Wheat: May I make a comment here? These particular kind of end scrapers are continued over a very long period of time. Byers has them in his Bullbrook stuff and, of course, they go all the way from Clovis on down.

Wormington: Here's another one from Lindenmeier that I brought to show earlier.

Wheat: And one of the characteristic ways of hafting these is to put them in an L-shaped haft. From historic times there are a number of these. They are made out of elk antler and they were hafted in such a way that they have to be pulled back. You couldn't possibly push them forward. They have to be pulled back.

Bordes: All right.

Wormington: Perhaps we might go on to something else. This is some of the Ohio material from the Sawmill Site either late Paleo-Indian or very early Archaic or Transitional. And this is sort of a flat retouch that Don has been concerned with. I brought this as an example of this particular type of very flat thin retouch flake.

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Crabtree: The spacing of some of this retouch seems to be quite unique. Instead of using the ridge to guide the flake - other than on this one particular example of this Folsomoid shape - they used a technique of collateral flaking which did not involve using the ridge and, therefore, this allowed the flakes to spread. This shows fine control. Some of these examples show a rhythm and control of removing conchoidal flakes, and you can see the tearing and overlapping of the individual flakes as they were removed. They have been spaced alternately between the bulbs on the opposite side to provide strength and also to thin the artifact. On this side, the worker got a hinge fracture so he couldn't possibly continue with this pattern. It shows the different examples of flaking techniques. This type of flaking seems characteristic to this type of material. This very thin one also has the collateral style flaking and, again, ~~you will~~ notice the spacing of the flakes. One flake has been removed here and, in order to retain the ~~strength~~ strength of the material, he removed a flake on the opposite side which also gives a sinuous edge. He apparently changed angles on this one side and directed the force from the tip towards the base. The flakes are not quite directed straight in on one side, but there are two different examples of flaking shown on the one artifact. The others show a certain uniformity of surface flaking with well-spaced, well-controlled, collateral flakes but still leaving a thickness down the median line, apparently for strength. This ~~artifact~~ artifact demonstrates one of the many types of serrations. The force on the

edge was downward from one side and turned Then around and the same technique used on the edge on the other side. ~~on the edge~~. But the majority appear to have been made by percussion first with very little marginal pressure retouch. ~~But~~ This sort of edging shows the flakes were removed from the base to the tip, on one side of the artifact only. I think I should turn this over to Dr. Bordes now.

Wormington Well, I think that finishes it.

Bordes: Perhaps I will have something to say. Let me look at the tools. Most of this, I think can have been done by percussion; most of the tools here. But I wonder for some of these. This, for instance, I wonder if it is only percussion. It looks to me like a pressure flaking on this one especially ~~specially~~.

Crabtree: Well controlled.

Bordes: And this one too. Ya, ya, ya. This tool seems to me to have been made or finished by pressure. But most of the others seems to have been just percussion. Ya, good percussion mainly with this material. This one also could very well be made only by percussion with perhaps some pressure to finish the end. And that with this big denticulation. I think it is rather pressure denticulation than percussion. It is too sharp and too hollow even with a very flat pebble it is very difficult to get that without breaking the tips, the points. Well, that is about all I have to say.

Tixier: Do you know, Miss Wormington, that exactly this type of tool does exist in the Eastern coast of the Mediterranean coast of Lebanon. Neolithic. Do you know?

Wormington: It's a type that is very wide spread in time and in space in North America too. I guess that finishes the North American material. I do have a few examples from El Jobo in Venezuela here that we might consider next. This is North American, perhaps we might just look at this. This so called Nebo Hill type and this is identified as a gouge. It is consistently associated with these points, Unfortunately we have no firm dates for them.

Bordes: Pressure. No. Not quite, not quite. Well this tool looks at first sight like a Campagnion tranchet but it is not. It's lacking the lateral blow here that would cut here and give a very sharp edge. That is something different technique only to get the same result. And this point is beautiful with this retouched tip very, very pointed. The one who did that was really mean.

Crabtree: This one appears to have been made by percussion and retouched on the ends. Notice how he guided his flake to save losing his tip. Directing the force from the tip to the base with very small flakes for the retouched edge. It appears to be by percussion for it is impossible to remove flakes of this size by pressure.

Bordes: I agree. I agree with Don, no question.

Wormington: Well that finishes the North American material then we can go on to this El Jobo material from Venezuela. These bifacially flaked objects occur in great quantities and a wide range of sizes Many are much larger than this. And these are also very

characteristic with this curved base and this ridge carenate.

Bordes: Well, this one is very strange. It looks like an elongated Mousterian slug but then you could call it a working slug, you know. That is very special and I have never seen anything like it except perhaps in some Campagnion tools but they are much cruder than that. Not so well worked. That's strange.

Wormington: A very characteristic form and I don't know of any other occurances of it outside El Jobo.

Bordes: Like that? Exactly like that slug. But this kind of a tool made on a convex flake can be found in some Campagnion in France. Whatever Campagnion is. Some say it is early Neolithic, others say it is just a facet of Neolithic.

Wormington: Does anyone else know of any New World occurances of this?

Henry Irwin: I think Mueller-Beck has some material like that.

Wormington: From where?

Henry Irwin: I couldn't exactly say from some of the sites that he worked in Columbia. But perhaps Bordes knows more about that.

Bordes: No, I don't know. I don't know.

Crabtree: Dr. Bordes, while you are examining these, would you say that, instead of a blade technique being used, that a side struck flake technique was used to form that edge? I don't know about function, However, with the abrading from this edge and having a curved outward surface, it

would be difficult to determine a functional use for this artifact. It's a very difficult thing to analyze.

Bordes: Certainly this one was not made on a blade, but on a flake. A short flake with a big bulb or perhaps on a terminal flake. I don't know.

Crabtree: Is there any sign of abrasion on the ends? Could it have been hafted like the adz to be used like a pick which would give great strength.

Bordes: Well, there is some trace of use at the point but not very heavy. This side is more crushed but not very much. Strange thing. Yea, that's what I mean for this one. Could be a natural fracture. It could be that they took advantage of the ~~ground~~ ground fracture terminal fractures of this kind of material.

Wheat: I would like to postulate a potential use for this thing. If this were hafted on a shaft in such a manner that only the tip itself was fastened like this, this would produce a beautiful barbed hook for the taking of large fish or crocodiles, alligators or this sort of thing - something fairly large, iguanas that might otherwise get off, so that an analysis of the wear pattern of the thing itself might indicate that it was hafted.

Bordes: Something like the curvetron points in the Upper Paleolithic in France. That could well be, for big fishes.

Phil Smith: Marie, you might take a look at some tings which escaped Thompson from Kharga Oasis in Egypt in the so-called Neolithic. They have the inverted arch, concave, beveled flakes which are retouched. Somewhat reminiscent of that of El Jobo although not precisely like those.

Wormington: Then this brings us to the El Inga material from Ecuador. This is material sent by Mayer-Oaks and Bell. As I am sure you are aware, the points that are found with this have a shape like a Fells Cave Point but are almost invariably fluted. Mayer-Oaks and Bell are reluctant, for some reason, to use the term blade and do not wish to call these blades. And it certainly seems to me that they are blades. I would like comments on this. They have also identified some of these objects as burins, and I think that they would be very interested in your comments as to whether they are burins, and are they blades.

Bordes: There is no question that this is a blade. If that is not a blade, I don't know what a blade is.

Wormington: That's my feeling too.

Bordes: And you have a burin on this rigid blade, which is a preparation. And as for burins I can see at least two beautiful ones. Here is a nice burin on the concave truncation on this side. There is another burin on the convex truncation on the other side of the same tool. A double burin. This one, except that it is in obsidian, could belong in most of the Upper Paleolithic culture in France. This one also is a nice burin on a concave truncation. And they are all over. No. One is double, the other is single. That is also a burin on a fracture. That's also a type well known here. Let's see. That's just a blade. That is probably a burin spall, no question. I am not sure, but it can well be one, yes. Yes, that's one. Another burin on the concave truncation. This one is not so good, but it could well be. Yes, it is one also, that's a burin of obsidian and of obsidian it is not so easy to make burins. And once again it is not easy to make burins in flint. No, that's just a blade, I think.

Tixier: Looks like Scams Cave.

Bordes: That probably is another one. Here is one broken. Broken but that was one double. That's a blade. Let me see. If you put them back again at the same time I take them off, we can do that way for a very long time. That's a bit of blade too. No. No. That's a blade, yes. And that. That's a burin spall, I think. A big burin spall.

Sonneville Bordes: What's this?

Bordes: Could be one, too.

Wormington: The dates are running about ...

Henry Irwin: There are a variety of dates.

Wormington: Yes.

Henry Irwin: We prefer the date of 6000 B.C.

Bordes: And what of the other dates? Younger?

Phil Smith: Younger. And older, the obsidian dates are older. They are around 11,000.

Bordes: That could be a burin spall. That is just an inverse truncation.

Tixier: Yes, and Senor Frey or Leakey

Bordes: Please don't speak of this man!

Tixier: I speak of Senor Frey and Leakey

Bordes: Next we'll speak of folklore. Yes I would say there are a lot of ~~blades~~ and a lot of burins in here. Would you care to comment. Yes, you are specialist of the Upper Paleolithic after all.

Sonneville Bordes: I am speaking for ~~Cambier~~ Combier. For this little tool he is thinking it is prepared a little like the Noille burins because of this truncation and size.

Tixier: Because of the flatness of the flake only, I think.

Sonneville Bordes: Yes.

Tixier: ~~And~~ But there is no notch. Oui.

Sonneville Bordes: Yes, but

Cambier & Tixier: (French)

Bordes: There is a lot of burins.

Sonneville Bordes: Yes.

Bordes: This one, this burin spall, is interesting because it shows a lot of preparation of the flake, the blade, before taking off the burin spall. And this has very often been mistaken for a tool. This is not a tool. Just a technical preparation.

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Tixier: (French)

Bordes: Because just suppose I take this blade and I want to make a burin on it. Well, I made a truncation here. But if I leave this angle here, the burin will not go. I have to retouch, put it straight, like that, and then it is very easy to get the burin spall out and prepare a burin. And it will give you this kind of burin spall with retouch which has been supposed by many people to be special type of tool. But it's just a technical trick.

This a correction added to original sheet as this paragraph was omitted on original sheet.

(then to page 124)

Sonneville Bordes: This, as my husband said, it is just what you can put in the preparation.

Bordes: No question, they are burins.

Sonneville Bordes: It is quite well.

Tixier: It is the first time two such burins are found in the industry?

Wormington: The first that I know of.

Irwin Williams: I think either this afternoon or tomorrow, we will have a chance to look at some burins of quite different types but certainly burins from an industry possibly with the equivalent age in Mexico. Apparently burins of one type or another are very widely spread, but rather spottily distributed in the New World. We get them both with blades and without blades. Sometimes just made on flakes. I wonder if anyone would like to comment on possible methods of producing these kinds of blades.

Crabtree: Some percussion. This is quite typical of producing blades by percussion. You can see the compression and there was almost no preparation. They left them very thick but you still get a great deal of compression. ~~If you'll notice~~ notice the little undulating lines on these. They appear to be flat on the surface and the cores would probably be quite conical when they ~~had finished~~ were abandoned. They apparently used fairly thin tabular pieces in order to get the thickness of the blade with these single ridges, for there is no regularity of form. More indiscriminate percussion. Yet, for a certain purpose, they did desire, apparently, these thick blades. So they would have to have a quite narrow core in order to produce this particular type of tool.

Irving: I had occasion to look over Mayer-Oaks' surface collection of El Inga at one time. I looked thru a good portion of it, and I didn't see anything that reminded me of a blade core. Many, many burins have a great variety of shapes but nothing that I would call a blade core. Now, I am not sure how that scores with the identification of some of these as blades. Could many of them be, perhaps, burin spalls, or is this getting too technical.

Crabtree: This appears to be a very narrow tabular form of obsidian, and, therefore, the cores would have been utilized. I doubt very much whether a core would be found where one was accomplishing this type of a very thick blade. The one that Dr. Bordes has may be the last of the core. So you would go to the end of the thick tabular flake in order to remove a burin spall to get this thickness. From a cylindrical

or rectangular core, it wouldn't be possible to recognize anything that could be determined as a core to get this type of flake. It must be a fairly thick flake to serve as a core to make a blade of this thickness. So the thick tabular flake would have been utilized to produce these. So it would be hardly identifiable as a core when they had completed and utilized what material they had on hand. That would be my feeling of this type of a blade technique and it is certainly a blade technique that they did use.

Irving: That would seem to explain it. Thank you.

Bordes: There is no question that it is a blade technique. There is a preparation of the side of the core.

Crabtree: Yes.

Bordes: There is no question about it. But now perhaps they went on and on until the core was just finished and then made it into their burins.

Crabtree: Dr. Bordes, there seems to be no regularity of preparation on any of the ends of detaching these. Just by percussion taking these and following these heavy ridges in order to guide this type and to get the thickness of flakes.

Bordes: It is not a very good blade technique they have, but it is a blade technique all right.

Wormington: This is Mayer-Oaks' surface material. I was reluctant to transport any excavated material. The plane might go down or something.

Sonneville Bordes: (French)

Wormington: There are points with the shape of the Fells Cave. Could someone get one of the Fells Cave casts? But also fluted. And there are, I believe, a variety of side scrapers and, I think, some end scrapers but I have not seen the full assemblage.

Henry Irwin: (French)

Bordes: Ya, fishes.

Wormington: Yes, but here these are Fells Cave materials. These are unfluted in association with this we have the same shape, but fluted.

Bordes: This one is perhaps, I am not sure.

Wormington: Well, there is basal thinning on the Fells Cave material but on the El Inga material there is real fluting.

Bordes: That's cast.

Crabtree: This point here is good for comparison. It demonstrates how, from a stemmed projectile point, the thinning was done on either side. However, this shouldn't be confused with the El Inga material because the form is entirely wrong.

Wormington: That is the type of fluting though.

Crabtree: Well you would know better than I because I have never seen this material.

Wormington: Well, I guess that wraps it up.

Bordes: Who is presenting this material? Okay, let him speak and speak clearly.

IRWIN Collection (Hell Gap)

Henry Irwin: The collection that is front of Bordes, Tixier and Crabtree is all from the site of Hell Gap. Earliest date on this site is 9000 B.C. The latest date on the horizon that is represented here is 8000 B.C. There are the later industries. I brought collections, not necessarily representative in terms of statistical counts. This collection is largely aimed around the formation of projectile points. You get in this corner, these are blanks. Now these tools and the collection, in general, is fairly representative of all we term Paleo-Indian, at least in the Plains area of the United States. I think many of the types correspond with those found in Eastern United States with which I am not very familiar. These end scrapers, which are statistically not too numerous, the side scrapers which are numerous. The technology - if I start on this end, you have these large cores and these cores resemble, in some small fashion, Levallois cores. But, if you consider them Levallois cores, they really aren't very classic. They removed large flakes which are also typologically Levallois flakes. I brought one here. There is a little faceting on the butt here. Notice that this platform is ground, before the removal. This is an extremely characteristic aspect of the Paleo-Indian technology. This flake is Levallois, but as I say, the technique, if you want to call it Levallois, is sloppy. The blades, in addition, which occur are not as good as the blades from the Clovis horizon. They also are sloppy, there are some here. And they were probably removed from cores such as this one that I had there. There's another core here. They would, as Don says, simply follow down, with the percussion stroke, down a ridge and they would retouch these blades into side scrapers and retouched blades. Also they like to produce large wide flakes which they could make into side scrapers and things. There are some tools on the end here which are rather interesting and characteristic of only one of the horizons. These, as I said, these horizons are mixed. This goes thru (through) a number of so-called recognized Paleo-Indian groups even Scotts Bluff what used to be called Angostura, Agate Basin, Midland, Hell Gap, a complex called Alberta and the projectile points from these, some of them, are down in this corner. Now more interesting

than the projectile points somewhere are the beginning stages of these projectile points which you can see are up in this corner here. These are blanks from Agate Basin points, that were broken in manufacture. Here this great long thing is a blank for an Eden point and it was an ambitious project. I think it belongs to Eden points, and the record is about nine and one-half inches. This would have been eleven if he, well presuming he had gone down maybe only ten, if he had peeled it down a little bit. We found the flakes which have been removed from this and we have been fitting them back together just to get an idea of the technology of it. One thing that is important and a great problem of the American typeologist is distinguishing between things which were cutting implements like knives. I brought two or three pieces which were probably knives, in this corner, and things which are blanks or unfinished points, such as this piece right here. This was probably going to be an Agate Basin point. It's a bad piece of stone; there is a hole in it here. This isn't very good. So, apparently, they just didn't finish it. Here are two of the complete points which would have been made from this form here. Here are other things which are commonly called knives, which were probably preforms. Here is a preform for one of these points here. You can see. Apparently, he broke it before he did the final touch. Again, this illustrates the progression of the technology. Up to this point it was almost all percussion. Some of the work from this point on was pressure. Now this point here is interesting from Don's point of view. This would have been an obliquely flaked point. They normally are. He was trying to turn his flakes here, and he kind of goofed. And he never got them quite around in the right angle. He got started on the wrong pattern and was never able to straighten out and also he broke it mid-stream. Here is an Eden point. This has a diamond shaped cross section. This also was broken in the manufacture. You can see the stage which is prior to the small edge retouch which characterizes most Eden points. Some of these things.

Bordes: That's quite normal. There, it has been heated.

Irwin: The scrapers are interesting because you have these generally rather short scrapers. They are also characteristic of everything from Lindenmeier down. You have the kind with a corner on it which is not quite one of these little spurs, but it ranges from something with no spurs, to something with distinct spurs which is probably functional. I am not quite sure about this particular one. There is one over here with a little spur. Often inside the little spur, although not in this one, you will have a little flaking where they apparently did some of the work on the plain face. And quite frequently you get a little notch lower down in the scraper. This tool here is also characteristic of Paleo-Indian. Apparently both East and West. Coe had one of these things. Quite frequently you not only get the single notch in here you get a double notch which makes it like a strangled blade and frequently this is broken giving some of the people the mistaken idea of a drill. In fact, it really isn't. These little things here are so called graving tips. I think

that if Byers has any of the Bullbrook stuff here, he will find that the distance between these two little points is rather similar. I don't know precisely why it is true, also of Lindenmeier measuring the distance between these points. They seem to always run about the same length or the same width. I don't know why. Here is another so-called knife. You can see that it is nicely finished, it is not a blank for a point or anything. Here is a rather large end scraper. Large end scrapers are fairly rare in Paleo-Indian, although apparently not in the East. At least in the West they are fairly rare. Over here are the retouched blades and these things, which I think I showed earlier, I don't know what they really are. They are finished tools, they are not blanks. They are not material that they bring back from the quarry. Some show use and edge retouch. I guess that is a good summary, unless you have further questions. I can, if anyone wants to know, point out the exact type of each one of these points later on that might be of interest. Oh, notice this burin on this projectile point. I think that there are two possibilities, one is impact and quite frequently you get an impact fracture. I have not made an experiment, largely because I have never had enough points to do this, although I've used some Archaic things to drive into the wall to see what kind of fracture you get. But this one, I think, was actually pounded on the top and this burin was caused by this pounding, for as you see this was quite a bit of pressure on the edge. Maybe this is something similar to the Piece Esquiellee that Doug Byers has. But it's not yet. I ~~that~~ that pretty well summarizes the general collection. There are a couple of cores; these cores are typical. Some of the cores appear in larger quantities. One problem with Paleo-Indian sites, and this includes the Lindemmeier site, is that most of the work was done at the quarry which is often some distance from the site. We do not get very large cores in the quarry. You can see. In the site itself, the quarries which we have been trying to investigate, which are a little hard to investigate, are quite numerous and, I think, this is true of Lindenmeier. So we don't know really what most of the larger cores look like. You want to say something?

Bordes: Oh, well, I can try to say something. Well, that's a beautiful array of material you have here. With a lot of different kinds of points. I won't try to remember all the names. I can't. That is out of my horizon. But things which are interesting. This is a scraper of some kind and these big things. About that - you want to know what they are. Well, they can be tools by themselves. Kind of knives or Laurel Leaf. In France, we call them Laurel Leaf. But you know really, how you say, this is just unfinished stuff. Even if it was, it could have been used like that. I would rather say that this was the first stage of that. And that the definitive point should have been about this width and this length. So it could well be that this is derived from that. That being the first stage. Then this one was a large one which is broken but also probably once finished would have been much smaller.

Irwin Williams: This material of ours from Hell Gap, we do get occasional pieces of this kind which have been finely retouched at the

edge. To presumably make a cutting edge which is why Henry thought they might be knives.

Henry Irwin: Well, if you look at the edge here, there is quite a bit of retouch.

Bordes: That is not retouch. No, no, no. What do you mean? That is just some kind of roughing of the edge before striking new blows. That is not really some special retouch.

Irwin Williams: We do get, however, some rather large relatively well-finished points.

Bordes: I won't say they are not bigger or Laurel Leaf shape, but knives that is quite possible. But I speak of this one. This one strikes me as a stage in percussion of smaller things like that. And then the blades, oh well, they are blades, not very good. And they were always struck, as you say, from this kind of flat blade core which is more like the Levallois blade core than the Upper Paleolithic blade core but can give you perfectly good blades sometimes as long as that. And then your flakes here. Some are Levallois-like. Not very good Levallois, but they are. Oh, this one was burnt. That 's a typical fracture of heating. That is quite typical.

Tixier: Not heat treating but overheated.

Bordes: They tried to treat it and burnt it - it has happened. Yes, that's a nice side scraper. That's a nice flake from making and mixing like that. No question. Typical with this.

Henry Irwin: Ground edge.

Bordes:= No, no. Not so much ground as this lip.

Henry Irwin: Yes, it is prepared but also notice that this platform has been exposed.

Bordes: Oh, exposed! I am not sure. It can be exposed just like that. With some blows with something. That you could find in the Solutrean. I don't think there is anything very special about it. Lots of side scrapers. Nice ones, beautiful ones. Yea, this also. That's a kind of bifacial side scraper, perhaps. That is also nice.

Henry Irwin: That's rare.

Bordes: No, no, no.

Henry Tixier: On purpose.

Irwin: There is one maybe.

Bordes: No, no. Not here. It doesn't matter.

Henry Irwin: ~~It's rare, anyway.~~ There is one maybe

Bordes: Could be. Side scraper on a blade, a retouched blade, as you like it. Not this one, but you have seen it. Ya, this is an end scraper on the notching. It's a kind of

composite scraper with convex and concave. Always small multiple borers like in the Lower Magdalenean. This one has a spine. That's one of these crazy ~~things~~ points.

Henry Irwin: Dr. Bordes, look at this, called the cutting edge. This causes a lot of confusion. This has the same shape and generally calssified both as knives. This is probably an unfinished point, and this a cutting tool.

Bordes: Ya, ya, but you want to be optimistic and I wanted to make a point, you know.

Henry Irwin: Sometimes we are stupid.

Bordes: Americans are all too optimistic. This one, you know, is a funny thing. It looks very much like La Quina bifacial scraper, small ones which are leaf-shaped with this big flat flake on one side. Of course, here there is some pressure retouch, that you would not find in a Quina scraper, but from this side it could very well come either from some La Quina culture or some Blatspetzen culture in Germany or from early Mousterian in Combe-Grenal.

Wormingtpn: Some are Hungarian material.

Bordes: Hungarian - not quite. Not quite. It's more, you know, like the Solutrean or most of those things - symmetrical. But this is not quite symmetrical. One side is just thin so you can hold it but there is no try to make it regular shape. That is only one edge which interested them. That's beautiful. A scraper with - not a knife, it is not cutting on the other edge, but it's rather abrupt retouch. What else. Oh, yes. You see it seems that the Americans were already infected with mass production. They have a lot of blanks and blanks and blinkety blanks. That's a thing which does not happen in France either in the Solutrean. They either finished a tool or they broke it and threw it away. But very, very seldom we find blanks. That is half-finished tools.

Henry Irwin: These are mostly broken, let me point out.

Bordes: This one is broken, yes.

Henry Irwin: We simply found both pieces.

Bordes: Yes, they are broken pieces.

Henry Irwin: You can see, for instance, on this one they got to the stage where they hit this imperfection.

Bordes: No, but what I mean is that I have read in American publications that very often, in the earth, you find a cache of blanks and so on that, to my knowledge, has never been found in France that we know of.

Jelinek: I think it probably reflects a difference in social situation of the tribe.

Bordes: Could ~~weal~~ well be.

Irving: A concentration of wealth.

Bordes: You know there are two interesting differences. There is this blank business and there is your quarries different from camping site. In France, I don't know, I never have seen something that would qualify as a quarry site distant from an occupation site. And that's one of the big differences, I think, between the European and the American Paleolithic.

Henry Irwin: They quite often are quite distinct. At the quarry site locally, for instance, you can turn over several hundred thousand flakes and never find a finished tool. If it is a finished tool it often is a very late finished tool from ~~Tepee~~ tepee period Indians.

Bordes: Yea, but that is not the case with us. Well, that is about all I have to say for now. Probably, when Crabtree will have pointed out which to him is obvious perhaps I will say well, I agree, I agree, I agree.

Crabtree: This material certainly ~~shows~~ displays a wide array of manufacturing techniques. It starts in with the core with several different techniques in blade detachment and there are three different platform preparations ~~here~~ shown. Notice the very small platform at the top. It is not as large as a grain of wheat, yet they removed a flake of this size, ~~which shows~~ a great deal of control and preparation to remove this much material. ~~This shows another side of the edge. And we have these quartz flakes~~. These two quartz flakes show a polishing of the edge, ~~but~~ and these three show a crushing of the flat platform and then here, ~~again~~ on these specimens they get away from the crushing. Here we have side struck flakes and we have the trimming flakes, as Dr. Bordes indicated. Here is one that is a little unique. Apparently they turned the flake up on one edge and ~~they have~~ there utilized the ridge in order to give it this conformity and this seems to be not too uncommon. This flake has been left with a wide distal end, apparently because they did not want a narrow portion in the center. But ~~it~~ makes a very ideal scraper having this edge which has been slightly retouched. Their thinning techniques are

makes a very ideal scraper

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very superb; their control of thinning where they took advantage of the step and the hinge fracture. This one shows a nice step fracture terminating it in the center by using the core tool method to do this remarkable thinning to bring the flakes in from the side to meet in the center. Starting to get a very thin blade like the solutrean sort of thing and coming in on this side to meet in the center. This one is an example like the one I was trying to find this morning, but we couldn't find it - with beautiful solutrean shoulder point techniques. This is a very typical technique used by Solutrean, however, their flaking was a little more direct without as much of the angle but the spacing seems to be same as the one Dr. Tixier showed me this morning. I'll go a little fast so that we can utilize our time well. They seem to be collateral flakes like Cynthia, Henry, and I were discussing of this type of spacing, using a complete flake rather than following ridges and yet keeping wonderful control on the edge. This one had apparently been retouched as a knife particularly on the one side, all from one side to give it a cutting plane like this and then redulled again so we have lost a lot of the character of the edge, and it looks like a reutilized biface, or knife, or something like that. Evidence of heat treatment in this particular one. These are quite characteristic of the Lindenmeier Site. The quartzites and the variety of materials show quite a range in diversification of utilization of materials. The flaking characteristics are very much the same. With the quartzite the flake characteristics are hardly identifiable because of the texture of the quartzite the flakes lose many of their characteristic features, while they are fairly obvious in flint. You'll notice the sharp deep indentations all the way thru in most of the examples. This is because of the way they have set their tools - to get a deep enough flake so that they can pop it off and the flakes will feather out. Almost no hinge fractures in any of these particular pieces. This one is a superb example of this type of flaking, but by the nature of the material, there is almost no detail shown. It looks almost like it was ground and polished Turn it edge wise on the light and you still have this same character but a longer, narrower flake. But they still don't appear to be a parallel flake type. They have very little slant. They are directed inward, towards the center. This specimen I didn't see earlier - the one Henry said was broken in making. In spite of being broken the control of the quartzite is very wonderful. This quartzite shows a little different preparation. This side shows basal polishing of this edge, but the well defined bulbs of this shows the last row of flakes that were detached. These flakes have a slight slant to prevent breaking the tip of the point. The flakes slanted toward the base. Point characteristics are not too obvious on this side, removal of flakes was backwards and inwards away from the tip on this particular point. The rest, I guess these are some of the Alberta style. These two at the top have little diagnostic value other than this one which was apparently shot whether they missed somebody and hit a rock, I don't know, but it is evidently a projectile point. I'll turn it over to somebody else, I think. That's all I can say on the flint working other than it is beautiful array of many different types represented in this collection.

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Wormington: What about this one?

Crabtree: It appears to be a percussion preform made from a tabular piece of stone instead of ~~it~~ being made from a single blade. It's done by the core method from a tabular form of material and it is most certainly a preform, or it hasn't been refined. But the spacing and the regularity of the flakes indicates it is a preform. Note the spacing of these very wide inward flakes, and instead of using the ridge, each one is a separate flake and there is no utilizing of the ridge for a parallel flake. It might be interesting to note that the parallel flaking technique would have flakes with straight sides. These have rounded sides or, what would you say, a convexity.

Cynthia Irwin Williams: I wonder if you would like to comment just from a purely technological point of view, how do you think for the first thing, those blades would have been produced? By what techniques?

Bordes: That is ~~rather~~ not very easy to do. As Crabtree pointed out there seems to have been several different techniques, but you know the experiments I have just made these days show me that it is very difficult sometime to make a distinction between one technique and the other. For instance, this I would say would be rather with a wood billet than something else.

~~Irwin~~ Tipier: ~~Before this congress.~~

Bordes: But this morning I took off a beautiful blade with a punch technique. And I got exactly that. So

~~Irwin~~ Tipier: It could be punch technique?

Bordes: Could be. One thing is definite; it is not stone struck.

~~Phil Smith~~ Crabtree: Right.

Bordes: That is a different thing. That is not stone struck.

Henry Irwin: We comment on that as we find no hammerstones.

~~Bordes~~ Tipier: Never on an anvil.?

Bordes: no

Henry Irwin: Anvils might be. no none of these are on anvils.

Bordes: I will tell you something, even in the cultures in France where we know a lot of stone struck stuff, very seldom we ~~found~~ FIND the stone hammers.

Henry Irwin: Yea, well I think we would have to examine the flakes plus the hammerstones.

Bordes: Very probably when the hammerstone broke or was just too worn out, they just throw it away like Mousterian or let us say Folsom ~~point~~.

Henry Irwin: I might add, speaking of primitive psychology, from the gentleman who was trying this large leden point here, broke it, we found the flakes which fitted on it and he didn't throw it very far, so it indicated that he didn't feel in too bad a temper about having it break.

Bordes: How much far away was it?

Henry Irwin: Oh, about six feet.

Bordes: Six feet - that 's always something you know. It could be related to the stone. It did not just fall. To hell with it, To Hell Gap with it. ← delete? →

Irwin Williams: That's where it went.

Crabtree: Cynthia, I have been trying to replicate the character of Hell Gap but I'm missing it. I am getting closer, but it is still not characteristic of Hell Gap. The difference is in the wide flakes. Mine are a little narrower, but I am producing ~~these~~ the deep bulbs. ~~in spacing~~ so that I leave the little triangular portions at the top by spacing the flakes wider. I notice that with the Hell gap material sometimes the worker removed these little triangular portions and sometimes he didn't. Then they would alternate the flakes by removing ~~the heavy side on the opposite side~~ flakes opposite the bulbs of the previous flake scar. but unless you have a model, it is hard to remember the exact detail of the edge character.

Bordes: How did you do it, Don?

Crabtree: Just with pressure, but I give it a thick bite with the tool so it pops fast so the flake will carry on through and feather out.

Bordes: Just pressure! Did it work right?

Crabtree: Yes. But it is a change in techniques for me. I had been working on bending flakes so I at first ruined everything ~~for awhile~~ by bending all flakes when I didn't want them to bend. It's very difficult to change from one technique to the other.

Bordes: It's already difficult to make one technique. Well, about this burin, you know. I don't think it is a natural break. I think that a projectile was broken and they tried or did a kind of burin blow there. Was it to make a burin or was it just because they wanted to take a small lamelle or something like that, I don't know. Technically, it can be called a burin. If it is only one in the whole culture - well.

Henry Irwin: There are no burins except there are a minor tenth of one percent of burins on breaks which are probably accidental.

Bordes: Ah, you never can tell.

Epstein: To move it along here I think the result of at least this conversation you have taken all bifaces and broken them down into two categories, and you are destroying American archaeology. They are either blanks, or they are finished products. I'm very much concerned as to how you can make this judgement so surely.

Henry Irwin: If you are making a biface, it's either a blank or a finished product eventually or somewhere in between. Either it begins or it finishes.

Epstein: I wonder. I'm very much concerned about why I think, as Dr. Bordes would say this is probably a blank. In other words, there seems to be something going on over here as to a certain kind of judgement. As I understand it right now it seems to me that if it doesn't have fine pressure flaking, it is a blank.

Henry Irwin: No.

Epstein: I ask for clarification on this.

Bordes: ~~The thing is~~ It is not that, the thing for which I think this seems unfinished is that first it looks unfinished. Nothing would be easier to get a straight edge here. Very easy. No trouble. It takes about two minutes and then on the other hand, you know, if there was only this, but you have things like this one which is much more - well, that is about all I get when I am making a Laurel Leaf and somebody disturbs me before I am finished and I put it somewhere to pick it up when I have time. That's about the shape it was and the size, and the weight is down, the amount of finishing of the edge and so on. Well, perhaps, after all, these blanks were finished as tools; I don't know. But when we call things scrapers after all we don't know if they were doing any scraping. They were, perhaps, cutting, who can tell. Till some time machine is invented, we must try to study the things by classifying them as well as we can and giving them names.

Epstein: We have to give them functional names, Dr. Bordes.

Bordes: Oh, well, functional - No, God damn it (delete) - it doesn't matter. Call it a scraper, call it burin, call it Goldwater, it doesn't matter. You know when I speak of scraper, I have not in my head the idea of scraping, I have the idea of a flake with a retouched edge, you know. Let us see. Well, it so happens that you can scrape with it. But perhaps, after all, it was just made as a ceremonial knife for the presidential election for cutting that and it was both Democratic and Republican. I know that it is not the tendency of the type of typeology that you are trying out, and I know it is easier to get into the life of political ~~mean~~ men. I know it, for I know science fiction.

Epstein: I still am not satisfied. I do not feel that you have given me an answer here as to why I should think that this is just an intermediate step to something else as opposed to the finished product. Is there a ground projection, or is it just purely the sort of thing that I know deep down inside that this is not finished.

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Epstein: Can I have an answer here as to why I should think that this is just an intermediate step to something else as opposed to the finished product. Is there a ground projection, or is it just purely the sort of thing that I know deep down inside that this is not finished.

Bordes: No, that is not right. That is the state in which I leave something when I don't want to finish it now. That's all. That is the only reason I have, but it is at least another reason. On the other hand, you say to me that's a finished thing. Perhaps you are right, but give me your reasons.

Crabtree: May I help a little on this? I don't know if I can or not. But maybe, Gerry, instead of cutting sharp and fine lines between whether it shows pressure retouch or is a finished percussion tool, we should consider that, generally, a preform is roughly percussioned to the shape the worker wanted the finished artifact to be. This work could be done at the quarry to save transporting a lot of material to the campsite or workshop for final finishing. The design of a preform also shows that it is adaptable for further thinning and completion. Sometimes you can see, perhaps, some functional use on the edge or indications of a little retouching. This can help to decide if it is a preform or an actual tool. Like Dr. Bordes said, with a few blows, one could straighten this out, therefore, it appears to be incomplete. They, possibly, were in a hurry to bring in their material in this form and later on to finish it. Maybe this will help determine if it was a preform, or just very crude, roughed out blanks. Some are a little more finely finished at the quarry, so there is a slight variation in preforms, unless there are indications that perhaps did show function. Could be they used their preform for some purpose ~~to show these scars~~.

Epstein: Fine. Now what I am concerned about here is that some of us may rush back here and start calling all bifaces, that aren't strictly on this level - blanks or preforms. Suppose then, we talk of these as thin oval bifaces with this kind of flaking on it. This kind of thinning flaking. Long pointed bifaces with this kind of flaking on it, and specify the flaking quite specifically.

Crabtree: Before one does that, Gerry, it would be well to very carefully check the edges to see whether this could be a digging tool. There is no purpose for a pressure retouch on a preform and, certainly, we cannot call all pieces that don't have pressure retouch - preforms. There is quite a wide difference between the percussion technique for a preform and the percussion technique used to finish a tool. It may be finished as far as it will be finished by percussion and be a completed tool. Let's not use pressure retouching as a diagnostic trait to determine the difference between a preform and a tool. It may even have a functional retouch from rubbing one way or the other which would indicate the manner in which it was used. Close examination of a preform roughed out by percussion will show ~~that~~ it was left at a stage of final finishing by either pressure or percussion. Thin, oval bifaces usually are not designed for, and will not

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permit, further thinning - only edge retouch for sharpening. One really needs an assemblage before final analysis may be made. I'm not saying this well.

Henry Irwin: One other aspect of this problem is - I mean you excavate these sites where people have been fabricating these objects, and you quite often find both halves of an unfinished object whereas a projectile point - notice here that we have all bases - well, that's because they lost the tip while hunting. They took the shaft back and made another one. But with these blanks, they were in the midst of the fabrication and this is true of this point which you notice is not edge ground because it was not finished. It was broken before they finished it. Almost invariably a point that is finished is edge ground - this seemed to be one of the Paleo-Indian characteristics. This point also, which is not finished, is not edge ground.

Irwin Williams: In the same line, it may be interesting to note that among the workshop materials that we do get from Hellgap, we do find these rude fine-grained stones, very much like that grooved piece that Don had, for grinding the edges of projectile points or for grinding the platforms for further work.

Byers: May I take a piece of this. This large piece that Gerry was talking about particularly, as to whether this was finished or whether it isn't. There are enough ethnographic specimens that have been found with wrapping around them to make that a perfectly good semi-lunar cutting knife, which is widespread thru the New World with an edge no straighter than that, but very jagged because it had been chipped. And as far as this is concerned, we have a piece from Teotihuacan that isn't finished as well as that, but it is already hafted - has a handle. Looks like something that no one would pick up.

Bordes: Yes, that can well be, you know. That can well be. But, on the other hand, you know, you always have lazy people who did with what they had until the end rather than to work. It's as simple as that.

Byers: This is simply American informality.

Bordes: I really don't think so, you know. I don't think so. When you see the lots of pains it took these people when they really wanted to finish something. For instance - where is it? This and others and the bit of laurel leaf; this, this, and this, there is no question that it is finished. But this strikes me as something which is not quite finished - with, oh, about five minutes more of work and that's all.

Henry Irwin: Well.

Bordes: You can cut with that. Of course you can cut with that. You can cut with almost anything. We can cut also with a crude flake without any retouching. You can haft also. Have you seen some of the things which have been hafted by people in the Pacific - Australians and so on. Any flake. But, anywhere, it is a flake.

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Henry Irwin: Well, one thing you get in this, is if you can find all of the production stages - that is, if you can go from this blank, so called, or from a bigger one you can go from something like this to something like this and to something that gets a little more finished like this - and to the final point. You'll notice the form is kept reasonably similar. With these things, I don't know.

Bordes: Well, you can -

Henry Irwin: The thing is that these are - just to confuse the issue a little more - specific of one horizon which, unfortunately, does not include any of these. So, maybe they kept on sharpening these and chipping them until they became something like this. Maybe they started using this -

Bordes: No. I won't say that this is a preform for that. I will say that this could be a preform for that, which is a quite different shape.

Henry Irwin: So we don't know. We would have to find one hafted, I think, to tell. But with something like this, there is no question, Gerry, that that isn't a tool.

I have another thing to ask Gerry.

Bordes: Yes, ~~I think~~ so. Except, do you really think that putting this as a long bifacial tool, with such and such type of scars and so on, will give you more information than to say no, he didn't finish the point.

Epstein: No. Yes, I do.

Bordes: I don't. I don't.

Epstein: No. What I am very much concerned about here is that - here Dr., I mean Mr. Crabtree - we'll have you elevated to Doctor status before the meeting is over.

Crabtree: ~~Drop that point.~~ Thanks Gerry

Epstein: Crabtree has certainly shown that we can get a tremendous amount of information out of this material by studying it extremely carefully. Much more carefully than we have ever done before.

Bordes: That's another thing.

Epstein: All right, but I think there should be one case here to distinguish between a judgement and a fact. And, when we call this a blank, and when you call any of these things blanks, you are making a kind of judgement which I think is very dangerous. And I would like here, at least, to say you scare the daylights out of me.

Bordes: Well, I want to say something about archaeologists passing judgement. After all, this passing of judgement is not archaeologists - it is catalogue. And I have seen too many dumb, bloody articles which are just

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catalogues. So many points of such lengths and such ~~matter~~ widths and such material and so on and so forth that go on and on and, in the end, you know what - nothing.

Irwin Williams: You call them laundry lists.

Jelinek: I would like to say something.

Bordes: Yes, go on. Shh'

Jelinek: Hello! What I would like to say is that I think part of this problem concerns the fact that you have done considerably more analysis with stone material over here; your typeology is worked out more clearly over here, and, in America, we are just beginning this kind of analysis. And I think that Epstein's emphasis on a more descriptive terminology reflects the fact that we need more description in looking at this material and keeping track of it at this particular stage of analysis in America. And later on, we are going to be able to work out a terminology that would help.

Bordes: I understand this quite well. I wouldn't say that what Epstein's saying is wrong, you know. But I would say that first when you speak of this tool in your first report, or in your general report, you say one ~~and~~ unfinished Eden point, ~~finish it in point~~. And then when you get into the technology of the making of the points at one particular site, you can go to any measurements and consideration of which facet if you like. That's something else. But I don't say we have something to win if each time you have to mention this point - you have to say, in your report, a bifacial tool much more longer ~~and this~~ than it is wide with such and such type of flaking, you know. That would be a convention.

Jelinek: I think that, initially, if you are describing an Eden site, that you need the measurements and statistics on each of these things and, once several of these sites can be analyzed, then we can go ahead and say, after that, well, we know now from our previous analysis, that this thing is ~~more~~ most probably an unfinished Eden point.

Bordes: Ya, Ya, ya.

Jelinek: The more material we get, we can do it.

Bordes: All right. You are right up to a point. And you are certainly right up to a point. But, on the other point, I am very much afraid that this will lead to some kind of work I have seen done this summer in a certain shelter not very far from here with about ~~20~~ twenty measurements to show that this was longer than it was wide. That's very dangerous up to a point, you know.

Jelinek: We don't have that much time.

Irwin: The point is that - that it is longer than it is wide, of course.

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Irwin Williams: I wonder if either one of you would like to comment on the possibilities of some of these points being made on flakes rather than by reducing ~~a~~ bifacial core technique or by reducing very large thick flakes. There are some that we find of which this Agate Basin is not a terribly good example - unfinished ones which do show fragments of striking platforms.

Henry Irwin: I don't know about that one.

Bordes: I'm not quite sure.

Irwin Williams: This is not a particularly good one.

Bordes: It could be. It could be.

Henry Irwin: Yes, you do get this certainly with Lindenmeier. We don't ~~have~~ ever have enough to tell. In general, this end of the Paleo-Indian horizon was done from core, but, with Lindenmeier - and if Bordes sees the Lindenmeier collection and Don sees it - you will see that quite frequently you have the Folsom points made on a large flake - somewhat larger than that, actually, and there will be the bulbs of percussion - quite often ground, like this. And then, in addition, they put a little more grinding on it apparently for that support. The one example that Marie brought doesn't show that because it is a little bit later on in the thing. And, of course, then often they would break it. The Lindenmeier collection has a number of these. That's one of the differences in Folsom and this stuff.

Crabtree: This one is certainly suggestive of that sort of thing.

Tixier: I think here we can see ~~bits~~ little bits of biface.

Bordes: Ya, I think so, I think so, yes.

Crabtree: Here is the natural face of the proximal end of the flake. That is ~~good~~ a good observation, Cynthia, that that is the flake and this could be from a flake and with a very flat platform and is quite unusual with this facet of the original portion of the natural surface.

Irwin Williams: This one, I might add, ~~an~~ is an unfinished point in mint condition without the grinding on the face.

Henry Irwin: No grinding.

Irwin Williams: And it was found along with a couple of other unfinished points in a workshop area.

Bordes: I will tell - that in the Solutrean, anyway, many of the ~~Laurel~~ laurel leaves are made on big flakes because it is rather wasteful to begin on the core to make a ~~Laurel~~ laurel leaf and you have a lot of more work, but sometime when you find - how do you call it - slabs of material, then it is all right,

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You can go from a core like this one for instance, directly from a core technique, but to really make such a fine thing - taking a big lump of thing like that - it is a waste of time and work. And it is less easy.

Tixier: It's more easy on a flake.

Bordes: Right, it's more easy on a flake. This one could also be.

Tixier: Could be. Looks like made on a big flake. A symmetrical cross-section.

Bordes: I wonder. I wonder if this is not a little part of the original ~~face~~ surface.

Tixier: On the big flake there is no little waves like in the retouch pressure or retouched by percussion.

Bordes: Of course, you can start from this one on the very big flake like we had before. I could make some kind of thing like that on one of the big flakes I have - I made.

Henry Irwin: The material outcrops locally in tremendously large nodules, ~~10~~ ten to ~~15~~ fifteen times as large as the flint nodules as you have been working.

Bordes: Ah, yea.

Henry Irwin: This was mined. They had a technological mining procedure. They were able to go after the beds of this type of chert. ~~(Reel 9 - Side 2)~~

Bordes: No question. They made big flakes first.

Crabtree: I wonder whether, Cynthia perhaps meant with this one whether this was a blade technique, a small blade technique rather than a flake because there is no way that you can tell with a big tabular piece of stone.

Irwin Williams: Well, no I ~~did~~ didn't mean a flake as much as a blade but this is possible.

Henry Irwin: You could get a point like that out of this blade.

Bordes: Ya, if the material was better.

Henry Irwin: If it was a little better stuff.

Irwin Williams: The point is that we do have somewhat better examples that do look very much like blades. We do have points of this kind. In fact the other point found with the same one, made apparently on a blade with one flat face, quite ~~in retouch~~ unretouched.

Bordes: By Jove, that's not a typical scraper. Is that what they call a typical scraper?

Henry Irwin: Would you not call that a little more of a little truncation on that.

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Bordes: Ah, no, that's not a truncation.

Henry Irwin: Not steep enough?

Bordes: Not steep enough.

Henry Irwin: I might add to point out one other thing that is interesting about this. You saw some artifacts of this material in the stuff Marie Wormington showed you. This is primitive treated at best apparently it occurs in North Dakota, I haven't been able to find the other location of it.

Bordes: But I have seen such material in Old World too. Same kind exactly.

Henry Irwin: Ya, there may be more than one locality in America I don't know. I presume there are more.

Bordes: I mean in Europe ~~they~~ I have seen things like that same material.

Henry Irwin: This particular batch comes from North Dakota, it occurs in Alberta, it occurs here, and it occurs down as far as Clovis, isn't there two or three places in Clovis?

Irwin Williams: Yes, there is.

Henry Irwin: And they traded quite widely for it. It's interesting to notice that when we get artifacts of this material we rarely get blades. We have small sections or refinished tools.

Irwin Williams: We have perhaps seven or eight flakes of the same material but almost the same number of finished artifacts, apparently it was a desirable relatively widely traded material.

Bordes: That's also an end scraper. That's interesting. That's a scraper, all right. Retouch blade. Oh, yes.... Oh, yes, that is sloppy ~~looking~~ work.

Henry Irwin: Don, do you want to say anything more about heat treatment? for instance on this piece.

Crabtree: That one is the most obvious. It shows the original facet of this side prior to heat treatment. Others possibly indicate they were exposed near the surface which changed the color. It's quite obvious that that one was changed. Some of the finished ones are very indicative of treatment but, without the original surface for comparison - one cannot be sure . Unless you can find some of the original facets, it is hard to tell.

Henry Irwin: Find out if we can see something.

~~Bordes~~ Irwin Williams: One of the factors ~~metagating~~ mitigating against this is the fact that there is a very good quality of flint, or chert available locally and there really wasn't the necessity for heat treating.

Henry Irwin: This is some of the stuff then that was brough from up State.

Bordes: Very good. That's not bad at all. Not bad. Well, how many other collections have you to look at? You again?

Sonneville Bordes: But, of course, me again.

Bordes: Okay.

Wormington: This is some of the Western material.

Bordes: Okay, all right. We have a limited time.

Wormington: Joe has some Folsom material from New Mexico.

Bordes: Okay, we have a limited time up here.

WHEAT Collection (Vanhorn)

Wheat: The material here is from three different sites. The earliest of which is the Folsom site near Van Horn, Texas, and the Big Bend area. Actually, the site itself is a multi-performance site. All the material, so far, is from the surface, but there are several occupations of this from the Folsom site on up thru varieties of parallel-sided projectile points and so forth into an Archaic horizon and finally up into a late pottery horizon. From this site, I want to make a point of this, because from this site we have about three hundred of the little snub-nosed end scrapers and, normally, anywhere in the Plains one will say that these could be any age. At this particular site, I have pretty good reason to believe that they are all concerned with the Folsom horizon because I have something close to fifteen to eighteen thousand specimens from this area and I have no snub-nosed scrapers from any other site, anywhere in the area, until we get to this Folsom site. I won't say I have none, I have two actually from other sites. So these snub-nosed scrapers almost certainly belong to the Folsom horizon. Now the Folsom material, most of which I have brought here, I have selected out of a total collection because many of the pieces show the evidences of manufacture. There are a number of the pieces which were going from the stage which Marie showed this morning thru various steps of fluting. Many of them were actually broken in fluting. And I also have one or two odd-ball pieces which look like something they were practicing on - learning how to flute a point. As you can see, the original side of this has no particular significance but there is, nevertheless, a good form and a flute started. These are channel flakes and a number of small, what we would call, gravers there. But they are obviously little drills and so forth. Burin flake - this could belong to any horizon. Possible burin but not a very good one, if it is. And these projectile points - most of them are later in time. Notice that there is one here which

that there is one here which has a burin on it. Yes, right here. Now this is an Archaic period point. Some of the others have been battered around. Shall we take this first and then, well I should mention this material down here. These cores and other bits of blades and so forth here, most of these are from the same site as the Folsom site or close to it. At least they are representative of the same type of material, hammerstone type of thing, which shows a secondary usage of a core and the double-ended scraper or side-scraper and some flakes and so on. These are all typical of the Vanhorn area and apparently are also typical of the Folsom horizon. This, of course, can only be finally established thru excavations there. So I'll turn it over now and then we can come back to these sites later on.

Van Horn

through

Crabtree: Dr. Wheat, which was the example that you would like to take first in this first group?

Joe Ben Wheat: The Folsom points and the ones which were broken in construction. Most of these down here.

Crabtree: This first one that I picked up is particularly interesting. We are just preparing to do fluting; one side by pressure and one side by percussion, with Dr. Bordes doing the percussion. I have a similar example on the shelf over there, it is the same sort of a preparation to support between the tip and the base as the flake is detached. And so he didn't bother to change the platform preparation from one side to the opposite side in order to remove a flute from this side. It's difficult to tell the type of breakage here between the base and the tip but, no doubt, there was a bit of flexing of the fluting flake and, therefore, the artifact broke. These basal portions do not appear to have been broken in manufacture but were apparently broken in the field.

material

Joe Ben Wheat: Yes.

Crabtree: However, there are several here that do indicate that they were broken by the hinging off of the channel flake and this particular flake indicates it hinged off at the end of the fluting flake. This has been a problem of mine for years-to stop end snipping, and I find one must use a particular type of tip support to prevent this break. Several of these stubby small ones in these three groups show the fluting was done first without shearing the ends and then the retouching done afterwards showing a very distinctive overlap of retouch on the channel. The fluting removed the tip first, but it was then retouched to rejuvenate the point. Undoubtedly it was originally much longer. You can see the intersecting scars between the tip and the channel scar where the retouching was done on these short ones, Folsoms. This broken point is peculiar. No doubt it was broken by being stepped on. After it was broken it was reworked. There is no scar evidence on the edge of this side showing, in this particular case, that this Folsom was made on a blade. Whether this is characteristic with the whole group, I don't

know. This one from the flake scars of the outside surface, shows the flake was reutilized as some sort of a scraper certainly it was not intended to remove another flute. But, they had thinned this maybe for sharpening. It's a little unique, this sort of a thing. But it shows some sort of a reutilization of these tiny points similar to other specimens we saw. The direction of the functional scars show how the tool was used. As Dr. Tixier and Dr. Bordes will observe, all flakes scars are from one direction. A good example of a reutilization of a broken Folsom projectile point. This one shows a peculiar break. This side shows the flute splitting the platform because of a crushing of a cone. It apparently was fluted on one side and broken when fluting on the second side. But, this sharp edge may even indicate a sort of a burin break on this square ended piece. ~~There appears to have been a softer tool used to remove this type of flake.~~ This material appears to be softer than the others. The heat treatment is quite obvious. We get this typical sort of a break from the collapsing of the platform. However, the fluting looks like it was successful, but the channel flake split. This one was not successful; it came off the edge as the second flute was removed and it collapsed either from being held and gripped too tightly due to the extreme thinness of this particular point. We can move on to these others. One cannot be sure of the preparation but it shows the general method is polishing the platform to give it sufficient strength to support the tool and the necessary forces to detach the flute. Unhappily, most of the specimens are the center sections of the channel flakes, which are not as diagnostic as the proximal ends. This shows a wide range of material was used. This one appears to be polished on the basal platform to withstand the pressure. There is a difference between grinding and polishing. Grinding lets the flake dislodge more easily, while polishing gives the platform more edge strength to withstand the force needed to remove the flake. The base of a core that is ground has a much weaker surface then when it is polished. So there is quite a pronounced difference in a flake that is polished and one that is ground and abraded in order to free the flake. Grinding and polishing is usually done on a flat top surface. The grinding shows as the platform of this flake while this one is rounded and polished. The difference between the two is apparent. With the cores I don't polish the platforms, but I do grind them. Apparently, almost a complete utilization of the core here, Dr. Bordes. I don't know whether there is anything distinctive left in the core. The flakes may show some character on that side. This appears to be a big side struck flake. A collateral flake with a hinge fracture at the distal end. It had to be struck from the side to produce this distinctive type of flake which is very adaptable for a big scraper. Not a Levallois Levassian type of flake but the basal portion has a similar thickness that is comparable and shows a slight retouching of the platform. Yes, with a flat surface and a conical core.

Bordes: If it is a core, I am not so sure.

Joe Ben Wheat: We also get pulping planes in that area which look superficially like this and you have to examine the bottom to see where the wear on the surfaces are.

REEL 9 (2)

Crabtree: Oh, Yes. I see. With this array all I can do is oh and ah. I have never seen anything as exquisite as this particular piece. It appears to have almost been ground out, but there is no mechanical way to produce this beauty. We know that it was preformed in several stages and probably several techniques were used to give it this final character of beautiful uniformity, feathering of the edges, and the edge character of spacing of the flakes and yet to leave the median ridges and edges straight. This is indeed one of the finest works of art that man has created and Joe Ben has an artifact that compares with painting, sculpture any of the fine arts.

Joe Ben Wheat: Did you notice that you are speaking before of retouch on the edge. Did you notice the retouch on that?

Crabtree: Extremely good! The type of material is similar to Sweetwater agate and the amount of labor that has gone into making this a beautiful artifact would make it almost a sin to use it as a projectile point.

Joe Ben Wheat: This appears to be another one of the big preforms. The base of one of the preforms such as Henry got at the Hell Gap.

Crabtree: It's very exquisite work and very distinctive. It shows a very distinctive technique.

Henry Irwin: What site is that?

Joe Ben Wheat: This is the Claypool.

Crabtree: Dr. Bordes.

Bordes: Well this is Bordes speaking. First of all this Folsom material it looks as if the biggest state, no the second state, now, has also the smallest Folsom, because there are some here which are really small. Anyway they are beautiful.

Joe Ben Wheat: Just a flake.

Bordes: Yea. As for other comments I won't say much. The scrapers are ordinary kind of scraper that we have already seen in other places, but here about the burin. This is a projectile point probably; I should say that it is a bifacially worked broken tool. Which seems to have had a burin blow from the break. I wonder if it would be interesting to experiment with points and see sometimes if the fracture break could not give us at times this burin blow. I am not sure, not at all. Just an idea, I throw into the air and let it hang. But there you have something and on two sides the same thing looks very much like some burins which have been done by ~~silutrian and~~ Solutrean on broken laurel leaves, so it could well be burins after all. Well that is more a kind of a splintered point, ~~basically~~ Pièce Esquillée Lancéolée. Or it could be just, no I don't think. It should have been something very ~~odd~~ hard to make that.

No, that's a little borer. I don't see others.

Joe Ben Wheat: What comments do you have on that one? That's one not on the breakage so much as the flaking itself.

Bordes: I leave that to Crabtree who is better than me on this ~~what~~ material?

Crabtree: It looks like a very fine pressure flaking and it shows an entirely different technique than any of these. In fact in this assemblage, this is quite a distinctive piece and the character shows a distinctive style of flaking. Is this common, Joe Wheat?

Joe Ben Wheat: ~~Is this common?~~ This is the only piece that I have like that from this site.

Crabtree: It seems unique.

Bordes: Ya, well, you know there is a lot, after all, in fractures ing of these burins or perhaps double burins, I don't know, But there is a lot. And this one is amusing, if it is a burin it has been made in the same way as Alaska burins that we have seen. Not on a true truncation but something which is almost bifacial retouch before that, the burin blow. Well, about the other things, I have not much to say, there are nice ~~bores~~ borers, ah yes, here. Crabtree what do you think of this? Was this big flake taken off by pressure do you think?

Crabtree: It appears to be unless it struck a rock at a diagonal angle it could have removed the flake by the percussion blow. But as it slid through it could have caught from the weight of the shaft and been given this sort of a flake scar.

Bordes It could be

Joe Ben Wheat: This was actually in a buffalo.

Crabtree Is that so. Well with striking the bone like that.

Bordes: ~~Is that so. Well, with striking the bone like that.~~ Striking the bone or as I have seen when I was young and practicing bow and arrow, my arrow touching the surface finding a rock and jumping again and going to bury itself in a tree. So it could be the ~~bow~~ blow as it went into the soil before getting into the buffalo.

Crabtree: It doesn't appear to be an intentional sort of thing that they were doing.

Bordes No.

Joe Ben Wheat: No, its from hitting the bone, I am fairly sure. Did you notice this one? Look on the other side it's more obvious.

Bordes: Looks as if there has been two sets of retouch with a different ~~prospect~~ aspect.

Joe Ben Wheat: This one has become partially patinated and since it is evidently the same type both before and after, it evidentally was found and picked up again somewhere and then reused, resharpened and reused.

Bordes: Looks like yes.

REEL 9 (2)

Crabtree: Notice the change in technique on here. I mean it's a random sort of thing like that, compared with the uniformity of this.

Bordes: Ya, that is good work in such a material.

Crabtree: Basalt is tough.

Bordes: But, that is very beautiful, but it is so regular that it becomes almost mechanical. I must say that that is a beautiful piece of work but, I must say that the general impression is less striking than some which are less beautifully made but more human.

Wheat; Hand made.

Henry Irwin: It has a dramatic touch to it.

Bordes: No, it has a mechanical touch.

Joe Ben Wheat: Notice the range in size in points from one site. These are all from the same site. These would be considered blades, I presume, or are these simply elongated flakes.

Bordes: I am not sure, no I think that can be rather a flake.

Joe Ben Wheat: Yes, well that was my impression.

Bordes: A flake of first workings of bifacial things. Sometimes you have several blades like that. Well let's see here. That one here is very nice, very fine side scraper and it seems they were vicious enough to apply pressure flaking for making side scrapers, you know. They were certainly pressure people. That's another flake of making bifacial tools. That's the same thing. That is more like a blade. This one too, also. This one is certainly a blade. Ah, that has something on it, yes. That, you know, seems to be a kind of tool, because it is much too regular to have been just a preparation or a striking platform but anyway I don't see what they could have hoped to take from ~~that~~ here. This is a little flake, I don't think. That here. Is this very common with your scrapers?

Joe Ben Wheat: Not common. You mean this removing of the bulb?

Bordes: No. Not removing of the bulb that not removing of the bulb~~ing~~ you know. We find this often enough on end scrapers, not very often, but scraping edge - A regular scraping edge or utilization like that. I have done it by trying to polish ~~a regular~~ scraper like that, ~~something~~ like that. Well, this is a spall and not a core I think. Rather a kind of rough grade of tools. That's a kind of levallois flake with a what I call scraper with flat face, but it can well be a knife. Because it give a sharp edge. These are cores which are not very good. This kind of Mousterian we call.

Tixier: ~~Tixier speaking.~~ I think that there are two sorts of gravers you see, ~~there is gravers or bores.~~ Borers,

Bordes: Borers

Tixier Gravers or borers.

Bordes: I don't like this word graver.

Tixier: Graver, borer.

Bordes: ?Borer if you like - but not graver.

Tixier: These borers with an abrupt retouch, you see, like this one, like this one, and others with beautiful semi-abrupt retouch, you see. It's quite different. Here is abrupt retouch and here is a semi-abrupt retouch. And here is a little bit of channel flake. I think these here, the back face of the blade and then the retouch of the edge and then the flaking out, flaking off of the channel flake. I think it's another preparation which makes me think that the Folsom points or fluted points were made on blade or on biface.

Crabtree: This is the natural facet.

Tixier: This is the natural facet. It is a bulb flake, I think.

Crabtree: I mean the original large flake on that side.

Wheat: Oh yes, that's not a stem. They just didn't take out the center.

Tixier: And this is a very good burin spall with a retouch before striking off the spall perhaps coming from another burin. This is a burin but not very very good. Yes, it's one. Yes, it's good; it's good. It's on a little truncature. tion.

Crabtree: Any further comments from you, Dr. Wheat?

Wheat: No.

Crabtree: Anyone else?

Alan Smith: Don, would you like to try that channeling now?

Crabtree: We can do that. It will take me just a few moments.

(Lapse in recording time)

Bordes: Fire away Cynthia.

IRWIN-WILLIAMS Collection (Anasazi)

Irwin Williams We have here a collection of late pre-ceramic materials from the Southwest which are of interest principally because they very likely represent the antecedent to the Anasazi or Pueblo culture. I've got them arranged more or less chronologically, so that we have at the other side of the table here, the San Jose culture, as it has been called in New Mexico which probably has a date range around 1000 to around approximately 3000 B.C. The crude materials to the left, unimpressive as they are, seem to make up the most of these peoples chipped stone assemblage and I brought a representative collection primarily of the actual tools, scrapers, scraper planes, choppers, and things of this sort, and also some of the crude flaked tools which go along

with them. Some of the cores from which these were apparently struck when ~~siliceous~~ siliceous material, relatively fine-grained sort, was available. And also some pieces made on this rather coarse basalt. Over to the right there are a series of projectile points from the same time period and these, of course, occur with a large number of grinding stones so these people's main concern was for seed grinding rather than for the production of gorgeous projectile points. The material closer to me here, apparently, represents the successors of the same groups and the same area, the development in projectile points, styles and development in chipping techniques. I think that it is quite obvious that there is considerable improvement in the kind of simple tools made in the late periods and there are apparently some ~~blad-like~~ blade-like objects of the same period. Now, right in front of me, there is a big collection of sharp looking flakes which do represent, I brought along just because they represent a workshop, small workshop area probably from one or two pieces of obsidian from this later period and this is they are just sort of representative of the kind of stuff that we were getting in the flint pit there. One man or so sitting there and chipping for an hour or so. They probably are somewhere in the 500 B.C. range approximately. Down at the bottom here, just to indicate what this stuff develops into of the Basketmaker to the projectile point, and this is almost certainly what becomes of the culture ultimately. Now I don't think that I will go into the typeology anymore. That isn't our primary concern, so if either of you would like to comment on this why you might as well start.

is this wording fouled up?

Crabtree: Well, I'll start with the flake debitage and I'll start in the middle here. These are not even as good as those in our working pit. A lot of the flakes show that the distal end broke or collapsed from the shock which is, sometimes, characteristic of obsidian. They show almost no platform preparation and very little control of the flaking technique. This one indicates that they did take advantage of the ridge to thin their points. This is a nice thinning flake and probably one of the best examples of utilizing an existing platform, but they made no preparation. They show a lot of crushing and heavy cones. These flakes here indicate percussion work and show an extreme amount of compression. They lack a great deal of control and altogether this seems a very unusual array of workshop material. Some of the edges show a little use pattern. This flake indicates the direction from which the force was applied and it apparently collapsed in a flat flake rather than a burin style. Mainly they show very thick indiscriminate flaking. A variety of everything and not much in the way of technique. It's a little lower on the scale than what we find in our working pit here. It seems that they were wanting to produce, for some reason, a very heavy durable point. For what purpose I don't know. These are quite thick and have very little diagnostic evidence on the surface regarding flaking except for the extreme thickness. However, we find that they did appreciate good work. For here they have carried in this Clovis point from somewhere showing that they did admire nice work. Here is a flake showing some refinement - this shows a step-fracture for thinning . Serration of the edges is done from one side and then the other. They didn't use this too much for forming their point other than to produce the little projections on the side. Shows very little refinement - one single flake from this side and then a crushing in on the other side which is quite different. Here is an unusual piece of palm wood which is quite distinct in this array of fossil wood. I can't see on the far end of the table very well and I think Dr. Bordes can see them better and tell more about them. This is a little out of my category, so I will turn this over to Dr. Bordes.

Bordes: Well, these tools which are just to my right, looks if they were alone they could pass for a medium grade of Mousterian. Almost all of these there are a kind of crude scraper, chopper, and better scrapers. Kind of thick-nosed scrapers or something like that. Bad cores. And here are chopping tools rather than choppers. Chopping tools worked on two edges, an occasional blade which is retouched on two sides, and that's an end scraper with very flat retouch, very, very flat. That's a bit of a bifacial tool and not very good. Scrapers, scrapers are everywhere. Lot of them. End and side scrapers, big flake. Oh, they hit a hard blow on this one. Not much else to say except that they seem to have done a lot of retouch on the flat face of this one too. This one also. Bit of bifacial tools, broken. This doesn't belong to this thing. Well, bad scraper. Oh, I should say a flake with a badly faceted striking platform not too well defined on bifacial face by several scars and so on and then some retouch with step retouch from one side which is perhaps due to the nature of the material rather than the technique of the typeology. That's all right but it takes five or six lines. I would call that, you know, La Quina scraper and I think that they are the same. As for this obsidian debitage, well, I am not too well today, but I think I could do better. It's not a very good job. Well, these poor people, they had no real culture yet.

Irwin Williams Yes, they probably did.

Bordes: It is hard to explain. That's a peasant culture. Peasant culture, yes. Well, they didn't do much with obsidian And, for the points, they look not so bad considering the material. What's this, petrified wood?

REEL 1 ~~(Side 1)~~

~~considering the material. What's this, petrified wood?~~

Irwin Williams: Yea.

Bordes: Yes, that's hard to work. This is rather fancy but I wonder if it was very effective as a point. They did not know better, probably. What. Yes. Rather strange this one. All right, but that's a later one?

Irwin Williams: Yes, this is later. That's # Basketmaker.

Bordes: Yea, that's better. Much better. Well if you want to be optimistic. They succeeded up to a point. And here, other end scrapers. Some side scrapers.

Irwin Williams: These are late.

Bordes: Ah, that! A kind of bifacially worked flake with longer retouch on one side and shorter on the other. But I would call it a bifacial scraper, which can be a knife, of course, That's something else? That's obsidian?

Irwin Williams: Yes, that's a kind of cloudy obsidian.

Bordes: That's nice material - this one. And that's what's that one?

Irwin Williams: Just more material from the same late series.

Bordes: Ah, that. What do you think of this? Is it not your State?

Crabtree: No, I don't believe it is. I rather think that this had been in a fire. Accidental or not there is no way of knowing.

Bordes: Same stuff.

Crabtree: Excuse me, Cynthia. This one right here appears to be also - more petrified wood.

Bordes: That's the same stuff, I ~~see~~ think. Some obsidian. Ah, ah! This one is backed. No question. Pocket knife, yes, no question. Small, but no question, this is the first one I have seen in all this American material. Yes.

~~Phil~~ Alan Smith: What is it Prof. Bordes?

Bordes: Pocket knife. A pocket knife.

REEL 1 ~~(Side 1)~~

Irwin Williams: That is because ~~he was~~ these were a very backward people.

Tixier: Abrupt retouch.

Bordes: You are sure that it didn't drop from your pocket.

Irwin: No, I'm sure, ~~sure~~ I'm sure.

Williams?

Bordes: That's the first example of backing I have ever seen in American stuff. I don't say that they do not exist, but.

Irwin: I mean that's not preparation, that's just actual backing.

Bordes: No, no question. Not backing? All right, ~~there~~ that is no preparation. That is not the side of a core. They took off the little blades and made this from here, you see. A little platform here but a lot from here. Now, that's an interesting tool.

Henry Irwin:? Are there many of those?

Irwin Williams: No, that's the only one. I brought it along because I thought it might be interesting.

Bordes: That was (ingenious?) ingenous.

Crabtree: Dr. Bordes, I found one that redeems them slightly. This one right here. This one looks like they knew how to take off long blades. There is only one, but the percussion work is very good.

Bordes: Yes, yes, yes.

Irwin Williams: I would imagine that's intrusive.

Bordes: Ah, well, well, well don't fight them. They are your people, after all.

Phil Smith: What type is this?

Irwin Williams: Well, this is not necessarily that.

Tixier: What type is this does it go with these?

Irwin Williams? Well, this does, but not necessarily that. I have never seen another quite as finely made as that one.

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Tixier: Like Upper Paleolithic.

Irwin Williams: And I would guess - a progression and degeneration. But we get this kind of thing.

Crabtree: Yes, it appears to be.

Tixier: But on the other ~~hand~~ end, you see.

Crabtree: Yes a Little preparation. It's a shame they waste obsidian like this.

Irwin Williams: Well, they didn't know what they were doing. It can be seen by the points that they turned out, or at least the tools. Well, these people's main interest was in grinding up either ~~wide~~ wild or agricultural materials. They have dozens and dozens of grinding stones for every projectile point. And hunting is apparently a very secondary kind of pursuit. With one interesting thing. You mentioned that you thought that perhaps these had been made because they needed a sturdy, heavy kind of point. Well, certainly the kind of game that these people were hunting doesn't necessitate this kind of thing. Primarily deer, and rabbits and this sort of thing.

Bordes: Rabbits, ah yea.

Irwin Williams: Rabbits?

Bordes: Rabbit's hide is hard. And ~~if~~ you know, if you shoot a rabbit, you shoot downward, and so if you miss it, your point is ~~gone~~ ruined except if it is very strong.

Irwin Williams: In other words these people were also bad aims.

Bordes: Oh no. Try to shoot a rabbit with a bow and arrow. That's not so easy as it seems.

Irwin Williams: Well, this was probably with dart points, spear.

Bordes: Spears are even ~~worst.~~ worse.

Irwin Williams: Well, I would assume that most of the, not all, but most of this has been done apparently by percussion.

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Crabtree: It appears to be.

Bordes: All of that anyway.

Crabtree: With the exception of the little serrations on this side here, and some of this work here, but this is very simple to do with a tiny pebble. Or with an extra piece of sharp flint you can do this. ~~They are even abraded,~~ The notches are even abraded. ~~notched.~~

Bordes: That's percussion here. Perhaps a little pressure, but they are not much farther on pressure flaking than ~~that~~ I am, rather less.

Irwin Williams: Rather less.

Tixier: And their arrowheads are more beautiful in quartzite than obsidian.

Bordes: Ya. But you know, that it is easier to work quartzite than obsidian, except when you know. Oh, yes. Oh, yes. I would rather work this than obsidian.

Epstein: We agree, we agree.

Crabtree: It depends on the different techniques.

Bordes: On the technique you use and quality of the quartzite of course. No, no, no.

Crabtree: It looks almost like a blade whether it is accidental or not - there is not enough there to tell.

Irwin Williams: I wonder if you thought that might have been heated.

Crabtree: Yes, I'm sure it has. I'm sure it has.

Bordes: That's an important thing, you know.

Irwin Williams: Well, all right, we'll make it a little later.

Tixier: Scars on obsidian - an end scraper.

Irwin Williams: The ancient mariner. Yes, it looks like it.

Henry Irwin: Even that is characteristic.

Irwin Williams: Well, does anybody have any more comments or shall we move to another group of materials.

REEL 1 ~~(Side 1)~~

Bordes: All right, let's move. Epstein Collection - San Isidro

Epstein: The material on the table now consists of material from two sites in Mexico. The heavily patinated, tan-patinated material comes from the San Isidro Site which is an open site about ~~40~~ forty miles east of Monterey in Northeastern Mexico. In the lowland section of that area. It's a very hot, dry region. And this site was discovered in 1960 and excavated in 1962 with very little results of excavation. The site seems to have been uncovered rather recently, but how many times this last recent exposure represents in the history of the site, I do not know. But there are a whole series of fire hearths that seem to be in almost perfect condition, that is, there are circles of concentrations of rocks maybe ~~3~~ three feet in diameter and in and around the hearths are these heavy artifacts. Most of the artifacts are heavy percussion bifaces of this general kind. Some twice, sometimes three times, as large as the ones on the table, and they vary in size. Second in number are these pebble choppers which are unifaces or? on unifacial and bifacial and some of these weigh as much as four and five pounds. Going along with that, are such things as what we call in Texas, bifacial clear Fork? clear fork gouges of which this is representative. And throughout are whole series of what I think of as very heavy percussion flakes. Some of them have relatively straight platforms and some have rather faceted platforms. These flakes that I am bringing here are the smaller flakes. Some of the flakes are enormous, being of this kind. In terms of the faceted flakes, most of the flakes that are faceted are struck at the high point of the platform. Also, in this area, in this region of Mexico projectile points are the most common single artifact one can find. And yet at the San Isidro Site projectile points were very uncommon. We found a few, once, to lump these things together and called them something or other. We found ~~14~~ fourteen of these. And they were all within essentially a very small area of the site. We found ~~5~~ five of these, or things identical to this. Actually this is almost identical to

REEL 1 (Side 1)

a specimen that MacNeish found from Tamaulipas called Lerma. Almost identical in terms of the photograph of his stuff and going along with something like this. These are some of the projectile points found. There ~~is~~ are also some very recent projectile points found at the site. The material itself is a highly silicified limestone. Where is that clear fork gauge? And it consists of essentially black material, which is patinated, as you can see. There was no context in which this could be surely dated except that the material that we found in the survey was not like this. And recently, as a matter of fact, I am working on the site now, we stopped digging just to come up here. There is a site near Lenores on a second terrace, it is a two terrace arrangement and this is the high terrace, the cave up in the high terrace is about ~~75~~ seventy five to ~~80~~ eighty feet above the ground. There was a ~~5~~ five foot cultural deposit lying on top of gravels in it and then because I had been to Combe-Grinelle and seen Bordes' excavations, I decided to go through the gravel and there was about ~~5 to 5½~~ five to five and a half feet of gravel in the section of the cave that I dug through and this was lying under the gravel. And, so far, the kind of material found with that are the large flakes of this kind but, so far, none of the thinning flakes that one would find in making a biface such as this or something like this. We have abundant carbon ~~14~~ fourteen samples on this material, but we won't have that run until about a week from now.

Bordes: That's a pity. ...would like it though.

Epstein: In terms of typology one things that comes up at this site which does not come up here are these. The pebble tools, unifacial we have, but these things, which are pebbles largely that have been miserly unifacially worked, with just a little bit of bifacial working, do come up at this site, but do not show up at San Isidro. This material is known as Oue Vedal a Zona, because it is very close to a zone of rock fall in that area. That's all.

Bordes: This material is very strange. And it seems from what Epstein says that they

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are always small flakes. The biggest flakes not being there. Well, of course, there were flakes which were struck rather hard but most of them not by stone but ~~by~~ rather, by a soft hammer. This is more the characteristic of wood on the first flake. This one perhaps, no I don't speak of this one. This one perhaps, but soft hammer anyway, not a very hard rock. This could be stone struck. It is difficult because patination is so heavy, but on the other hand this one does not seem stone struck. Seems they used it as some kind of stone hammer. This belongs to same.

Epstein: It's the same open site. That's all I can tell you.

Bordes: But you have not found it here. And these projectile points are rather surprising and I wonder if these two are not intrusive. I wonder. I don't know the material, the site, and so on.

Epstein: I wonder too.

Bordes: This one could be a burin. They seem rather much fresher, than the other as far as patination goes. Perhaps it is not the same material. I don't know if this is the same material as that. Looks like.

Epstein: On the patination, it is very difficult to tell. There is definitely a ~~reuse~~ re-use of tools evident at this site. In other words, some tools will have been used, some bifaces have been used and then the new flakes on it, the patination is much less. Of course, patination can vary with the amount of exposure and it is difficult to tell looking at this open site which side has been exposed.

Bordes: Ye, yea, of course, but it seems rather strange that the four projectile points, all ~~4~~ four of them, seem to be of the same material ~~not~~ much less heavily patinated that the others. This one is a little bit. Not the same kind of patina, you know. This is, you know, I would say, let's say it is worse in France on the plateau. I would say that this is Paleolithic and this is Neolithic. Of course the patina can be but I think that if you have enough material, as statistical as this of the different elements following patination could, perhaps, give you

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something interesting. It works here, and on the plateaus. Of course, you will find on every patina some that are ~~not too~~ bad and ~~something~~ something like that which is not very patinated. I would be rather surprised if there was the same ~~preparation~~ patination in the two kinds. This looks very good, it doesn't mean much. Could be a peasant culture, you know. And this you say comes from below the gravels in the cave?

Epstein: Pardon me. Just one thing. This has a slight sheen to it because point one: when these were found they were heavily encrusted with limestone and when the finish of the limestone after it was through with acid was so ~~different~~ difficult that I decided, I just touched it up with oil. So there is a sheen to it because of an oil finish on it.

Bordes: Yes, yaa, yea, It doesn't matter.

~~Epstein:~~ Irving. It also photographs better with oil.

Bordes: We have seen this. Yea. After all, not only ~~the work in~~ the Solutrean can do thinning but also the people with the chopper chopping tools. That looks very much like the old culture of Font Robert. I don't say it is. I don't say it is, but if you find a little like well, why not. Who can tell. That's really quite different. Even this one.

Epstein: Try fluting on that or thinning and I was wondering whether Mr. Crabtree would think of that as fluting or thinning or what?

Crabtree: It's reminiscent of some of the very rudimentary Clovis sort of thinning with the step fractures. He pressed and then stopped, or attempted to stop without the flake going on through. He got a step fracture here. He was letting it go as far as the pressure would allow before he let it come outward. But this material appears to be comparatively soft and your observation of their utilizing a ridge for the impact, is quite important. To concentrate the force of the blow up on this projection so that they can carry their cone on through.

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~~He got a step fracturing here. He was letting it go as far as the pressure would allow before he let it come outward. But this material appears to be comparatively soft and your observation of their utilizing a ridge for the impact, is quite important. To concentrate the force of the blow up on this projection so that they can carry their cone on through.~~ But, because of the softness of the material, these seem to be going inwards from the leading edge. Shows almost a shattering before that one. It demonstrates considerable toughness of material yet they have the ability to come up with a point such as that. It's quite amazing if this is all the same material.

Bordes: This is what I call in France a ~~diagonal~~ dihédral striking platform and it is very, very common one, but very peculiarly the point of impact is not just on the ridge, but just beside.

Epstein: What kind of a platform is it?

Bordes: Dihedral striking platform.

Epstein: ~~Diagalog~~? Dialogue??

Irwin Williams: Dihedral.

Bordes: Dihedral.

Epstein: Now what is the ~~chapeau de gendarme.~~ Chapeau de Gendarme?

Bordes: Chapeau de gendarme, ah, something quite different. It would be. Have you a pencil somebody and a bit of paper? Here is a pencil and a bit of paper and the chapeau de gendarme would be. ~~Oh, God damn this tool!~~ delete It would be A striking platform like that with small faceting, you know, with this shape. What you have here is a ~~diagonal~~ dihedral striking platform. And, generally, ~~a~~ the point of ~~percussion~~ impact is not just here, but here just beside. Because just try to strike exactly on the edge and you catch a ridge and, pop!

Tixier: I think that you have to make one. You have to make one.

Bordes: Yea, yea. It's not difficult. And here I would say is a striking point. Here

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was a ridge and a striking point is just here, just beside. Why they use this kind I don't know, but perhaps this is just a flake taken off of one of these chopping tools or no bigger.

Epstein: I think.

Bordes: Well, here is ~~indicative~~ tentative of a convex striking platform. This material. Yea, yea, yea. That's a good one.

Tixier: That's a good one.

Bordes: It is not bad from what I have seen here.

Epstein: Interestingly enough, in the area where I am working there are apparently no burins.

Tixier: What kind of raw material? basalt or what

Epstein I think like basalt.

Phil Smith: There's one almost ~~as good~~ one.

Bordes: That's Almost not quite. ~~except for the~~ To be a true Chapeau de Gendarme it should be a little like that. That's a convex striking platform. In the ~~value~~ valley of Chapeau de Gendarme it is like that. No, no, no, they did not quite get to the Chapeau de Gendarme. That's a convex striking platform. The Chapeau de Gendarme is a variative of the convex striking platform which looks like the old hat in the old French ~~Gendarmarie~~ Gendarmerie. Yea, and this kind of tool, how you call it?

Epstein: We call it a clear fork gouge in Texas.

Bordes: Clear four?

Epstein: Clear fork, a gouge.

Bordes: A gouge - oh, yes.

Tixier: But, we call it in Egypt, an adz.

Bordes: Is this known in other cultures in America?

Epstein: Yes, it has a very wide distribution in the American Plains, ~~largely~~ I think, the well stratified evidence in Texas indicates that this is associated with Plainview, so called Plainview points and ~~Llerma~~ when the evidence is well documented.

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Bordes: Could be. Could well be that those belong to the same thing but it is rather surprising but anyway, nothing is impossible. That is very rough work, huh? I would not call that a projectile point. That's rather rough. This, this, I don't know what it is. Here, a kind of bad scraper. Chopping tool. Their best tools are chopping tools, by far. Oh, well. Have you seen anything like that in Siberia, Marie?

Wormington: Some of these big things and even larger than this are the sort of things that they call "skreblo" that you get at ~~Afontoba~~ AFONTOVA Gora. That's part of the tradition which is quite different from Malta and ~~guieriere~~ Buir ~~(ck. spl.)~~ and there is now a radio-carbon date ~~in~~ somewhere in excess of 11,000 years for the lowest level of the ~~Afontoba~~ AFONTOVA Gora where you do get this general type of thing.

Bordes: Yea, that's a small ax.

Epstein: These large triangular things which is here about ~~2½~~ two and a half inches wide and maybe ~~5~~ five inches long. These have been found in Texas in dry caves hafted to a branch, in other words a branch about this large, which has been split in half and then tied at both ends.

Bordes: Yea, yea, I am not at all surprised.

Tixier: Hafted like this or like this?

Bordes: No, like that.

Epstein: This is the branch here. Yea, like this.

Tixier: An ax.

Bordes: Looks like. Rather a nice thing. Yea, strange. These Americans are crazy! No more comment?

Epstein: Do you have any more comment on this, Mr. Crabtree?

Crabtree: I haven't any at all. It is strange material.

Epstein: Well, here may I ask you one question? I think that I have seen points called

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Palasades
~~Palasaides~~ points in, who's the author of "The Old Cordilleran Culture" — Butler? I think he illustrates a point like that that he calls Palasades ~~Palasaides.~~

Irwin Williams: Cascade.

Epstein: Cascade, I'm sorry. And it has a certain amount of serration in it and I was wondering if it is at all related.

Crabtree: This is unique. In getting away from this sort of pressure, which is very rare. I mean, I thought I had seen many, many points in the Northwest but we never see this type of diagonal flaking. Either they hold down the artifact and push away from the body or they are left handed men doing it this way. The Solutrean are straight in, straight in like this, but to turn it like this is strange. There are well-defined bulbs ~~in here~~ of pressure flaking, showing the worker moving ed ahead instead of following the ridge and staggering their flakes exactly right, without the help of the ridges. A slight step fracture there on that side, but not a great deal of regularity. However, the direction of the flakes certainly indicates ~~going~~ pressing towards the tip rather than towards the base of the point. I'm not familiar with the Cascade points.

Bordes: Nothing more.

Crabtree: No, I wouldn't like to say anything about them.

Bordes: ~~No~~ any question?

Irwin Williams: Well, no except that I think the Cascade points generally have considerably more bipointed effect.

Wormington: You have same there.

~~---~~. I think ~~that~~ Dick has a Cascade point that you can use to compare it with

Irwin Williams: Oh, good - a ~~cascade.~~ Cascade

Daugherty: This is coming closer to what we are talking about.

Irwin Williams: See, the point of balance is considerable farther up the widest point is farther?

considerably farther (further?) up the point than the Cascade stuff. Here it is essentially at the base.

Bordes: Finished?

Irwin Williams: Well, the only other comment that I have is that I think that both Gerry's and, to a somewhat lesser extent, my stuff from the Southwest indicates at least the possibility, and in my case the probability, of the association of relatively well made points and these extraordinarily crude things. And, I think, it is interesting to think about the problem, anyway, of the many comments that have been made on our early cultures. ?The cultures that have no context, surface materials, etc. which are sometimes considered to be very early just on the basis of pure typology (typeology?). The point is that it is perfectly possible for people to make stuff like this or like the Cochise, San Jose choppers and scrapers, planes, etc. and, at the same time, be producing perfectly functional ~~bifacial~~ (bifacial) projectile points for spears or whatever. That's all.

~~Daugherty~~ Daugherty Collection

Daugherty: Let's take these groups one at a time. Over at the left is the Lind Coulee material. It was found back in the 1950's and radio-carbon dated, two runs, at 9500 and 8500. However, that was without heat treatment and I'm sure it is older than that. Geological studies have suggested that it is probably a couple of thousand years older than that. But we have, I didn't bring the whole assemblage, there are a lot of bone tools with this, long bone shafts like you find with Clovis, serrated bone points a variety of scrapers. There are flake scrapers as well as these heavy steep angle scrapers. Projectile points you'll notice are of considerable variety, different materials involved. There is one of these crescents, actually two were found. These have a very wide-spread distribution throughout the Intermontane West and down into Mexico. I think that I'll stop at this point and let you look at those.

Bordes: What's the date did you say? What date?

Daugherty: The radiocarbon was 8500 B.P. and 9500 B.P.

Bordes: What?

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Daugherty: Nine thousand five hundred.

Bordes: Yea, yea, yea.

Daugherty: And I think that it would be more likely between 10,000 and 11,000.

Bordes: O.K. Well that's certainly fine work on this one.

Crabtree: Very fine.

Bordes: Good material but fine work too. And that is a projectile point. This is a kind of bad carinate scraper, thick scraper. This is a thick scraper not much ~~cut in~~ cutting edge. it, and that is a projectile point. This crescent is amusing. Looks a little less well made, unless big like Egyptian or Danish stuff, but ~~That's~~ smaller and not so well made.

Daugherty: There were larger points in the assemblage, We didn't find any larger complete points, but we found the stems on the order of this point but maybe 3 three times as large as that.

Bordes: Don.

Crabtree: This one here is a little unique, when comparing these ~~between these~~ two points with apparently the same sort pressure technique. These two appear to be the same and this one no doubt, is the base of another point. They have basal grinding on them. Some of the flakes carry over the surface while this point shows a different technique used with the short flakes ending ~~in~~ on the ridge giving a different contour than this ~~unique~~ other point. This one appears to be of untreated material. This one appears to be treated material, which is a little unique. These flakes are spaced with the sides straight and ~~almost appears to be~~ are almost parallel. Well-controlled flakes. But they are of the very broad style with almost no indentation for the placement of the tool. This poses the question - how were these wide flakes detached without having a bulb of pressure. Normally, the tool would be set back away from the edge to produce this type of flake. So far, I haven't been able to replicate this technique. I'm working on it,

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but I don't understand it yet.

Bordes: I wonder if this is not part of a much bigger flake.

Crabtree: Yes, I think so.

Bordes: Yes, it could be. It's a rather big one.

Crabtree: Let's see this bunch here.

Daugherty: There is a large form of bison found with these. The identification was just a large form they didn't find anything that was diagnostic to suggest that it was a non-existent type. but, on the other hand, it was extremely large for modern bison. This next group comes from ~~Marmos Rockshelter~~ MARMES ROCK SHELTER, a site that we have just finished excavating. We worked three years on this. There is a large collection of material, radiocarbon dates received so far run from 10,750 and right on up to modern times. This 10,750 date was not at the bottom of the deposits, there was 3 three feet of material below that. So we have no idea yet how far it goes back beyond that but I would guess not too much earlier. The earliest points, interesting enough, are the stemmed points very markedly edged-ground and quite a variety of these. Then you come up to ~~certain lance lot forms~~ some lanceolate points like this but with the distinctive basal notch. Then the so-called Cascade type come in about 8,000 years ago and this happens all over the plateau. It's not nearly as early as Butler originally suggested. About 5500 to 6000 years ago you get these large basalt side-notched right in the midst of the Altithermal when it is hot and dry and economic conditions apparently rather grim. The fine material changes almost exclusively to basalt and this form develops. After that when things improve you get this is a example of large corner-notched points giving way to smaller corner-notched points and finally I didn't bring any, some very tiny side-notched points, which are just about the beginning of the historic period. These large blades, five of them, were found with a infant burial about 7,000 years old. All right I'll stop.

Bordes: Done.

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Crabtree: These appear to be very well done. This basalt has extreme toughness and appears to be made by percussion. It's hard to say whether blade or core technique was used with these particular ones. Apparently the flakes were removed from a big blade showing -- nice meeting and thinning of the collateral flakes -- well controlled. Good edges here. No doubt a finished tool.

Daugherty: Do you think it's finished tools.

Crabtree: It appears to be, yes. They are nice straight sides. This basalt is very tough material, however, this one here may not have been basalt it looks like an overfired piece of the dark flint. Like it has been burned on the edge and it was starting to break down. Perhaps not, I don't know. It's hard to identify from one piece as to what the range of material was. ~~Basalt~~ material is very difficult to work. However, the variety and grade of ~~the~~ basalt is as variable almost as quartzite. And these show quite a refinement of using small flakes and slight retouches on the edge with nice pointing. Is there anything distinctive about the pointing? Notice how they are flaking these back from the tip to control the flaking ~~and not break the tip~~ and still retain the tip and not break the tip. The flakes start from the tip and are worked back on both sides of the point leaving a little projection at the tip. They are almost serrations.

Tipier Crabtree; Basalt Looks more like Basalt to me

Bordes: Was Heated, of course.

Crabtree: Oh, yes.

Bordes: No, question. Heated or burned.

Crabtree: This one appears to be a little more ~~lus terous~~ lusterous on ~~on~~ this side but the color would certainly indicate it was burned, all right. However, the flaking surface is coarse, like untreated material, but burned but it may have been burned accidentally or imbedded in the meat during cooking or something like that. Because it doesn't appear to have been heat-treated, yet this one from the older sites does appear to have been altered. This one shows a reverse again.

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I mean there are several styles and changes in flaking technique on this particular one. The flakes go back at this angle and yet it shows a collateral style of flaking with a bending technique over the edge but still leaving the sharp ridge, which is quite different from this style of flaking on this point showing very fine, smaller retouching on the side. This thick one here looks like some pressure retouch after percussion on the side of that one. This one here looks like another piece of petrified wood that has been altered by heat, however, there are still no facets that remains on that side.

Daugherty: This last group over here. Since obsidian is quite rare in our sites up at Washington, I brought some from a site that has been excavated in Oregon. Very late material. It shows the technique that they were using. This site was occupied within the last ~~1000~~ thousand years. There was no clear ~~was~~ way that it could be dated but it is late. But it is of obsidian material, exclusively.

Crabtree: Percussion with a slight retouch on the edge.

Bordes: ~~Something~~ SAME thing here.

Crabtree: It is slightly diagonal ~~but~~ with quite deep indentations ~~of~~ for placement of the tools, fairly heavy bites on the edge. ~~These and the same thing with the other one.~~ There may be some difference in random flakes and smoothing. The notching and the flaking were done at the same time on this one and. No doubt, a very small pressure tool was used. Single flakes were removed from both sides in their notching. Apparently, the same technique with these single flakes.

Bordes: Serration is different I think.

Crabtree: Oh yes, it is. This serration is from both sides. This edge wasn't serrated, peculiar one side serration.

Daugherty: One final point. This is Hell Gap and how does the flaking of that compare to the flaking on the ~~Lincoulie~~ LIND COULEE material?

Crabtree: Very different on this particular one. They are not nearly the same. Because here they have the flakes bending over the surface while here, the flakes

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terminate right here, here, here, and here. And the flake scars are not nearly as well defined.

Borden. Ya.

Daugherty: How about that one? Still different, isn't it?

Crabtree: Still different, Still different from the edges of that one there. This one has quite an angular direction of flaking while this one shows the flakes were removed at right angles. This one has a slight angle in ~~camparison~~ comparison with this one over here. But here, again, we have the reverse or back-hand type of flaking. This is my first experience in finding this back-handed flaking.

Daugherty: They held it behind their back.

Crabtree: They must have. Or they must have had some genes that brought on this left-handedness.

Daugherty: Any other questions about this? Well, do it.

Crabtree: Something interesting, Dick, is the dating of the heat-treatment somewhere around the time of 10,000 years. There is not a sufficient array of this material for positive evidence but it is quite interesting to note the occurrence of alteration even to the Clovis and Folsom; and, yet in Europe there is no evidence of alteration. I was so in hopes that with such a tremendous range of time here in Europe that we could find some particular horizon in one of these sites, ~~that~~ which would indicate heat treatment and we would be able to follow its development, but it just wasn't here.

(Tape is Recording) Irwin Williams - Mesa Central

Irwin Williams: We have here a collection this morning from Central Mexico on the Mesa Central the highland plateau of Central Mexico just north of Mexico City. This is material from two caves which covers probably the period of around 6500 B.C. to perhaps 1500 B.C. The material is typical, but not necessarily representative of the entire industry because I don't have still left ~~down in~~ out of Mexico, very much of the original collection -- just a few projectile points for casting and a few other artifacts. Well, in any case, they are arranged more or less chronologically, over here, are the projectile points and over there, to their right

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there is a relatively typical group of tools which would be typical of the early Pecalote or Hidalgo complex of perhaps 5000 or a little more B.C. This bunch of debitage on the right is again relatively typical of this period and, I think, a pretty well developed small blade industry. In addition, not seen here, are a whole bunch of large blades made in approximately the same way but about twice the size, or more, of ~~these~~ those that we got here. There ~~is~~ are a number of burins that I would very much appreciate any comments on as well as some forms and knives and things of this sort. So fire away.

Bordes: I will leave the projectile points to Crabtree and I look at the burins. Well this one is on a broken point or let's say a bifacial tool to please Gerry. And it seems, really, to be a true burin, not a result of an accidental fracture. This one is also on a projectile point broken and then there is a burin all right. This one is the best, by far. It's a burin on one end and an end scraper on the other, and it's really absolutely typical, no question. This one is, or was, a double or perhaps a triple burin, no question. This is just a broken piece of bifacial tool.

Irwin Williams: This is simply the kind of broken bifacial tool that they did convert into a burin.

Bordes: And that could well be also a burin. Not very, very good but obsidian does not take the burin blow easily. And that is amusing. It looks like a channel flake a little. They made a burin on it it seems because it is not only a fracture I don't think, there is a burin blow, all right on ~~the end~~ it.

Irwin Williams: The point of bringing these burins here, outside of just indicating the kind of material that we do get in Central Mexico for burins is that these are not a minor tool in this assemblage. There are more burins in these early levels than there are projectile points. They make up to 30% of the entire group of materials so that these are really a major tool. They aren't just

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a minority piece, some of which could have been caused by chance.

Bordes: Oh, no some of them are ~~not~~ definitely not by chance. They can't. This tool it is quite impossible. Now I leave it to Crabtree.

Crabtree: This assemblage is quite a typical of a roughing out, preforming, assemblage. Some ~~of these~~ are well refined. ~~They~~ and there seems to be a difference in preparation of the platforms. Some indicate the use of a billet on obsidian. ~~Possibly~~ Here they ~~they~~ utilized the ridge to guide and make a series of flakes and the Flakes were, ~~no doubt~~, detached with considerable regularity. ~~It does indicate~~ They also show that there has been a little extra platform preparation and the ~~However~~, these flakes are well controlled from the edge of the artifact. This does not look like a typical core tool. I mean, the flakes do not appear to have been detached from a core because when they are detached from a core there is a lot of regularity in this type of an edge, with a slight bending of the flake where it hangs onto the side of the billet. Here They were able to force the ~~these~~ flakes clear across, using a small tool, while here it appears they may have used a stone percussion tool. When there is a great deal of shock, you lose the platform and There is ~~also~~ a shock pattern at the ends of these flakes where the flake was broken from the shock during striking and it ~~leaves~~ has left these lines, or fissures. Notice the compression of the flakes. It appears to be the result of a blow by a hammerstone. The deep heavy scars and the bulb here on the top and the striations indicate the direction of force. ~~There is a~~ This is the hinge fracture where the force was dissipated. Because the platform collapsed, they were not able to remove this flake. Back to this other group. The surface of the scars, with the exception of this one, and perhaps this one, have indications of being core tools or well-defined flakes. And this one ~~most certainly~~ is one of our definite pressure techniques showing ~~prepared in the same style as some of our pressure flakes~~, refining of the platform so that the flake is released easier. It ~~does~~ indicates the pressure technique of lifting the long flake off, but it is

difficult to tell ~~their~~ the original length of the flakes. Not having an assemblage, but just one flake, it is difficult to tell, but it does show that they had ~~the refinement of a~~ a very refined pressure technique. The rest of these flakes required more than pressure and this one indicates a ~~short~~ sort of percussion thinning flake, ~~yet still~~ but following the outward ridge. Back to Gerry's problem. These are quite interesting preforms made by simple percussing roughing out ~~with the flake technique~~ to avoid transporting a lot of material back to the campsite. There is no refinement in this preform and it is clearly not a tool, but shows working just merely to remove surplus material. Another percussion type of ~~a little~~ preform that could be later shaped into an artifact. Now with this one, I don't know. Because you find many of these sort of thick objects that do not appear to be preforms but indicate they were used as tools as they are. So to sharply define the difference between this tool and this ~~tool~~ preform is a little difficult. But ~~because~~ the edges on this one show they haven't created a platform to thin it down ~~and~~ to make a better artifact. So this, even though it may resemble a preform than ~~no doubt~~, was the artifact itself. And the functional scars ~~on this artifact~~ on its edges indicate that it has been drug toward the person. Wouldn't you agree, Dr. Bordes?

Bordes: Yes, I think so.

Crabtree: This is not a preform, but looks like a sort of little gouging, digging tool because it has been abraded back from this edge and it is not designed particularly for a preform. Each artifact must be appraised and one must determine the difference between a tool and a preform. This, of course, is a little difficult. This one certainly looks like a preformed object with no retouching and has no apparent abrasion on the edges. This one was, no doubt, stepped on, for a direct downward blow will give you this type of break which appears to be accidental, for it shows a crushed area just in one spot.

Bordes: Look at that.

Crabtree: This one shows beautiful refinement of pressure work. Very excellent. It also brings out something that we haven't seen here before. I thought all this type of flaking was done by

a left-handed man. But this shows that the worker was ambidexterous for it shows he changed directions of flaking. This shows a remarkable amount of control and the technique of feathering the flakes off on this side and this is a very beautiful artifact showing double diagonal flaking. This is very uncommon in most of the western United States. Is this common in Mexico, Cynthia? This kind of technique of diagonal flaking - making a Christmas tree pattern.

Irwin Williams: Not particularly common. It does occur on this projectile point type.

Crabtree: Well, that is a superb example of double diagonal flaking. This one appears to be the same technique. Both slanting in that direction.

Bordes: Do you think, Crabtree, that this could indicate that the man could use his two hands, because I think when I am doing pressure, I would have no trouble doing this kind of retouch.

Crabtree: Yes, it could. But it is very difficult to control the angle with the tolerance of having this flake and this flake meet. I mean the degree of angle just can't be measured. It is to perfection. So, can ~~you~~ the worker calculate the angle this perfectly going this way backhand, and then constantly ~~turning and turning and turning~~ it around and going this way and yet retaining exactly the same angle. ~~However~~ See here, the last series of flakes on this side were pressed off done from the tip back toward the base. He Starting ~~and~~ from the tip and flaking back toward the base in a back-hand sort of technique. But ~~the changes of angles~~, even considering the contour of the artifact itself, the changes of angles requires a great deal of skill to keep ~~this very constant~~ the angle constant angle. I mean it is like setting up a machine to calculate in which direction you are going to have two points meet. For instance, if you are going to drill a hole in a bead, you have to balance the hole on the other side so that the holes on both sides will meet perfectly in the center, and this is similar to what they have accomplished here. It is certainly a very beautiful piece of work. This could be done by a right-handed man by reversing the platforms and changing the direction of the flakes, or it would be done by one who is ambidexterous.

Reel 1

~~Side 2~~

Irwin Williams: Could you comment on how that would be produced?

Crabtree: This looks like it is made strictly by percussion. Just by dragging the tools on the edge you can get this sort of character. They are random flakes on the side. Its doesn't appear to have any pressure scars on it. This one has a peculiar technique of being retouched again after the initial flaking with a slight basal thinning and polishing at the base, which is a little unique with this type of hafting. This is apparently an example of gathering someone else's artifact, or blade, and retouching it again at some different date. And here is another one which certainly looks like some of the Eastern U.S. fluted points. However, there is a slight basal thinning on this one and as the ~~artifact~~ artifact broke it hinged back in the other direction. But with this basal grinding it certainly is very characteristic of some of the work of earlier types. These have a uniformity - these over here. This is a type of point we see in Southern Nevada. They have changed directions of flaking. This type of roughed-out material with no regularity indicates that they have used a preform, then removed the ridges. This ridge, that ridge, and so on following through on the ridges until they get a better contour of the artifact, prior to the final retouch. Then instead of going ahead with the retouch, As far as they were concerned, the tool was functional and was, probably, just as good ~~as~~ a tool as the other one.

Irwin Williams: There is an interesting little platform on the base of this one.

Crabtree: Oh, yes, there is.

Irwin Williams: Some of them apparently were made on flakes or blades.

Reel 1

~~Side 2~~

Crabtree: You can see a little of the original flake, scar surface showing the second scars coming from a direction other than the original flake scar. But these little thick tools, like this sort of thing here. Sometimes, they appear to be quite refined, however, this one is heavily keeled on one side and fairly flat on the other; while there is ~~regularity~~ FLAKING with this one with no attempt at thinning. Apparently they wanted a very strong point for some purpose, whether projectile or what. I'm sure I don't know. This one up here--this long stemmed point, ~~This~~ is rather interesting. It is random pressure flaked but done with this technique to get the form and there is no continuity or regularity with this one. Let's see. Did I miss some of them?

Irwin Williams: Oh, here's a serrated one you might comment on.

Crabtree: The serrations have been made just by crushing the edges. They did not ~~do their~~ use the serrating flakes technique at the same time as the surface flaking when forming the point. It appears that they just crushed in the edge--just flicked it over by pressure with a rodent tooth or something like that. We might check that--the angle of this one here. This is another back-hand. Two more back-hands. At this meeting we have seen more evidence of left-handed people than I have ever seen in my life. This worker didn't have a right hand. But this would almost be an ambidexterous man, flaking in both directions.

Bordes: Could be. I think that if I am good enough some day to make this kind of retouch that it will be very easy for me to make this kind of thing-just changing hands.

Crabtree: This one appears to be a utilized core. That's the balance of it. This doesn't show a great deal other than detaching flakes for making small projectile points. Was there anything that we missed over here or weren't you ready for them? I'm all through.

Reel 1

~~Side 2~~

Irwin Williams: No that comes later.

Epstein: One question for Mr. Crabtree: Would you show us or explain to us in more detail exactly what you mean when you say this could be made by dragging the point?

Crabtree: What I had in mind, Gerry, was this artifact here. It shows removal of some small flakes in through here. What I mean by dragging is taking the billet and pulling it across the edge, which would square up the point. This can be done instead of leaving these projections like an unfinished article. If you have these bulbs and irregularity on a preform, they may later be used as platforms, and then again, they may have used these as tools just as they are if they wanted an agricultural tool for digging or something like that. It may have been of no importance. We have called dragging several different things such as referring to it as "shearing". Then we will have another word for shearing. This may be confusing, using terms that mean the same thing, But, I think, Dr. Bordes understands. When we ~~dragged~~ these billets ~~as~~ hammerstones across the edge it gives this sort of a character on the edge.

Bordes: Small flakes. Shocks. Something very regular. Looks like pressure

Crabtree: This is something very interesting.

Irwin Williams: Now what tool did you think might have been used to produce these?

Crabtree: It appears to be ~~almost~~ one of pressure. Very careful placement of the pressure tool and following the ridge very carefully. The end is quite distinctive of the type of the Valley of Mexico. The ends have the same characters that I get when producing these long prismatic flakes.

Reel 1

~~Side 2~~

Irwin Williams: Most of the impulsively produced blades you get a little later have a distinct character of this little overhang which is very often not removed and a very heavy bulb, even heavier than that.

Crabtree: Is that so?

Irwin Williams: I don't have any with me, unfortunately, but they look much like what you have been producing.

Crabtree: This is the only one that I found that was quite distinctive in this array here.

Irwin Williams: It might be something ancestral, very easily. Ordinarily we don't get them coming in until the very late pre-ceramic or very early ceramic.

Crabtree: This is ~~quite~~ an interesting incomplete sort of thing, ~~having~~ has the character of almost a side-struck flake and ~~leaving~~ left the original cortex and almost finishing it by pressure.

Tixier: ~~Txier~~: Crabtree, we spoke about this flint and I think that it is an unfinished one, you see.

Crabtree: Yes.

Irwin Williams:" Well, I have no objection to it being unfinished one way or another. However, it was part of a burial outfit that was buried with a woman. And I wouldn't be surprised if, in this case, the thing was just a mint condition artifact, which could have been hafted by that back end there. Very often this is the case of hafting like this. Because, as I say, this and a long bone awl were crossed at her side ready to go, I suppose, to be used in the after world.

Reel 1

~~Side 2~~

Crabtree: That's quite unique.

Irwin Williams: I never found another one. There's one at El ~~Arbillo~~ Arbolillo in the somewhat later classic.

Crabtree: The thing is, generally, the preforming is done by percussion methods, but this appears to have a great deal of pressure retouch ~~that~~ like they were doing the whole thing with pressure rather than percussion which is a ~~little~~ a little different and unique.

Bordes: They seem to have a little trouble here taking this off, and they did not bother to go on. And, probably, it didn't matter to them. But you see this kind of thing we meet, well, often enough in some bifacial type of side scraper which looks more or less like a German ~~Blatspeden (check with Earl)~~ BLATSPETZEN in the North of France in the Ethna (check with Earl) Valley where you have some bifacial tools, ~~follette~~ POLIATE tools and with this kind of flat thing left probably to hold it better or things like that. And perhaps the man wanted to make a projectile point and then said " well, after all, it can make a very good knife".

Byers: May I ask one question? Don, did you say that the ~~llama~~ Lerma point is a preform or is it finished?

Crabtree: It appears to be a finished point. It's just not adaptable for anything else other than just what it is. I mean there is just no angle left for thinning this down or for changing the character or shape of the artifact. It's a finished artifact, whatever it is. It's not a preform. That was the thing, Doug, to determine the difference between a preform and this sort of thing.

Reel 1

~~Side 2~~

Bordes: You know what you have to do. You have to make things like that and when you have made one or two of them then no questions asked.

(Laughter)

Epstein: All right, I will make one.

Bordes: No, not one but many.

Irwin Williams: All right, well, I haven't any more questions. Does anyone else have any questions on the obsidian lot, otherwise we can move to this other material.

Bordes: Yea. Let's go to the other material.

Irwin Williams collection - (Valsequillo? ~~Vasequillo~~)

Irwin Williams: We are going to go to a collection of casts of material from somewhat farther south in Mexico. These are from the ~~Vasequillo (check spelling)~~ Valsequillo? archaeological zone south of Puebla, ~~Mexico~~, and they are of considerable interest in that they occur in ~~direction~~ direct association in non-rolled material with a rather large extinct fauna characterized primarily by mammoth, camel, horse, mastadon, an extinct four-~~horned~~ horned antelope, Tetramerix, and a wide variety of other extinct animals. Now I have them arranged in essentially what I believe to be their chronological order, from above left in sort of a reverse S to lower right. So that the latest material here is that just in front of Dr. Bordes.

I thought it was Valsequillo? D.B.

Bordes: The oldest is here?

Irwin Williams: Well, this is the oldest, these two are probably the oldest collection here, yes. These first three plaques were found directly statigraphically one above the other. This is from a separate site which we don't have directly dated in relation

Reel 1

~~Side 2~~

to the others and so it is probably of approximately the age of this little collection of flaked points here. I might add that all of the little flaked points, with the exception of this one, have occurred in direct association with the bones of, well, camel and mastadon, in these cases. This one was found with a horse kill among the horse ribs. This was among a bunch of horse bones, but not probably a kill. So any comment you have on this material will be extremely welcomed. Oh, this material here down on the lower right was with a ~~mast~~ mastodon kill. This, for whatever it is worth, scraper or whatever, point or whatever, was among the mastodon ribs. The ~~oth~~ other material was scattered in among the butchered bones. So, as I say, any comments you may have I would be most appreciative of, and the more detailed comments I can have on these the better.

Bordes: I am very much impressed to see tools which have been found in direct association with mastodon. The more because, here, in Europe, the mastodon are very, very old. I know that they are not so old in America, but nevertheless you know, mastodon that is something else. Mammoth ~~were~~ we're? used to it, mastodon. Let's see these flakes one by one.

Irwin Williams: This is probably just a flake, possibly used on one side.

Bordes: That's A flake which had been detached by probably a wood billet or soft billet. That could be a burin of the same crazy kind as in Alaska, you know, with this pointed tip. Could well be, could well be a kind of burin, you know.

Irwin Williams: Well, this was directly under the one ~~ela~~ ilium of the mastodon pelvis.

Reel 1

~~Side 2~~

Bordes: I don't know what they wanted to do with a mastodon pelvis and a burin. This, if this is a point, it is a rather crude one. If this is a scraper, it is not a very good one either. But there is certainly some trace of utilization. That's slightly retouched looks like a bad end scraper.

~~Crabtree~~ Typical: Could be an end scraper. - typical end scraper.

Bordes: You know they were rather brave to attack a mastodon with such tools. And that is also a flake with a dihedral platform. ~~Perhpas~~ Perhaps you could call it convex with a small flake here. It's rather difficult to tell but probably struck with a wooden or a soft hammer. Some retouch on the concave edge, not much. And there is also,here, a little bit of retouch. That's not much, you know. It seems that these people have used anything that they had in their hands at the time they found the mastodon because did they kill it or did they find it dead. That's the question?

Irwin Williams: If this is a point, they may have killed it, if not we don't have much of a conversation.

Bordes: Well, that's a rather small point for rather a big animal.

Irwin Williams: But these are smaller.

Bordes: Yes, but they are better. This is something else again.

Irwin Williams: These people were apparently accustomed to split ~~the~~ tusks mastodon mandibles for one reason or another, and this was found imbedded in one of the mandibles just below the teeth row. We took it out in block.

Bordes: That's a completely typical tool. You know that's the kind of thing, yes what we call ~~backed-burin~~ alter--graduating big, which gives you an edge, a cutting edge like that which is very strong, you know. With that you can cut like that, you see. Like a burin but a different technique. This, this could be a point. Oh, ya, probably is--is some kind of point but it can be also some kind of scraper. Difficult to tell with this American stuff.

Reel 1

~~Side 2~~

Irwin Williams: My impression is that it might be the point end of one of these others.

Bordes: Ah, that's interesting also. That's just a pointed flake but they made a kind of stem, a little bit like a ~~Conrobert~~ Font Robert--a bad ~~Conrobert~~ FONT Robert, but if it had been found in ~~Perigurdian~~ PERIGORDIAN culture in France we would call it a very bad ~~Conrobert~~ Font Robert or at least a ~~pitingrated point~~ pedunculated point.

Irwin Williams: I wonder if you will notice here. The platform, apparently, has been faceted before striking off this long flake.

Bordes: Very slightly, you know....It can be just rubbing the hammer here to prepare a little bit of platform. And it seems to have been struck also with a rather soft hammer, with this lip, B but anyway, this hammer was not very wide for it was struck as I do for the blade, you know, vertically, because over there you have a good bulb. ~~It looks like a Levallois point.~~ Tixier: It looks like a Levallois point, almost. Bordes: And this is the most interesting of all, because there is one question. It is certainly a point but was it hafted like that or like that? Looks very much like some transverse arrowheads we get in the ~~Meolithic~~ MESOLITHIC and Neolithic in our home.

Irwin Williams: Well, perhaps it will help in that its position was point first under a camel rib.

Bordes: Under a camel rib, You know, that's all right but from which side of the camel did it get in.

Irwin Williams: South.

Bordes: And, ~~it~~ the hole can ~~go~~ get pretty deep. Even in the camel.

Irwin Williams: True, true.

Bordes: In a way that's interesting, you know. Because it shows that oh, ya, I would like you to find others like that.

Irwin Williams: So would I. This doesn't show particularly unless you point it out, but the entire base of this, all the way around on both faces, and the side, was polished, ground, for one reason or another. Apparently not I would guess to do with the flaking technique, but to do with its ability to be hafted.

Bordes: That could be. Anyways that's a kind of point made with small retouch. And these people didn't seem to bother much about retouching their points.

Irwin Williams: No, there is no bifacial retouch in these lower levels at all.

Bordes: There is a kind of bifacial retouch.

Tixier: A little curving - very short.

Irwin Williams: Edge trimming, yea.

Bordes: Now we get to that. That's different. That's a good ~~positive~~ projectile point, broken, or knife, you know - this bit.

Irwin Williams: That's just a fragment of a biface.

Bordes: That-that's a fragment of something bifacial. Something bifacial. ~~Oh, no,~~ I don't think so.

Tixier Bordes': Piece of a projectile point

Tixier: Maybe something of a projectile point?

Bordes: Could be, I don't know. This is a nice one. Seems percussion made, rather than pressure. And that-that's a strange thing. It is difficult. The casts are good but not a good point.

Irwin Williams: That wasn't a very good piece to start with.

Bordes: What?

Irwin Williams: That wasn't a very good piece to start with.

Bordes: No. I can see that the material is bad material and the retouch is not very easily seen on ~~here~~ it. That I don't know what it is. It can be anything.

~~Byers~~ Tipier!: It looks like a drill or a ~~bores~~ borer.

Bordes: Looks more like a bad drill than anything else. Ah, here, ah, ~~ha~~ ya'. Here is a bifacial tool. It is certainly not a projectile point. Probably a knife, With a basal end untouched, ~~notch~~ notched, very outward. And it seems that here either, they made a burin out of it or they tried to get small blades. Who can tell? It's difficult with such things. You know, since I have seen the Japanese stuff, where they began by making a kind of thick laurel leaf and then they break it one way and then they do all this work to get small blades like that. Well, of course, you say they are Japanese, and Japanese are always pigheaded. I wonder when I see something like that if it is a tool or if it is a core. You know, you never can tell. That is not too good. That is a faceted striking platform with a little ~~hinge~~ overhang but anyway it was not done with a stone. You never get this overhang with a stone. But it was a hammer which was medium hard, not too soft.

Irwin Williams: This apparently has had some sort of gouge or leading edge maybe.

Bordes: Oh, ya, a kind of scraper anything, you know. Scraper is a good word because it does not mean much. It has a very wide acceptance. That's a very nice ~~positive~~ projectile point. I don't think that this is fluting. It could be the

surface
~~face~~ of the flake and it went into something hard. And that is certainly probably not a burin. I think rather it went against something hard, camel skin, perhaps, I don't know. What was with it?

Irwin Williams: The horse and camel.

Bordes: Horse and camel. Ah! Hard enough But no, it went probably against a bone or a stone or something like that. Ah, that's another thing. That's a small flake with platform which has nothing special some facet of that. And it is difficult to tell what was tried with this one. Could be stone could be something else. But an interesting thing is a very outward truncation to the right of the burin and very, very, outward by small retouch, no work here. It is not a borer. It seems that the truncation was a one. Nothing else. I don't know, perhaps it was two.

Irwin Williams: No, a concave scraper.

Bordes: It's not a scraper, it's too outward. It has something to do with camel hunting. I don't know. Other comments from other people?

Crabtree: I would assume that the casts are replicas, as near as possible to the color of the original material.

Irwin Williams: Approximately.

Crabtree: ~~And, no doubt, it is~~ Like Lake chert and flinty material. This is something I wonder about. In Mexico there is an abundance of obsidian and yet these points are of nothing but flints and cherts. It seems characteristic of many of ~~Ancient~~ ancient ~~Man's~~ sites that he wouldn't touch obsidian when it was right in the ~~Valley~~ valley floor below. I'm speaking of my experience with obsidian in Southern Idaho. For some reason they seemed to desire these flints and cherts and yet we have a lot of obsidian there. I think Dr. Bordes has made all of the comments necessary But this group proves that they had some well-controlled, well-defined flakes. There is one little flake here showing

a hinge fracture. This shows a little specialized retouch, of ~~spacing~~ spacing. I mean, there is not enough of these to show any uniformity, but it indicates that it was used scraper-wise in that area. ~~But~~ These three show the position of seating the pressure tool each time rather than indicating percussion or function. This side indicates a bifacial flaking, such as Dr. Bordes explained. This one also shows a bifacial retouching. This one appears to have been abraded on the tip like it may have been one of the ~~gravets or a little engraver~~ gravers. That is all I have to say on this.

Irwin Williams: Do you have any suggestions how the retouch on these later points, well this particular later point, would have been done?

Crabtree: This ~~appears~~ side appears to have been done by pressure, ~~on this side~~. However, the technique is not too refined. You can see the little step-fractures indicating where the worker didn't apply he hasn't applied sufficient pressure, and ~~This~~ this character is not common with the percussion technique. He has undercut and left fairly heavy deep bulbs on the edge which produces quite a sharp edge. This is, of course, bifacially done. It is quite heavily abraded on this side. This ~~edge~~ appears to be the tip of the tool. And, again we have these left-handed rascals. There is a slight retouch here on the edge of this one, indicating it may be a reworked artifact. There is not much showing here, but it appears pressure was applied away from the tip and back in again on the opposite side. This one here, however, is in reverse. I mean the flakes are directed toward ~~away from~~ the tip which is difficult to accomplish without snipping off the tip. He took very wide flakes clear across the surface. The normal reaction when pushing down this much is to get a shearing of the flake because you must keep your pressure away from the tip. But with this specimen, he reversed it and applied pressure towards the ~~base~~ tip. He may have carried his finger out in this manner and used it as a sort of support for the tip. This gives

good support without losing the tip. This certainly does appear to be pressure work on this particular point. I'm glad you brought that one up. Don't you think, Dr. Bordes?

Bordes: Ah, yes. no question.

Irwin Williams: Well, do either of you have any comment on the kind of tool that would have been used to produce this rather large flat retouch or chipping on the biface here?

Crabtree: It appears to be done with a billet, horn, wood. Something like that.

Bordes: Something like that, yes.

Jelinek: I have a question for Tixier or Bordes. How similar is that small stemmed point to an ~~Iberian~~ aterian point.

Bordes: To an ~~Iberian~~ ATERIAN point.

Jelinek: To an ~~Iberian~~ ATERIAN point.

Bordes: No, it is not. Not the same technique.

Jelinek: What would the distinction be?

Tixier: The distinction is at first the stem is narrower and well shouldered, you see. It's very well shouldered in an ~~Iberian~~ ATERIAN point. On one side, yes. Here it is something like an ~~Iberian~~ ATERIAN point, but here, no.

Crabtree: This is just a comment to Cynthia. With the Paleo-Indian artifacts, we find occurences of the back-handed technique of applying pressure away from the base toward the tip and, yet, in the recent material, we see none of this. This Paleo-Indian does An apparently distinctive technique was used ~~by Paleo-man~~ at your site. It appears on the two retouches that we find in Solutrean ~~that~~ yet we find only two ~~but yet they are~~ that have this distinctive and different type of ~~retouching was done they applied pressure in the direction of the tip and away from the base.~~ while the rest of the specimens show very regular and very uniform flaking. ~~Whenever~~ this

Irving: Mr. Crabtree, in view of the fact of your earlier observation of the hand-holding the piece being flaked does most of the work, do you suppose it is

REEL 1 / -

possible that they have here a tradition of holding the piece being worked in the right hand and holding the tool in the left? This done by right-handed men.

Crabtree: This, I think, Dr. Bordes should know. He is ambidexterous and can work either right or left handed and can change angles from one direction to the other. Right-handed persons have their strength in the right arm and that is where you actually need it. If a right-handed person were doing this with his left hand he couldn't free hand-hold it. So he must, therefore, hold the artifact against a log or some part of the body. Right-handed persons will naturally thrust and pull inward toward the body when applying pressure. But to push away from the body, one lacks control of flaking. It is normal for a right-handed person to pull something towards himself very carefully and very gradually, if you understand what I mean. I mean to exert pressure toward the tip of the point and away from the body is not the normal thing for a right-handed person. Therefore, I assume the worker was either left-handed or ambidexterous. Another thing - the accuracy needed for flake removal requires seating the tool each time pressure is applied, and this back-handed method would make seating more difficult. This would also be rather tiring for a right-handed person. Because of the mechanics of flint, it is more likely to break when pressing toward the tip rather than toward the base of the point - or toward the body. This back-handed technique takes greater control for shaping points, yet with this particular one, they were applying pressure in the direction of the tip rather than into the body of the artifact. Now, no matter whether percussion or pressure is used, we have to keep the blow towards the center of the artifact, otherwise, we'll break it. I mean, it will break in the middle or at one end or the other. Well, the same thing is applicable to

pressure work. If a person has been using the right hand for pressure, I just don't feel that ~~one~~ he can alternate and use the left-hand for pressure with any degree of control. It's just like writing right-handed or left-handed. And these scars are ~~just as~~ almost as identifiable as penmanship; ~~almost. You'll have certain styles, whether it be Palmer Method or printing.~~ When one develops ~~these~~ rhythms and the muscles develop for a right-handed technique, it is very, very difficult to change over. It would require much practice and many hours for me to change from one style to another. For instance, last night I was trying to change techniques and do a Hell Gap style of flaking. I haven't mastered it as yet. Dr. Bordes was making a true replica of a Solutrean and he feathered out the flakes with fairly deep bulbs. The way he applies his tool and affixes it to the edge of the piece of flint determines the popping off and the feathering out of the flakes. So I tried to use his technique to show a little of the ripple flaking. But mine ~~The~~ flakes would go clear across and take off the other side of the artifact. I mean, I just couldn't get the feel of it. These are the things that are distinctive with pressure retouching, probably more than percussion. However, I think that at some later date, and I think Dr. Bordes will agree, that certain percussion techniques are going to be as identifiable as well - when further work has been done and more collections studied.

Bordes: Oh yes, yes.

Crabtree: Not from one group, because we have millions of people whose techniques we are trying to identify. And, there may be almost as many techniques as there is with handwriting. Maybe we can get a character analysis here from some of the stone work.

Bordes: Well, any other comment on this collection?

Byers: I think it's very interesting that Don Crabtree has picked up this concentration

of left-handedness with this early material. The preliminary indications from ~~Tetohuachan~~ Teotihuacan which is only about 40 miles away, Cynthia?

Irwin Williams: About 60, I believe.

Byers: Is that the population there is all very ~~inbred~~ inbred and this concentration of left-handedness may coincide with an inbred population.

Crabtree: This ambidexterous ~~of~~ or left-handed work is ~~quite a rarity. Extremely unusual. It is one of the first~~ one of the finest examples I have ever seen showing this precision and control. ~~I think this~~ It is a classic in demonstrating this particular type of technique. I haven't anything ~~here~~ in my collection of replicas that compares with that. I thought if we were showing different techniques that ~~something in this array on the table~~ my collection would pretty well cover the pressure types. ~~demonstrate many different techniques~~. But, my replica is most certainly not done with the accuracy and precision shown in the making of that particular artifact.

Wheat: Don, I have one question. I was wondering, Don, almost all pressure flaking that I have ever done or that I have ever seen done has been done against the palm and consequently on the force side of the blade from the chipper. Have you ever attempted to do flaking on the top side of the blade and if so what kind of control do you get on that?

Crabtree: Well, to answer your question Joe Ben, ~~when~~ I have tried flaking from the top side of the artifact. When I did, I used a popping motion up and out from the edge. I do still use ~~that~~ this technique but mainly in platform preparation. But to do an alternate opposite work on the top, even ~~to~~ just taking off a right angle edge, it would be very difficult. it's much easier for me to reverse sides of the artifact rather than work back-handed. However, you would hold the preform a little differently in the hand, if you were going to flake ~~from the top side~~ in this back-handed manner. For instance, hold the point like this and work backwards such as that. The fingers must hold the artifact, so they

are in the way when the flakes are removed toward the fingers. When using this method, one must flake by placing the tool on the underside of the leading edge, and pressing upwards and toward the tips of the fingers. The flakes, if you are successful in using this method, will go into the tips of the fingers. If a pad is used, it will prevent the flakes from terminating and we will end up with step-fractures and it will not have the character shown on these pieces. Well, this would be easier to demonstrate. I'll be careful, Cynthia. It is difficult to correct an angle when working on the top side. Now, if we would use this technique on the top side and have a leather pad to protect the fingers, we will catch the removed flakes between the pad and the art. and we'll end up with little tiny step fractures on the ends of the flakes without termination. We must hold the tool underneath the leading edge in order to get the flakes to feather. So to hold the artifact with the surface exposed, the tool will waver and we can't get this type of a snap which was, no doubt, used to terminate these flakes. For it takes a fairly heavy bite on the edge to pop them out from the edge upward. Notice the extreme sharpness of the edge of this artifact. No crushing of this edge, but very very well done and the angle of the flakes is quite consistent. It may be possible that they devised some sort of method of holding the stem in this way and following thru and they could have developed precision in flaking this way. It is not necessarily maybe a left-handed technique but it is one that goes from the base to the point on both sides and it is a holding method that is foreign to a right-handed person. Maybe some day we'll know more about this. The angle here is very good to keep a good straight edge; but they didn't do it that way. With this one they did it only on this side here, because you can see the overlapping of the series of flakes and it demonstrated they only did it from one side

rather than an alternate opposite. Otherwise, there would be we get a sinuous effect on the edge. not the same thing.

Bordes. Yes, yes.

Tixier: Yes, yes, yes - here also on the other face there is no bulb. But it is That is quite different in direction.

Bordes: Well.

Tixier: This was the last series on here. But it's quite different in direction. The same..... direction.

Crabtree: But this technique to have appeared between 3500 and 5000 B.C! This refinement is quite different, and it seems like it is an original. It doesn't show up very many places maybe other than in this particular geographical area. It is quite an uncommon technique and very distinctive and perhaps could be traced much easier than some of the random flaking which doesn't show refinement. This sort of thing just shows mainly pressure trimming the rough surfaces off by pressure, without any regularity.

Alan Smith: Prof. Bordes. We have three other tables to look at. Before you we have Phil Smiths material. Then we have Msgr. Gambier's Combier's material. And then finally Don Crabtree has laid out a sample of artifacts of different techniques.

Bordes: All right.

Phil Smith (collection)

Phil Smith: These collections are all from upper region a place called Comonbona Kom Ombo not far from Aswan. There are 5 five collections here - 5 five industries and they represent the Egyptian equivalent of the Upper Paleolithic. They were found on a silt plain on and below the surface and I'll describe each of them in very brief detail and roughly the order in which they come. The oldest dates apparently to about 16,000 B.C. That's the one on my left and the youngest to about roughly 10,000 B.C. at the end of the Pleistocene. This is an industry which is curious because it hasn't been known in Egypt before. It seems to have been found recently in the Wadi Holfa HALFA area of the Sudan by the New Mexico and Colorado groups. There, I think, they called it the Holfan HALFAN

industry. It's made using the levallois technique. The micro levallois technique of small prepared cores very often with the ~~chapeau de gendorme~~ Chapeau de Gendarme striking platform effect, which I mentioned yesterday to Gerry Epstein. Associated with this rather archaic technique are polished bone needles, awls, and very well developed grinding stones, as well as burins and end scrapers. Should we talk about this one first and then I'll go on to the others later.

Bordes: As you like. I think here that most of the speaking will be made by Tixier who knows African material much better than I do. However, there are certain Upper Paleolithic similarities. But for this first culture, I would like to point out this small nest of some of these levallois cores which made flakes which were no bigger than a nail and one can wonder what could be the use of such flakes. Sometimes, in the Mousterian, we find very small but never as small as that. About this size is the smallest I know in France. Now to Tixier.

Tixier: They are very, very little such levallois cores in North Africa particularly in Upper ~~Arterian.~~ Aterian ~~Arterian~~ Aterian of North Africa there is most flakes of ~~Arterian~~ are the levallois technique and they are very, very little cores like this. But the thing is striking me, I think it is the first time it was found, the levallois techniques, with needles and bones and worked bones and it is very very interesting. And there is a question. Do you think, Philip Smith, these men are like in North Africa with suppose ~~Neanthethral~~ Neanderthal men or almost like them?

Phil Smith: We have no clue at all. No ~~skeleton~~ skeletal material ~~were~~ was found with it.

Henry Irwin: I have a comment. We found a jaw, ~~Homo sapiens~~ Homo sapiens, associated with this sort of thing. ← must be underlined.

Tixier: I would think so. Yes. I would think so.

Henry Irwin: This jaw ~~a bit with a bit of core~~ has been reported.

Phil Smith: Perhaps the unusual feature about these Levallois cores is, that they are faceted at the bottom. And I don't know whether that was done to form the bottom of the flake or whether it was used as a technique for resting the core ~~or~~ in order to strike it off. In other words to give it some firmness at the base.

Bordes: For such a small flake I don't think that it was necessary to rest the core on something because you can strike it very well in your hand.

Tixier: (In French) To Philip Smith

~~Bordes~~: Phil Smith!, So we finish with this one now and go to the next one, which was found at the base of a stratified site in a silt base, ~~here in the middle~~ this is the lower industry in a stratified site which had two industries. This is the upper industry. This seems to date about 13,000 B.C. and as you can see it is a highly microlithic industry. A large number of retouched backed bladelets, blades and a good number of micro-burins. There is also a fair number of true burins of various types on ~~truncature~~ truncation, dihedral on breaks, so on such as this. Cores are all small ~~unusually~~ and usually the materials are made in exotic materials that come from the bed of the Nile. Agate, chalcedony and various others fossilized wood several other things.

That's a ticklish point. I had been calling it the ~~(Silcellian) ck. spl.~~ Silcellant from Java, Silcella (ck. spl.) where it is found. Tixier and I have just about decided that it is probably an eastern relative of the Northern African Ibero-Maurusien which is better known ~~as~~ in Tunisia and Algeria.

~~Bordes~~: Tixier! Bordes! I'm quite sure. ~~It could be~~ it could be.

Phil Smith: Perhaps you can comment on this.

Tixier: I'm quite sure because there are tools which are very characteristic of Ibero-Maurusien and which are, like this one, little bladelets. Little backed

bladlets with their striking off a micro-burin, a little one. We call this "Piquant-Triede" in France and in North Africa. And, in France, "Point Oblique". Vignard said "Point Oblique". It has two names but, I think "Piquant Triede" is better. And this is a very characteristic kind of technique in Ibero-Maurusien. Usually, removing the flaking of micro burin is the preparation of truncation or geometric microlith but here it is not a preparation, it is a finishing tool to be more pointed, more sharp, you see. And there is also what I call Ouchtata retouch, because of Ouchtata in Tunisia. It 's a very, very little retouch, very short one - sometimes a little abrupt but often a semi-abrupt, sometimes needle you see and it is a very, very characteristic retouch of the Ibero-Maurusien. And this retouch very often begins near the bulb without striking off the striking platform near the bulb and it becomes very narrow and very thin and disappeared before the distal end of the bladelet. Excuse me for my bad English. It is very difficult for me. It is very, very difficult for me. And also there it seems that the statistical balance of this complex is very near, it is very close, is very like North Africa ones from Iberia, Tunisia and Moracco. I'm sure. (French)

Phil Smith: He says that they are not the brothers of the Ibero-Maurusiens, they are the first cousins. Two little things I'll point out. There are very few true microliths on the acute triangles, trapezes and half circles and segments of circles. But they are very rare in spite of the fact that the site was screened.

Bordes: I would hesitate to call this segment a circle.

Tixier: Because of its size.

Bordes: Just barely, if it is round. Barely. It's more like a true convex truncation.

Tixier: Yes, when the bulb is not removed, there is no pressure, no segment. But when there is no bulb and no striking platform and retouch all along here. This one is retouched a little bit of the bulb.

Phil Smith: Perhaps you can mention the "Points de La Mouillah".

Tixier: The "Points de La Mouillah", oh yes there are many things about this. Here is, you see, not a good one but a bladelet. A little bladelet, thin one but backed with the retouch. And, then with the removing of the micro-burin and these I call these "Points de La Mouillah". It's very important because it's a characteristic tool and we can easily gain experience from "Points de La Mouillah". I made a very good number of points. It's very easy.

Bordes: What else?

Phil Smith: The other thing is that all the nuclei recovered are very small. In fact, there is nothing much which is as large as these from which undoubtedly they were struck in the first place. In other words, they have all been worked down to very small proportions.

Bordes: There is an amusing thing. That this micro-burin of this culture is bigger than the Levallois core of the older culture.

Crabtree: They ~~do~~ show a great deal of refinement ~~in their~~ core technique of removing blades. This thick blade was removed from the core, but it also took off the flake scars from the removal of additional burin flakes, but they do show a great refinement. The thermal treatment is very evident in this array of material. ~~Particularly~~ this one particularly shows the change of texture and has the color change, which is very nice. Also the distal end shows the original facet prior to heating and substantiates the altering.

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Phil Smith: Do you find something like this around Wadi Holfa, Henry?

Henry Irwin: This industry is very curious, we have an industry, ~~oh~~ ar we have two industries which have these little pieces that have arched back like this, but as far as I know, at least with the stuff that I worked with, we lacked micro burin technique. Except some which are perhaps very rare, you know, one tenth of one percent. With that industry over there, we get two forms of that industry and one form has little lamella dou and there is a date which ~~Wendorf~~ Wendorf has gotten, and I expect our date will be the same of 17,000 years.

Henry Irwin (In French) translation of above.

Bordes: All right. well - why not.

Phil Smith: Curious Burin... backed

Bordes: Not quite. It's not quite ~~their best~~ a BACKED burin but it is an interesting burin. On one side a fracture and on the other side a kind of careful retouch in two direction. That's amusing.

Phil Smith: All right. Anything else about this industry?

Crabtree: There is one thing that I might ~~like to~~ add about this material. This point is so obviously heat treated. Even though there are no facets remaining, it is obvious. This type of agate, which, in the old country is called ~~in the old country~~ onyx and, is used for cameos, contains little tiny quartz crystals and, therefore, is quite irregular. And the surface is extremely coarse prior to heat treatment. You can see the color change from sardonyx to carnelian and this specimen is apparently from the pebble culture and. Another thing is the uniformity of termination of these little flakes and bladelets. As they were removed, they do come right out to the end with very slight curves on the end. This little core shows a slight platform preparation, of making a facet to control the termination and regularity and uniformity of the flakes ~~making this uniformity~~.

Phil Smith: Do you think that ~~that~~ heat effect could, have been produced by a solar action?

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Crabtree: I don't think so, because if it had been solar action, it would have changed the whole surface. The color changes make this quite unlikely. This is certainly not a natural stone, Unless the heat would develop up to 350 degrees which is unlikely. I believe, as Cynthia pointed out, that this is when this change takes place. I doubt very much if solar heat, even over a prolonged period of time, could ever develop heat to this degree and cause this crystalline change to take place. The uniformity in the texture of this array of smooth textured stones certainly indicates they are treated by man. appears to be man-made.

Phil Smith: There is one last point. As Tixier remarked, the other evening, that all the points here are retouched on the left side.

Tixier: Ah, that's very important. Very important. Characteristic of these La Mouillax MOUILLAH points. I don't know of one La Mouillax point on the right edge. They are all, all, all, all, on the left edge.

Bordes: You know it does not prove much because right here Next thing. you can't tell another thing. Next thing

Phil Smith: The next level, has been given the name of Sodeckian. SOBECKIAN it comes from the upper level of the same site. It has Several carbon 14 dates around 12,000 B.C. and a very rich fourteen fauna associated with it, but the industry is very monotonous. It's always made on that gray or tan colored chert without exception. Virtually all of the artifacts are long retouched, or slightly retouched blades or bladelets, really nibbled bladelets, but there is a small proportion of burins, such as the odd-ball that you can see here and a few end scrapers. One of the curious features about the cores is that you have the nucleus quasi, as they call it in North Africa. Unfoftunately I didn't bring along a good example with me. So .....back where you have the core being struck this way from that side and they turn the core over and do it at right angles. But most of the nuclei are more or less very, very steep striking platforms. Not always, but usually.

Bordes: Not always. There is one thing which strikes me about this core, you know.

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Bordes For this one a truncation of the striking platform and here too. And this seems not to be worked with pressure but with percussion and percussion with a soft hammer and a very careful percussion that just takes the edge a kind of glancing blow, you know. And takes off very thin blades with a small bulb but on the other hand some of them are quite different. This one on this side has a plane? striking platform which could have been struck like that. But, on the other hand, it seems to have had a preparation that could be for punch technique or perhaps pressure technique because look at some of these very small blades. This, for instance, is certainly the kind of wood struck stuff. But look at this one, and there are others like this one, here with this very small bulb and I wonder if this is not either punched French with a very thin sharp punch or pressure. I don't know.

Crabtree: Well defined. Very excellent. From the control it appears that they used certainly uniform. a fairly slender, tabular sort of a core for their initial work, in order to get this depth with this narrowness to establish these ridges and make a continuity of this sort of thing. To leave these These well defined ridges which would take a fairly narrow core in order to produce these. These are extremely flat with almost no compression lines. You'll notice that they do terminate sharply at the ends without any overhanging coming in from underneath the cores.

Irwin: Do you get loma crest, Phil?

Phil Smith: No. Well, yes I do but not enough. This Ouchtata retouch, as Tixier mentioned a few minutes ago, it's present on a good number of these also. Just what this industry represents is a bit hard to say now, but Mr. Tixier and I are having a slight argument about this. He prefers to call it a kind of Ibero-Maurusien - Nile Valley Ibero-Maurusien. I don't see quite eye-to-eye with him on this.

Tixier: There are four kinds.

Cambier: (In French)

Phil Smith: There are no micro burins at all in this industry and not a single geometric. It's entirely different from previous forms.

Bordes: Looks like.

Irwin: Does this occur locally, Phil?

Phil Smith: It seems to yes. You get it in the limestone deposits.

Bordes: (In French)

Bordes: An odd kind of Capsien.

Irwin: Looks pretty much like that bunch from ——

Phil Smith: Yes, it does, yes it does.

Tixier (In French)

Phil Smith: O.K. Now one question. Do you feel that this is a burin flat? This one here. Double burin flat.

Bordes: Could well be. There is a nice burin on the percussion here and there. It could be two, yes, yes, yes. Could well be, yes. Probably a triple burin. All right.

Phil Smith: We have finished with that one I think. This came from what was more or less a surface site. It seems to date to the late Pleistocene but, so far, I don't have any definite radiocarbon date for it. This industry was identified or found by Vignard about forty years ago at Kom Ombo he called it the Aurignacian

when he got around to publishing it about ten years ago, because of its typological resemblance to the European Aurignacian. There is no question but that it does resemble the Aurignacian in some ways although I won't call it Aurignacian publicly. Well, the fact that I found some engraved Venuses on the cliffs just above this made the situation even worse as far as Messr. Vignard was concerned. Now he is all in favor of direct migration up the Nile Valley from Rubisere? (ck). There are knobby cores almost no blades cores, true blade cores. Some have been reworked into steep scrapers of kinds, almost carinated ones. There is a huge proportion of scrapers of all kinds in this industry about 50% steep, some carinated on the end of blades, end of flakes, and also some side scrapers. Plus these retouched blades, lamellar triangle almost, which do resemble some of those found in the Antelian the so-called Aurignacian of Palestine.

Bordes: Why so called?

Phil Smith: We'll talk about that later. We have been arguing about that for five years. There are very few burins, no microliths, no micro burin technique, and, at the present time, the whole thing hangs in the air. As far as I know, it hasn't been found elsewhere in the Nile Valley up to the present time. I think it's final Pleistocene around probably, according to its geological context, probably around 10,000 or 11,000 B.C. But I have to wait until I get a couple of hearth charcoal samples run before I'll be certain of that. Tixier do you have any comments?

Tixier: No comments.

Bordes: The only thing that I can say is that I have seen, last Spring, some of the material from what is the name already? the big site in Lebanon, (Zoroque)? ck. spl. and some of the real Zoroque not only the Aurignacian-like tools but exactly the one of the Aurignacian. So, perhaps it has no genetic geometric connection with the Aurignacian but it is a little difficult to

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call it another name. You know, because, if so, we can go very far and say that the horse of North American wasn't a horse because they were in North America. You know, not only when you say some special feature all right, but no more or not much more than you could find between two, for instance, Aurignacians of France and one of Germany. It's even much closer to the Aurignacian of France than and the Focollere ~~(ck spl)~~ for instance and the same PROPORTION collection of tools.....which is exactly Aurignacian. So there is a problem of this Near East Aurignacian between quartz, if you like, but you know that old story about Shakespeare. Next one I think perhaps.

Phil Smith: The next one represents the ~~Sevillian~~ SEBILIAN industry which ~~Venoir~~ VIGNARD found at ~~Colombo~~ Kom Ombo about ~~40~~ forty years ago. Yes, the whole thing. This is the middle ~~Sevillian,~~ SEBILIAN most of this is the late ~~Sevillian which is more micro lithic~~ SEBILIAN where it became more microlithic. Unfortunately, I forgot to bring along some cores or some nuclei for the Middle ~~Sevillian~~ SEBILIAN but some of these here give a fairly good idea. It's an industry which starts out very much in the Levallois tradition, and then gradually loses it ~~although~~ though it never quite disappears. At the very beginning, and there are very few of the early sites known, it seems to be hardly distinquishable from a Mousterian, Mousteroid type of industry. At the end which comes at the end of the Pleistocene and the beginning of the ~~Oliecence (ck spl.)~~ HOLOCENE it's truly ~~micro lithic~~ microlithic using the micro burin technique. They made a great many geometrics and blades, but still a small proportion of the Levallois core. In some respects, in fact, it's kind of a second cousin to this industry, I described at first. But typologically it is quite different, technologically it's somewhat the same. Typologically it is completely different. There are absolutely no burins found in the ~~Sevillian~~ SEBILIAN, only micro burins as far as my experience at ~~Colombo~~ Kom Ombo went. The most distinquishing thing about the ~~Sevillian~~ SEBILIAN, of course, is the fact that these triangular and trapazoidal flakes, which are common throughout, and the fact that the bulb is almost always removed and this curious U-shape curving truncation.

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This is a "Bordafact," not an artifact. He made it last summer for me. You can tell how he makes it.

Bordes: Oh, well, that's not difficult at all. You take a flake, a Levallois flake if you have one in your hand, if not, a flake which is not special like a Levallois. You make a truncation to give the shape, and then you put it on a stone and you make a second truncation taking off the burin, and that's very easily done, ~~easy to do~~, you know?

Phil Smith: Here's a kind of core which is a Levallois core which is found quite often in the Middle ~~Sevillian~~ SEBILIAN and even in the Late, and this core is more like those found in the Early ~~Sevillian~~ SEBILIAN. In the Early ~~Sevillian~~ SEBILIAN most of the artifacts are done in basalt and diorite, as ~~Venoir~~ VIGNARD observed. In the Middle and Late they tend to swing more and more to flint.

Bordes: This is a discoidal core, not a Levallois core.

.....

Phil Smith: No, it's not a levallois core, but you can find those in the Early to Middle. Towards the end there are quite a number of backed bladelets present: triangles, trapezes, scalenes, virtually every geometric form that one can think of. And in one very late ~~Sevillian~~ SEBILIAN site I found these three artifacts which ~~Venoir~~ VIGNARD hadn't reported. They seemed to be in place, and they are really slugs, limaces, ~~climas~~, with what might be, it's hard to say, I think, it's percussion retouch.

Bordes: Oh, ya, ya, ya. Micro flakes. You know what ~~there~~ that is. It this a break, oh no, if this is not a break of the tool after completion, it is not struck. For typologically to be a true slug, you have to have retouch all around. This one would be better, not the shape, but the type. and this, what is the matter with this?

Phil Smith: That's a small version.

Tixier: So called... Pièce à Languette

Phil Smith: Double concave scraper rather spoke-shaped. Very large number of these. Not

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this one, but quite a ~~lot~~ few of ~~these~~ the SEBILIAN Sevillian points. They are not retouched except that the bulbs ~~they~~ are left. I don't see one at the moment. This comes close to being it. They are left in their natural state after being struck, usually, from the Levallois cores.

Henry Irwin: Phil, do you get a lot of micro burins with this?

Phil Smith: Quite a few yes. They tend to be heavier than those.

Henry Irwin: Little ones, ~~do~~ Do you get little ones?

Phil Smith: ~~No, they tend,~~ No, they are not as small because all the bladelets in the ~~Sevillian~~ SEBILIAN are rather thick. You don't get any very small micro burins such as this. This is more typical, although it comes from a different industry. This is more typical of the ~~Sevillian type~~ SEBILIAN micro burins.

Henry Irwin: But you don't get any of these little ones? Less retouch.

Phil Smith: No. They didn't have a very delicate bladelet technique.

Henry Irwin: You got a little blade .

Phil Smith: Yes, you do but they... apparently they didn't. I found no very tiny micro-burins

Henry Irwin: They didn't do it by a micro burin technique.

Tixier: Proximal ones or distal ones?

Phil Smith: Both.

Bordes: Well, we have still two tables, at least, to examine in a very short day and very short time so it could be, could be, could be.

Phil Smith: O.K. well. (Lapse in recording time) Bordes Collection

Bordes: ~~Which gives~~ It is the name ~~of the~~ site of the Solutrean but not the type site. You have this white flint, ~~from...~~ from Solutre and ~~And~~ then you have here some casts of some very good points, which are probably the most magnificent Solutrean points ever made by man. These are two American tools coming from a collection which is very, very rich in beautiful tools with, what a pity, more emphasis on the price than to the rest ~~than~~ on than ~~from~~ the origin, from which this is Illinois, which is rather big. And this one is Kentucky. And here you have tools and things that

is from Solutrean. This is a very, very Solutrean which comes from upper level Paleolithic. And that is what could pass for a Solutrean point a face plane but it is much later since it comes from a Chalcolithic (ck. spl.) level. You can see here many definitions. These are casts, of course, and the tools are much more magnificent than that, and which are very, very long, rather wide, and very, very thin, and they seem, however, mainly to have been made by percussion. Either indirect percussion or only percussion by somebody who really did know his business. I can't tell and I would like Mr. Crabtree to comment on this. That was a cast, and there were about 18 or 20 pieces like that. All magnificent.

Crabtree: There are many mechanical problems involved in doing this type of work. You'll notice the size of the detached flakes - the amount of stone removed in relation to the edge - strictly a mechanical and physical problem. The angle is very critical and it must be at right angles to the artifact. It must not veer a degree, otherwise it will break the artifact. Yet, when this much area is being removed, it is hard to prevent the edge from crushing because of the shock to the ends. Because if there is the slightest tap on the end the other end flies off as a hinge. But the trick must be to somehow dampen the shock and, apparently, to use some sort of a bipolar technique to get this feathering out. However, some flakes do appear to have met on the opposite side as a thinning technique and apparently were made on a very large blade or with the core, technique. But the placement and the regularity of the flakes are staggered, in order to remove the stone in between each of the flakes on the opposite side, and they are almost full flakes without a great deal of overlapping. They haven't used the next ridge to guide their flakes, but have used the flat surface and regularly spaced them. Therefore the flakes are conchoidal rather than parallel. There may have been a slight amount of

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pressure retouching done on the marginal edges. However, if you'll notice they didn't take off these projections left from previous flake removal, but utilized ~~this~~ the strength of this material to remove the flakes on the opposite side. Therefore, they didn't pull out a half-moon portion with the bulb of force. But they have resorted to every possible mechanical law in order to produce an artifact such as this. They are truly magnificent pieces of workmanship. There appears to be a mfg. uniformity of ~~manufacture of~~ straightness and regularity of these artifacts that would suggest the use of indirect percussion. They must certainly have been ceremonial objects. But for slicing elephants, you could take an awfully big slice.

Bordes: Well, this is many levels of the Solutrean. Where the ~~thing~~ flint was not too good on the edge. And so it is not as beautiful as in other Solutrean sites, but it is interesting to see the wide range of variation between the most elaborate ones which are sometimes not bad at all, like this one for instance, and this one, and ~~somethings~~ some things which can be, how you call it, preforms. Could also be heavy tools. This I wonder if it was ever intended to make a Solutrean Laurel Leaf. I don't think so. There are also, you know, that there are a kind of small hand axes in the Solutrean and this is probably one of these small hand axes and not at all a preparation for a Laurel Leaf. We have also the same problem that you have got in the States. Here is an interesting one, which will also remind you of things we have seen, ~~a~~ That's a piece on which ~~it~~ they gave a burin blow. There is another one here. The question is ~~-~~ is this really to make a burin or is it to make a kind of stem? That's another question. This one, no question, it is certainly a burin blow. We have a lot of burins made on broken Laurel ~~Leafs~~ leaves. I have seen another one; I don't know where. And that is a point which is different. In that case, in that case, it could be a burin blow, but it could be also something ~~-~~ a shock. And that ~~will~~ would be interesting

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because it will show that these relatively big things could be projectile points too. Not only knives, as some people have said. That's a thing that had happened to them, you know, flaking it and they took too much of a bite in the flint and bang, it broke on the side. And there were some here which are interesting with a stem, some not very well.

Cambier: Question in French.

Bordes: No, no, no, that is certainly Solutrean. In Perigeou - well these are some in Laurel Leaf and so on. And also one of the characteristics of Solutrean of this site is that very often they made things which were just worked a little bit and left a big unifacial. This one with the exception of the stem; it's not even unifacial. Just a little one almost. Ah, here, that's interesting! What do you think of this one, Crabtree? Do you think that is pressure work here?

Crabtree: There are two indications of pressure work here. This one appears to be of pressure work and yet the normal Solutrean has a square termination of the flake with a series of these flakes are removed with the technique of working flint in Solutrean blades is the spacing of each flake so they are separate and away from each other. It is most certainly this sort of wide flake and the narrowness at the proximal end of the flake leaving both sharpness and regularity. This is, no doubt, pressure retouch on the marginal edges showing quite a little refinement.

Bordes: And here, they did not bother to take this off. They could. They could. That could have been done, just holding it a little here and oblique blow on there, the same technique to get rid of square edge. It could have been done by pressure, by percussion, but it did not seem to bother them enough, and so they kept it like that.

Cambier: Question in French.

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Bordes: Ah, yea. In the Upper level Solutrean you have this ~~very this~~ one is certainly pressure work I think, and made very often flat. One face is not retouched, almost none. And here on this one it seems to be the preparation of a platform for pressure flaking, which is not very often seen in the Solutrean, this preparation.

Crabtree: No, this is different from what they did.

Bordes: It was removed or it was not done, you know. Here, for instance, it does not seem, it seems that the bulb is there, all right, and they did not seem to have prepared any platform for pressure on this one, you see.

Crabtree: A sharpening. But he was bending the flakes across which was not distinctive with the normal Solutrean. This is a little variation from what we saw at the museum yesterday. This particular technique is showing up. They are following the ridges; overlapping; double overlapping, following the ridges and are able to carry their flakes longer and up over the surface which shows a little change in technique between ~~the burins~~ those in the museum and this.

Bordes: Ya, ya - between the burins and this. Yea, yea, that's an end scraper on it.

Tixier: Don Crabtree, here there is a little polished edge. Do you think it is after or before flaking? Utilization or preparation?

Crabtree: This appears to be utilization. As for the projections, they are turned down the wrong way for a polished platform to serve any purpose for pressure flaking and seem to be serve ~~a~~ utilization, ~~purpose~~.

Tixier: Yes, I think, so.

Bordes: And this, this ~~chacolithic~~ chalcolithic French tool. It is quite something different, you know. It's a blunt edge.

Phil Smith & Cambier } Discussion in French.

Crabtree: This shows a slight amount of platform preparation on this edge in taking these flakes along here, very regularly spaced, very nicely done. He couldn't

have carried them any further because he had an indentation in the original flake. It is also interesting to see the straightening of the flake by removing the two curved ends. A little different style.

Bordes: Yea, much later. That is Ya.

Daugherty: Is that Solutrean?

Crabtree: I can't tell from that. I just am not familiar enough with these stones. There seems a slight difference, but I am not sure.

Bordes: Yea, it looks a little. Perhaps.

Phil Smith: One of the things which might account for the relatively scarcity of finely retouched pieces of Solutrean is the fact that it is just about the only important open air Solutrean site known, and very possibly it was a seasonal encampment rather than a place where they lived for longer periods. This might account for lesser interest.

Bordes: Ah, yea. You could say. Look, that's a Laurel Leaf and here probably on that side, I don't know if it has been done, oh no, it's done from this platform, you know. The leaving of the ridge here. It's not exactly fluting. Very close to it.

Crabtree: Some fluting technique?

Bordes: Very close to it. With this preparation of platform, no question. If it was smack in the middle.

Crabtree: If it was right in the middle. There we would have it.

Bordes: That's very interesting. Oh, no, no. That's much better, because what poor Greenman? green man called fluting is just, ah, I have no blade here.

Cambier —— (In French)

Bordes: Ya, ya. This one is a damn good one you know. With this preparation.

Tixier: Do you think it is intentional?

Crabtree: Excuse me, one other thing. You are wondering how to remove the long flakes, and this has ~~occurred~~ a curve here. Once this flake had stepped off, there was no

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way to get any further. So he followed all the way through, till he hit this ridge, which would guide his flake showing the flake coming clear across, then he could go all the way across the top of the artifact. But it is just a matter of mechanics.

Bordes: Ya, ya, and probably there was also a slight changing of angles. The angles was much like that and not so flat.

Crabtree: He had a little ridge to guide the flake right over the surface.

Bordes: Yea, yea, yea.

Crabtree: He could keep going with long flakes.

Bordes: This one is interesting you know, no question, ~~they~~ prepared the platform and they took this off.

Crabtree: Right.

Phil Smith (In French)

Bordes: This kind of fluting I very often do to get rid of the ridge.

Tixier: I think it is a broken Laurel Leaf.

Bordes: What?

Tixier: It's a broken Laurel Leaf, I think.

Bordes: No, no. I dont think it's a broken

Tixier: Is it not broken?

Bordes: Yea.

Tixier: Before flaking?

Bordes: I think it is a.... they made this with a broken flake as I take very often when I began to make a Laurel Leaf. Work this. I don't think it's a broken piece. No, I don't. No, no, no, no.

Bordes & Tixier → (Discussion in French) (lengthy)

Epstein: May I ask a question of Mr. Crabtree? As I understand your description of the flaking technique done on these large Laurel Leaves, you point out that they

did not utilize the other adjoining flake but went on beyond it. Or, in other words, they did not use the flake scar here but went much farther.

Crabtree: Very true.

Epstein: Now I don't know whether I understand you correctly or not, is there an advantage to this, as you see it?

Crabtree: Yes, to attain this extreme thinness, one must space the flakes alternately to leave surplus ~~so that there is~~ material left between ~~them~~ each flake. Then this material will be used as a platform ~~can be utilized~~ each time to provide strength to detach the flake from the opposite side. Therefore, there will be a little material between each flake ~~in this area~~ for a platform. Then, when the flakes are detached, they will meet in the center ~~of~~ (in other words) to thin down the artifact. A type of thinning flake.

Epstein: Then, in other words, it's the nature of the material which almost demands a technique of this kind or something related to it. Is this correct?

Crabtree: Well, by spacing the flakes so they do not follow the ridge of the previous flake scar, the flake will expand and result in a broader flake to assist in the thinning. It is just a matter of stresses and strains in this material. As the worker progresses, he must retain enough material to withstand this amount of shock on the edge. So by spacing the flakes further ~~ahead~~ apart one can provide a platform and then do the opposite side to get the thinness. One can ~~do a~~ make one flat ~~side~~ side without this technique, but to thin the opposite side, you must retain enough material for a platform. By leaving this amount of material, it assists sufficiently to take off the flakes on the far side. As you see, the flakes are staggered. So by spacing the flakes in this manner, one gains a little additional strength in order to detach the flake on the opposite side.

Epstein: Mr. Crabtree, then do you see in some of the very ~~thin~~ thin bifaces of Hopewell. Do you see the same technique? I don't remember from when we discussed it the last time.

Crabtree: There appears to be a similarity in the techniques, however, they didn't get as thin an artifact. However, between these two points, had he not trimmed off the material, he could possibly have removed a very heavy big flake by using the edge strength to withstand the shock.

Epstein: But these, of course, are not quite as thin as these.

Crabtree: No. This type of thinning hasn't the regularity. These flakes are fairly regular on this side but he hasn't taken advantage of the material in between. Here he has used it to a degree but not to the degree of uniformity of these Solutrean tools.

Epstein: If you were doing something like this, would you prefer, since this technique of staggering flakes demands a fair amount of precision, would you prefer to do this with percussion?

Crabtree: Oh yes. I think percussion is the only method for removing large flakes. But it is strictly a problem of mechanics of flintworking, Gerry. I feel there must be some sort of support for the artifact to remove these large flakes and it would also confine the shock to a restricted area. If it is held loosely, the ends are going to fly off and you will lose the artifact. But you must have this either covered with clay, as Dr. Bordes mentioned, to dampen the shock or you may remove small flakes as you go along the edge. Because when it is unsupported, the shock is dissipated into the artifact creating stresses which will fracture the artifact. And when you thin down to this degree, the shock is terrific.

Bordes: Yes, but you have to be very careful to work on something not too hard. Probably four or five layers of leather or something like that.

Crabtree: Some wood perhaps.

Bordes: Some wood, better than wood - it could be hard.

Epstein: Suppose one were to just dig a hole in the ground and put a rock underneath say a couple of inches, three inches in the ground, and then just put dirt or sand in and cover that and then place his biface edgewise into the dirt. Could that accomplish that effect?

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Bordes: I don't know.

Crabtree: I don't know, Gerry.

Bordes: I don't know, but I don't think so.

Crabtree: I don't think sand would offer sufficient support and as you strike outward you would still get flexing, even in sand. You need to use sort of a bipolar technique but not get a bipolar flake. You must just miss opposing forces in order for the flake to terminate similar to the Clovis fluting in order to get the flakes to feather out and yet keep control and confine the force in one small area. Because the flakes do radiate out and would most certainly cause a break.