

# Differentiating Archaic and Basketmaker II Projectile Point Manufacturing Techniques.

## Turds, Turkeys and Ticks on Cedar Mesa; New Insights from Old Collections.

SAA, April 14-18, 2010  
St. Louis

R.G. Matson and Jesse Morin  
University of British Columbia  
"Narrative"

This presentation does not have to do with Ticks or Turds and I hope it isn't a Turkey!

Some 30 years ago Don Keller (shown here) commented that the differences between Basketmaker II projectile points and some Archaic ones was as much "technological" as "typological". By this he meant that even when the shapes were similar the BM II points still appeared to be different. I thought that Don was right, and wondered what the technological difference was.

In 1994 Phil Geib (slide) was analyzing a BM II collection from Atlatl Cave and turned to the well-known material from Sand Dune Cave near Navajo mountain excavated by Dick Ambler to try to better understand his material. The location of Sand Dune Cave is shown here on this map (slide) of the four corners. Other places I like you to note on this map, are Cedar Mesa and Grand Gulch in SE Utah, Black Mesa, and Durango, Colorado.

Sand Dune Cave included a BM II cache of hunting and other gear inside a leather bag. Here are shown some Atlatl points (slide) hafted on foreshafts. As well as these some un-notched pre-forms were also in the bag (slide). Apparently these were notched only at the time they were put in the hafts. These pre-forms we called "Large Knives" in our Cedar Mesa Project typology.

Along with this hunting gear some gaming pieces were also present and these Mountain Sheep horn rods, which Ambler thought were probably also gaming pieces.

Phil Geib, an excellent flint knapper, thought other wise and inferred that these rods were actually punches, and that the points and preforms were largely produced by indirect percussion. He was able to demonstrate this pretty convincingly by SEM showing the characteristic wear of a punch and even a piece of chert embedded in this rod. There were also horn pieces that he inferred were used as pressure flakers.

In using reconstructed tools to make bifaces he determined that the punches resulted in much broader, thinner flakes (slide), and these in turn resulted in bifaces with fewer, larger flake scars and that tended to sinuosity in a side view.

Comparatively, points made with antler pressure flakes tended to smaller, narrower flakes, less sinuosity, but more serrations as shown on this point which he flaked the left side with the punch and the right site with an antler tine.

So he concludes thusly.

(Reading the text on next three slides)

Geib's (2002) Basic Premise:

Archaic and BM II peoples used different flaking techniques to produce their bifaces:

Archaic peoples used antler tine pressure flakers

BM II peoples used indirect punches and wide composite pressure flakers

These different techniques produce bifaces with distinctive morphologies and flake scar patterns

We first evaluate this premise quantitatively and then show how to differentiate BM II and Archaic points from Cedar Mesa

(slide) Geib (2002) indicates that:

BM II flake scars tend to be wide ( commonly 4 , up to 7 mm )

BM II flake scars tend to be widely spaced ( can be 10 mm apart)

BM II bifaces tend to be sinuous

BM II bifaces are not serrated

We Add:

BM II bifaces tend to be very thin and wide

BM II flake scars are best measured 5mm back from margin due to overlapping small resharpening flakes

(Next Slide)

Jesse shown here, determined

(Slide) Methods (1):

Quantify width/thickness,

A - Flake scar initiation width (10 largest per object, if fewer than 8 measures can be derived, the object was not included),

B - Flake scar width 5 mm back from margin (ditto)

C - Flake scar spacing 5 mm back from margin (ditto)

Sinuosity and serration indices (ordinal)

[Point out the relative thickness/width on the fourth slide, noting that the thick type 22 were not atlatl points.]

(Next Slide) Show the sinuosity of these three Geib Bifaces, noting that we would code them 1,2,,3 did similarly for serrations.)

With these attributes in mind, let us turn very briefly to Cedar Mesa (slide). This project was centered on regional sampling and we collect 76 quadrats shown here, which resulted in surface collecting 130 sites we id'ed as BM II. We also surveyed the intervening canyons, and collected some of the sites there, one of them being the Rock Island site here which was not fully analyzed in the 70s and 80s. This site, originally discovered by Don Keller was finally being analyzed by Jesse and I last year when we developed this paper. I'll also refer to some points excavated in 1991 over here in Hardscrabble 5, the Dos Tanques, Dos Fuentes locality.

The BM II atlatl points are seen here (slide), both side notched and corner notched forms. Also present (on the right in this slide) is a Type 22 biface form which is quite different, being much thicker, that were used for a function which led to extreme wear. These type 22 were not included in the analyses discussed here.

We included the seven Rock Island projectile points, shown here on the left, which had not been formally evaluated. [Although almost all of the BM II bifaces we have are from the Cedar Mesa Grand Gulch phase which dates from AD 200-400, the ones on the right here are from an excavated site in Hardscrabble 5 which I think is slightly earlier. Are they made the same way as the rest of the BM II bifaces.]

We did not locate any Archaic sites (slide), but did have a number of Archaic points (six) that were identified as such typologically, that is morphologically in the 1970s. Other work at Black Mesa has demonstrated that Archaic points were apparently picked up by BM II people and we presume this is true for Cedar Mesa.

We saw Phil as having produced something that Leroy Johnson might have called an Analytical Narrative, or Bill Lipe a plausible explanation, but not exactly demonstrated the empirical validity of his case. So we first wanted to verify empirically that the patterns he suggested did occur, and give some validity to the actual measurements involved. Secondly, there were a number of specific issues we could evaluate if the first was so.

First, I noted that Phil said serrations were very unusual in BM II points, and I noted that one point so classified in the late 70s early 80s was serrated, as shown here B11-261, and I wondered if this was an error. When I looked at it, with Phil's paper in mind, I thought this classification was an error. Since we had only six Archaic points, we added it to the Archaic points, with the provision, if its Geibian measurements didn't hold up, we would revisit this issue. All seven "Archaic" points are shown here on the right, after being coated by magnesium oxide to show the flake scars, a procedure Jesse had learned in Russia.

We subsampled the BM II points since we had a lot, using a systematic sampling procedure. With one exception, all pre-forms (large knives) came from the Rock Island site, as although I had been holding on to the points at UBC, the knives had been sent to WSU with the rest of the Cedar Mesa Collections in 2004.

In the box plots (slide) shown here, it can be seen that the four metric measurements are clearly different between "Archaic" points, and the BM II points and Preforms. Note that B 11-261 appears in two cases as an outlier towards extreme "Archaic-ness" and once in between Archaic and BM II.

Another selection of the same information (slide) is shown in the table here, with probability estimates. Note that the differences for all six variables is well beyond the conventional .05 level, even with only seven Archaic points. We believe this demonstrates that Phil's model is indeed correct, and we have validated it and have provided quantitative parameters that can be used by others.

Let us turn to applying this "validated model" to specific issues. First (slide), this object on the upper right, HS5-34, has sometimes been cited as an early "Archaic" point when seen on a slide, including, I believe, by Phil Geib, though he claims not to remember this now! I always thought it was a BM II knife (not a preform) or a BM II spear point. We also have the B 11-261 serrated point to look at more systematically.

We chose to investigate these issues, the combination of all six attributes, by Metric Multidimensional scaling which results in this figure (slide), with 76% of the variance accounted for by these two dimensions, demonstrating a high degree of correlation among the variables. We scaled all 26 bifaces that we had been able to record all six variables.

Note, that the serrated point, B11-261 is the most extreme of the "Archaic points, and that HS-54, the BM II knife, is one of the two most extreme BM II objects. [And the two objects from the early HS 5 BM II excavated material HS5-1558 and HS5-2675 appear to be made in the same way as the rest of the BM II bifaces.]

But we also found a surprise. Note object NRC9-5.2205, one of the seven points from the Rock Island site. It is sitting up there next to the Archaic points! Remember I said the Rock Island points had not yet been formally classified, and I just assumed that they were all BM II, as none of them were had a very obviously Archaic shape (slide). On further inspection, once we had done the MDS, this point (seen here in the upper left hand corner) not only did the Geibian measurements point to it being Archaic, but a cumbersome quantitative analysis developed by Holmer placed it as an Elko Side-notched, an Archaic point type, which is what it probably was. It was a collection that had a lot of Elko CN and SN points as well as BM II points that led Don Keller to make his observation.

With this "scientizing" of Phil's scheme, we think there are several obvious questions to be investigated.

Somewhat less well accepted (slide) than the determination that the BM II are dependent on maize are the ethnic relationships discovered among the BM II via previous Cedar Mesa research. I have shown that the Eastern (Durango, Colorado) BM II is different on a number of grounds from the Western (Cedar Mesa) BM II, points, house styles, and basketry foundations, among others. Further the Eastern does share a

number of characteristics with earlier Colorado Plateau Archaic, particularly, Basketry technology, point shaves, and cribbed roofs. The Western, shows similarity in point shape, house forms, and basketry, with the earlier agricultural San Pedro Cochise, leading to the inference that the BM evolved from a migration of the San Pedro Cochise.

From these postulated relationships a number of hypotheses can be developed that can be evaluated by our procedures (slide).

How are Eastern BM II points made? Since this kind of technology is of the "Enculturated" sort, it ought to track biological populations, and according to the model presented earlier, Eastern BM II ought to be more like Archaic. Conversely, the San Pedro Cochise may have transmitted this technology to the Western BM II, so measurements of this sort in southern Arizona are also in order.

Finally, it is hard to find enough relatively complete points from any given site to make these kinds of analysis. But analysis of debitage may also be sensitive to these issues. So Jesse and I along with David Pokotylo hope to produce some of these objects and see if the biface reduction flakes can be used to identify the technology (slide). We think from the analysis of the Rock Island site that this is likely to be feasible, if we can learn how to produce the bifaces by indirect percussion.

#### References (added later)

Carr, Christopher

1995a Building a Middle-Range Theory of Artifact Design. In *Style, Society and Person: Archaeological and Ethnological Perspectives*, edited by C. Carr and J. Neitzel, pp. 151-170. Plenum Press, New York.

1995b A Unified Middle-Range Theory of Artifact Design. In *Style, Society and Person: Archaeological and Ethnological Perspectives*, edited by C. Carr and J. Neitzel, pp. 171-258. Plenum Press, New York.

Christenson, Andrew

1987 Projectile Points. In *Prehistoric Stone Technology on Northern Black Mesa, Arizona*, by William J. Parry and Andrew Christenson, pp.143-198. Center for Archaeological Investigations, Occasional Paper No. 13, Southern Illinois University at Carbondale, Carbondale.

Clark, Jeffery J.

2001 *Tracking Prehistoric Migrations: Pueblo settlers among the Tonto Basin Hohokam*. Anthropological Papers of the University of Arizona No. 65. University of Arizona Press, Tucson.

2007 Archaeological Concepts for Assessing Mogollon-Zuni Connections. In *Zuni Origins*, edited by David Gregory and David Wilcox, pp. 39-48. University of Arizona Press, Tucson.

Conover, W.J.

1971 *Practical Nonparametric Statistics*. John Wiley & sons, New York.

Geib, Phil

2002 Basketmaker II Horn Flaking Tools and Dart Production: Technological Change at the Agricultural Transition. In *Traditions, Transitions, and Technologies: Themes in Southwest Archaeology*, edited by S. Schlanger, pp. 272-306. University Press of Colorado, Boulder.

2004 AMS Dating of a Basketmaker II Hunters Bag (Cache 1) From Sand Dune Cave, Utah. *Kiva*: 69:271-282.

Guernsey, Samuel J. and Alfred V. Kidder

1921 *Basket-Maker Caves of Northeastern Arizona*. Papers of the Peabody Museum of American Archaeology and Ethnology 8(2), Harvard University, Cambridge.

Hart, John P. and R.G. Matson

2009 The Use of Multiple Discriminant Analysis in Classifying Prehistoric Phytolith Assemblages Recovered from Cooking Residues. *Journal of Archaeological Science* 36:74-83.

Holmer, Richard N.

1978 *A Mathematical Typology for Archaic Projectile Points of the Eastern Great Basin*. Unpublished PhD Dissertation, Department of Anthropology, University of Utah, Salt Lake City.

1980 Projectile Points. In *Sudden Shelter*, by Jesse D. Jennings, Alan R. Schroedly, and Richard N. Holmer, pp. 63-83. University of Utah Anthropological Papers 103, University of Utah Press, Salt Lake City.

Lindsay, Alexander, Richard Ambler, Mary Ann Stein, and Philip Hobler

1968 *Survey and Excavation North and East of Navajo Mountain, Utah*. Museum of Northern Arizona Bulletin 45. Northern Arizona Society of Science and Art, Flagstaff.

Lipe, William D.

1978 Archaeological Work in the Grand Gulch Region, Southeastern Utah, 1969. In *National Geographic Society Research in 1969*, edited by Paul H. Oehser and John S. Lea, pp. 389 - 97, National Geographical Society, Washington, D.C.

Lipe, William D. and R.G. Matson

1971 Human Settlement and Resources in the Cedar Mesa area, S. E. Utah. In *The Distribution of Prehistoric Population Aggregates*, edited by George J. Gumerman, pp. 126-151, Prescott College Anthropological Reports, No. 1, Prescott, Arizona.

2009 Preface: The Cedar Mesa Project in Context. Prologue to Matson, Lipe, and Haase 1990,  
[http://www.anth.ubc.ca/Matson\\_\\_Lipe\\_and\\_Haase\\_1990.9797.0.html](http://www.anth.ubc.ca/Matson__Lipe_and_Haase_1990.9797.0.html),  
University of British Columbia, Vancouver.

Matson, R.G.

1991 *The Origins of Southwestern Agriculture*. University of Arizona Press, Tucson.

1994 Anomalous Basketmaker II Sites on Cedar Mesa: Not so Anomalous After all. *Kiva* 60(2): 219-238.

2003 The Spread of Maize Agriculture into the U.S. Southwest. In *Examining the Farming/Language Dispersal Hypothesis*, edited by Peter Bellwood and Colin Renfrew, pp. 241-356. McDonald Institute for Archaeological Research, Cambridge.

2006a Basketmaker II and Cedar Mesa. In *Tracking Ancient Footsteps; William P. Lipe's Contributions to Southwestern Prehistory and Public Archaeology*, edited by R.G. Matson and T. Kohler, pp. 46-62. Washington State University Press, Pullman.

2006b What is Basketmaker II? *Kiva* 72(2):149-166.

Matson, R.G. and M. Brand, editors

1995 Exploring the Anasazi Origins; The Cedar Mesa Basketmaker II. Report available at:  
[http://www.anth.ubc.ca/Matson\\_and\\_Brand\\_1995.11155.0.html](http://www.anth.ubc.ca/Matson_and_Brand_1995.11155.0.html)  
University of British Columbia, Vancouver.

Matson, R.G. and William D. Lipe

1978 Settlement Patterns on Cedar Mesa: Boom and Burst on the Northern Periphery. In *Investigations by the Southwestern Anthropological Research Group: An Exercise in Archaeological Cooperation*, edited by Robert Euler and George J. Gumerman, pp. 1-12. Museum of Northern Arizona, Bulletin 50, Flagstaff.

Matson, R.G., William D. Lipe, and William Haase

1988 Adaptation Continuities and Occupational Discontinuities: The Cedar Mesa Anasazi. *Journal of Field Archaeology* 15:245-264.

n.d.(1990) *Human Adaptation on Cedar Mesa, Southeastern Utah*. MS in possession of Sr. Author, and  
[http://www.anth.ubc.ca/Matson\\_\\_Lipe\\_and\\_Haase\\_1990.9797.0.html](http://www.anth.ubc.ca/Matson__Lipe_and_Haase_1990.9797.0.html).  
University of British Columbia, Vancouver.

Matson, R.G. and D.L. True

1974 Site relationships at Quebrada Tarapaca, Chile: a comparison of clustering and scaling techniques. *American Antiquity* 39:51-74.

Sall, John, and Ann Lehman

1996 *JMP Start Statistics: A Guide to Statistics and Data Analysis Using JMP and JMP IN Software*. SAS Institute Inc., Duxbury Press, Belmont, California.