAL edges of the blade. This material is ~~modeled~~ mottled and in the camera may show a slight distortion , it's not of an even ~~texture~~ color, so if one will notice these are red spots in the sides so it does distort the picture to a degree. You see by pressure that there is an absence of xxdxxx undulations or ripples going down the xxx side. These ridges now are useful for removing the next two blades. These blades however will be triangulate in section because only the single ridge is followed. After these have been taken off then one can take off the trap~~a~~ezoidal blades that have a flat surface on them with the lateral edges being ~~at an~~ angular, that makes fine straight cutting edges. You might examine some of these and see that they can be removed with a lot of uniformity and regularity when one has the exact feel of ~~these.~~ the material. I think these are without exception trap~~a~~ezoidal in section. They have been stuck together with scotch tape they are so difficult to handle without ~~one~~ cutting ~~themself~~ oneself because as these blades are removed they are broken out to nothing sort of to the last molecule and it's probably the sharpest material created by man. It's much sharper than even our best razor blades. I don't know xxxxxif in the picture if you can see, it's probably a little far away, but it will show the platforms or the truncation of the cone, these are still parts of cones. It is hard to realize this, but they are still portions of the cone. This ~~one~~ blade is a little larger and perhaps one can seed See the angle of the flat surface on this edge, the bevel on either edge is trap~~a~~ezoidal in section. This is the truncated portion of the cone ~~by~~ at the proximal end of the flake. This can also be done in obsidian, they work equally well. One is a natural glass, one is a man made glass. Perhaps with this blade you can see the flat surface at the top with the beveled edges. These are very regular and extemely sharp. This is the portion of the cone at the top where force both downward and outward were applied in order to get a blade of this dimension. We also have other types of flakes or blades, these I suppose one would call a flake. And by the use of these types of thick flakes they were later modified into other artifacts such as scrapers, projectile points, multiple uses, each one provided the angle for the next cone or flake to be removed. You can see with a scar such as this that this is almost arrow pointed shaped, so much like the little Levallois flakes that they'd taken off and were used directly as projectiles without modification. This flake scar shows you the type of flake and the dimension of the flake that was removed. These were removed alternately and a mass such as this are a little larger. This flaking may be 30 or 40 flakes of equal dimension may be removed which are still parts of cones. Here is one of the flakes that we might do an overlap showing how a flake is removed and later maybe modify it into a projectile point by a slight amount of pressure retouching. And so this was used for economy sake to produce a large number of us~~e~~able flakes which are parts of cones. To show the difference in the compressing and the splashing of the liquid, this may seem a little far fetched of us speaking about vescosities and SAE ratings of stone which are solid but this still shows the properties one has. The flake scar on here showing the force being applied here, the direction of force and the undulations and the waves as the material is being compressed. This is done by percussion which makes many more undulations than do those made by pressure. Shows a flake scar starting at this end going back traveling across in this area almost the full width of the bifacial tool. We might illustrate by the use of a cone the direction of force, this one I will turn the edge towards one and will overlay a cone to show the angle. The cone is now placed in the flake scar and ~~by~~ projecting vertically ~~the blow of~~ above the cone will show the direction in which the artifact received the force. This only shows one angle, however, since we haven't ~~a conventional~~ a third dimensional camera but it's quite interesting in studying the flake scars and the sequence of the flakes and the overlapping of the flakes to see the ~~mold~~ method of manufacture of the artifact. We have another bifacial artifact, obsidian is a little difficult to photograph because~~e~~ of all the high lights and it also produces a silouette but it is most valuable to study all of the flake patterns that coarser grained materials don't show. We can also do the same thing with these showing these scars carrying across, occasionally we'll make the ~~cones~~ flakes meet in the center in order to thin the artifact. This one was done by the use of the core method showing the thinning that can be done by the use of direct percussion alone.

Cones can be produced of course by pressure,percussion,indirect percussion, pressure with the aid of percussion. This show~~ed~~s ~~by~~ the use of pressure. This is the hollowness or the truncation of the start of the cone as the force was directed down either side giving a hollowness underneath which makes a very fine scraper edge. This particular artifact shows various types of flake scars and different techniques. This material is a red ignimbrite. We might show the variety of flake scar patterns created by cones. If the conditions are the same the material is the same your force is the same each flake will be the same. And these rhythms of human behavior patterns and that are probably going to be just as diagnostic in following these certain patterns as some of the artifact forms. You see the dimensions how the flakes the large ones at the bottom are spaced the curvature and the termination, this style over here where they are spaced far apart one gets the shell like fracture such as this on the edges, each one being the same. The top part also shows another series, this is the crimping of the edges of this edge this is much the same as it was done the handles of the daggers in Europe are these alternate, opposite flake removal, which are taking off a little portion of little cones regularly all the way from one end to the other.

Shows the use of the ridges in directing the style of the cone. The cone will be removed. This was the first blade, one can tell by the overlap. The force was dissipated before it reached the distal end of this particular slab of material causing an obstruction for the next flake, on this side right here, it was turned upside down. This was the obstruction on this one here, so this distorted every flake all the way across. You can see because of this irregularity the next ones were slightly beyond to try to overcome this, but it is impossible to get it other than extended slightly ~~this~~ each time. And then because of another step fracture the little cone was truncated at the bottom, ~~but~~ at the distal end of the flake. But this can show you as to how the surface must be prearranged in order to get regular flakes that are even and true to form.

This is a larger example here showing repeated flake scars, this is done by pressure alone. These are pressed from building glass blocks. It blends slightly here to show the little cones at the top of each one as parts of cones directly down shows the spacing of the cone removal. You can carry it a little further showing meeting these on the opposite side. These projections at the tip will have to be further removed in order to get the proper platform. One may see as to how the edge was beveled, before the flakes were removed. This is the beveling of the edge before these flakes were taken across from the side. I have been working on experiments in replicating the Egyptian daggers, or the Egyptian knives and it's not all resolved as yet, but you can see the flake scars. One sets slightly ahead of the other giving a little S-shape to each one of the flakes. And these go from one side entirely across and terminate at the distal end here from this side to this side. You might remember that the flake scar that you see here is only half of the flake scar because the ridges were used to guide the next flake so the flake is twice the size of these that you see on the edges of the artifact. But these were done by hand held manual pressure and removed in that manner. This is ~~a~~ an artifact under different stage of completion and this shows where the pressure tool has been placed very close together following the ridges. All are still parts of cones even though they are most elongated. The outside of the artifact shows a different technique, different style, of flake removal. This is showing the edge the thickness of the artifact, in relation to the width. All of the results are not perfect by any means and you find that certain things happen that are most interesting. We find that ~~when~~ where force is created by this bifacial tool was done by the use of direct percussion occasionally you will overestimate the intensity or velocity of the blow and we get this sort of a thing happening. This shows as how the cone had carried clear through, and was going to spread as it reached the opposite edge making a break such as this. This is much the same as the side struck flake, or we have a little example here that we had showed you earlier on the similarity on the types of cones and the types of flakes. This is one a half cone off of our piece of glass as we showed a moment before on the same character the same type and so you can identify the similar types of force.. Only one was the greater than the other and the material was much more massive in order to produce that effect. You can also see the ~~worped~~ worked edges bifacially ~~worped~~ worked edges, it looks almost like a finished tool, but it's actually simply a mistake in making the artifact. This flake is most interesting too because it shows the dimension of the artifact, shows the exact width from ~~the~~ here the platform to the opposite edge. Since it wasn't broken and the artifact remodified why we know that it's not going to be any wider than this portion.

This was done by direct percussion and it was being thinned when this accident happened so instead of modifying the tool further and salvaging it why it looks like an interesting study of a flake and how they are removed from this side.