

## Kentucky's Small Triangular Subtypes: Old Theories and New Data

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### Abstract

Attempts to seriate morphological differences in Fort Ancient triangular points in the Ohio Valley have led to the development of a typology that continues to be used by some researchers in the region. This typology is purported to have established a fine-grained time sequence for the Fort Ancient period based on variation in stylistic attributes associated with these triangular points. More recent studies have led to several modifications to the typology and called into question the reliability of the subtypes as more specific time markers. This paper examines the development of the typology and its usefulness in Fort Ancient studies by incorporating new data from recently excavated archaeological contexts in the region.

Small triangular points have been used in the Ohio Valley area as temporal markers of Late Woodland and Late Prehistoric cultures. While the name Small Triangular Cluster (e.g., Justice 1987) is often used for most of these point types (e.g., Hamilton, Madison, Fort Ancient), there is much variation in both size and shape of these points. Capitalizing on this variation, Railey (1992) used a sample of small triangular points from Fort Ancient sites in northeastern Kentucky in an attempt to provide a finer temporal placement of Fort Ancient points. A number of sites have been excavated within the Fort Ancient area since this point typology

was defined. More recent data has led to several modifications to Railey's typology (e.g., Bradbury and Richmond 2004; Carmean 2010; Henderson 2008). The impetus for the current paper came from application of the Railey typology to triangular points recovered from the Elk Fork site in eastern Kentucky. Data from this site seemed to be at odds with previously defined temporal placement of the various point types. In this paper we review the data for small triangular points from Fort Ancient sites and examine these data in light of more recent excavations.

### Railey Typology and Modifications to the Typology

In his original study Railey (1992) examined a sample of 133 triangular points from sites in northeastern Kentucky (Figure 1). His analysis indicated that several types had a more restricted temporal range within the larger Fort Ancient period. Eight triangular types were defined. Of these eight types, five (Types 2-6) were identified with a tighter temporal range. Type 2 points were found to date early in the Fort Ancient period (ca., A.D. 1000-1300). Type 3 dated in the middle portion of the Fort Ancient period (ca., A.D. 1200-1400). Types 4-6 dated to the late portion of the Fort Ancient (post A.D. 1400) period. Type 4 was thought to possibly represent a resharpened form of Type 5 or 6 and could only be dated to the late Fort Ancient. Type 5 points were thought to date earlier than

Type 6, reaching their height of popularity ca. A.D. 1400. Type 6 became the dominant type after ca. A.D. 1500.

A firm dating of the late Late Woodland /early Fort Ancient component was especially important due to the vagueness of Late Woodland and early Fort Ancient systematics in northeastern Kentucky. The radiocarbon dates from this component produced a relatively tight cluster (Feature 12, 18, and 60a). Feature 12 was located in the south central portion of the T1 and was identified during mechanical stripping. Feature 18 was located along the southern edge of Block 2. Feature 60a was located just east of Block 2 and it was identified during mechanical stripping. The raw BP ages fall within a 50 year span and the calibrated intercepts fall within a

130, 80, or 40 year span depending on which intercepts are used. Actual intercepts are A.D. 1050 (1100) 1140 for Feature 12, A.D. 1180 for Feature 18, and A.D. 1050 (1100) 1140 for Feature 60a (Table 5). The two sigma ranges for all three features overlap each other, indicating in all likelihood a single occupation episode (Figure 3). This hypothesis was tested using a T-test. Results indicate that there is no significant difference between the dates ( $t = .64$ ;  $p$

$< .05$ ) and that they are contemporaneous. A single occupation is also suggested by the excavation data in that the vast majority of the late Late Woodland/early Fort Ancient material in Blocks 1 and 2 was confined to a narrow vertical lense approximately 20 to 30 cm in thickness. Also, very few superimposed features were found further suggesting the occupation was likely small, of short duration, and of a single occurrence.

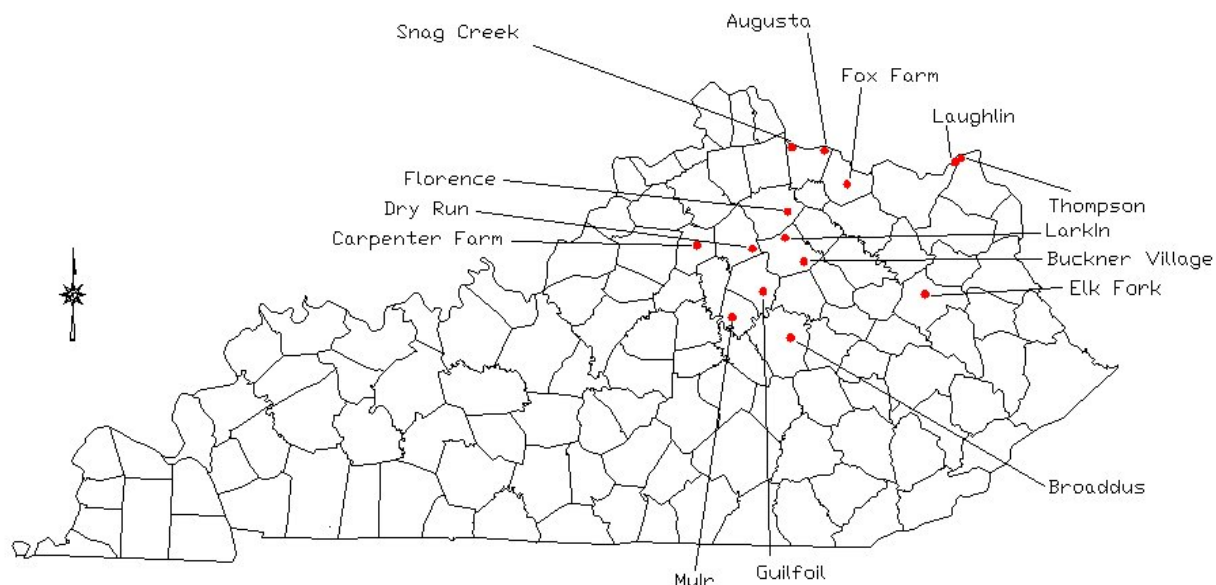


Figure 1. Location of sites mentioned in text.

Bradbury and Richmond (2004) examined a sample of 56 of the points from Railey's study and suggested, based on statistical analyses, that the three late Fort Ancient types (Types 4, 5, and 6) were morphologically similar and could not be confidently sub-divided based on metric data. Bradbury and Richmond did not test the temporal designations of these types and accepted Railey's temporal assignments. In short, they suggest that the five types should be collapsed into Early (Railey's Type 2), Middle (Railey's Type 3), and Late (Railey's Types 4, 5, and 6) due to the overlap in the types. In addition, they concluded that the Middle Fort Ancient (Railey's Type 3, coarse serrated) is somewhat separate from the other types due primarily to the presence of serrations.

Henderson (2008, also see Pollack and Henderson 2000) suggests that, based on newer data, Type 5 triangular points date from early Fort Ancient to late Fort Ancient and Type 2 points date from the early to middle portion of Fort Ancient. In short, she found that the Railey types have longer temporal ranges than first thought.

Based on points from the Broaddus site, Carmean (2010) suggested several additional amendments to the typology. She (Carmean 2010:229-230) argues that: Type 4 triangular points are resharpened versions of early Fort Ancient points; Type 5 triangular points date from early Fort Ancient to late Fort Ancient (following Henderson 2008 and Pollack and Henderson 2000); Type 5 and Type 3 may be the same general type, the main difference being the

serrations on Type 3; and Type 2 triangular points date from early to middle Fort Ancient times. Further, Carmean suggests that some of the differences in point morphology may relate to geographic factors, specifically the distance from the Ohio River.

Based on revisions by Henderson and Carmean, it would appear that: Type 6 is the only type that can be confidently assigned to the late Fort Ancient; Types 2 and 5 appear

throughout the entire Fort Ancient sequence; and Type 3 is still seen at middle Fort Ancient. As can be seen, the previous researchers interpret triangular points and their temporal placement differently. What is obvious is that a confusing array of interpretations has been presented over the last twenty years with little consensus. What is also becoming clear is the possibility that a triangular point typology is not grounded in any sort of Fort Ancient behavioral pattern.

### **The Elk Fork Site**

The Elk Fork Site (15Mo140) is located in central Morgan County, Kentucky near the confluence of the Elk Fork and Licking Rivers. A data recovery was conducted at the site during the summer of 2003 in preparation for the proposed realignment and bridge replacement of Route 7 over the waters of Elk Fork (Herndon 2005). This area is characterized by highly dissected V-shaped valleys produced by the down-cutting of the Licking River and its tributaries. For this reason, the region in which the Elk Fork site is situated consists predominately of steep hillsides divided by narrow ridgetops and valleys. Exposed bedrock consists of various members of the Lower and Middle Pennsylvania System (McIntosh 2002). The site itself is located on three terraces (T1 to T3) of the Elk Fork floodplain. The floodplain where the site is situated is approximately 500 m wide and generally consists of lateral accretion of alluvium derived from weathered shale and sandstone from the surrounding bedrock.

Although cultural material was identified on each of the three terraces, all of the late Late Woodland/early Fort Ancient occupation was located on the T1 immediately adjacent to the river. The investigated portion of the T1 encompassed about 1,300 sq m. Field methods consisted of the hand excavation of test unit blocks located in high artifact areas of the late Late Woodland/early Fort Ancient occupation. Mechanical stripping was used for those portions of the occupation not investigated in the block excavations. All features identified during the data recovery were hand excavated.

A total of three excavation blocks (Blocks 1, 2, and 3) comprising approximately 173 sq m were hand excavated within the late Late Woodland/early Fort Ancient occupation (Figure 2). Excavation Block 3, which was placed in the south central portion of the T1 and the smallest of the three blocks, did not result in much material being recovered. Consequently, this block will not be further discussed here as it did not have any data relevant to the present discussion. The results of Excavation Block 1 and 2 are below. As noted above, mechanical stripping occurred on the T1 where block excavations did not test. In total, 56 late Late Woodland/early Fort Ancient features were identified during block excavations and mechanical stripping.

Excavation Block 1 was located in the southeast corner of the T1 in an area exhibiting a high density of lithic debitage in association with small triangular hafted bifaces and a small amount of sandstone tempered, cordmarked pottery. Within this block, the Ap horizon extended from ground surface to approximately 25 to 30 cm bgs (below ground surface). From the bottom of the Ap horizon to about 60 or 70 cm bgs was the B Horizon, which contained the late Late Woodland/early Fort Ancient component. As can be seen in Tables 1 and 2, all the hafted bifaces, most of the lithic debitage and pottery originated from the first two levels (20 cm) of the B Horizon. The bifaces included Railey's Types 2, 3, 4, 5, and 6 (Cooper 2005). Two small pit hearths were also located within this horizon. The Bt1 below the B Horizon was generally devoid of artifacts.

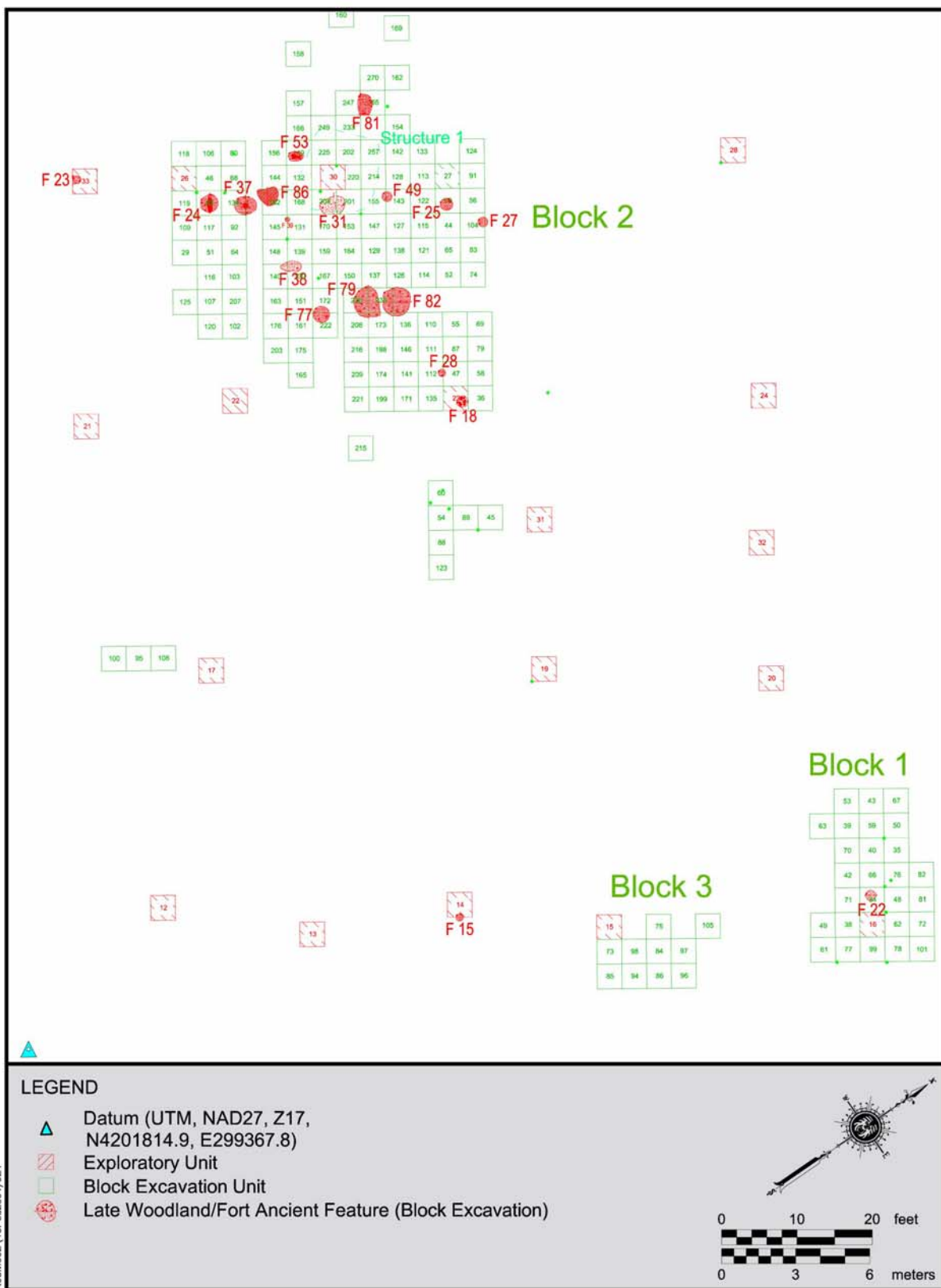


Figure 2. Schematic overview of the late Late Woodland/early Fort Ancient excavations.

Table 1. Tabulation of lithic material in Block 1 by level within the B Horizon.

Block 1	Biface	Cobble Tool	Core	Flake Tool	Ground Stone	Unmodified	>1/4" Flakes	<1/4" Flakes	Total
Level 1	12	0	6	1	0	0	540	563	1122
Level 2	4	0	0	0	0	0	146	245	395
Level 3	0	0	0	0	0	0	67	120	187
Level 4	0	0	1	0	0	0	40	59	100
Total	16	0	7	1	0	0	793	987	1804

Table 2. Tabulation of ceramic material in Block 1 by level within the B Horizon.

Block 1	Body	Rim	Sherdlet	Burned Clay	Base	Total
Level 1	0	0	23	24	0	47
Level 2	0	0	4	2	0	6
Level 3	0	0	12	0	0	12
Level 4	0	1	8	0	0	9
Total	0	1	47	26	0	88

Excavation Block 2 was located in the north central portion of the T1 in an area that had a high density of lithic debitage and sandstone or limestone tempered, cordmarked pottery. This area also registered numerous magnetic highs resulting from a pre-excavation geophysical survey that was conducted at the site. This block was by far the largest of the three blocks to be excavated consisting of approximately 120 units. From ground surface to about 25 cm bgs was the Ap Horizon. The late Late Woodland/early Fort Ancient occupation was restricted to the underlying B Horizon which extended from 25 cm bgs to 75 cm bgs. As shown in Tables 3 and 4, the vast majority of the lithic debitage and ceramic material was located within the first three levels (30 cm) of the B Horizon, including almost all the bifaces. These bifaces included all of the small triangular types identified by Railey, except Type 7 (Cooper 2005). Also located within this horizon were 16 features (mostly pit hearths but also two storage pits, a shallow basin, and a processing pit) and approximately 30 post holes associated with Structure 1. This structure was about 10 sq m in

area and consisted of single set posts with no associated basin or internal features. Little else could be inferred about the structure as it was located near the plow zone transition and as such was heavily impacted by plowing. The underlying Bt1 Horizon was largely devoid of cultural material.

A firm dating of the late Late Woodland/early Fort Ancient component was especially important due to the vagueness of Late Woodland and early Fort Ancient systematics in northeastern Kentucky. The radiocarbon dates from this component produced a relatively tight cluster (Feature 12, 18, and 60a). Feature 12 was located in the south central portion of the T1 and was identified during mechanical stripping. Feature 18 was located along the southern edge of Block 2. Feature 60a was located just east of Block 2 and it was identified during mechanical stripping. The raw BP ages fall within a 50 year span and the calibrated intercepts fall within a 130, 80, or 40 year span depending on which intercepts are used. Actual intercepts are A.D. 1050 (1100) 1140 for Feature 12, A.D. 1180 for Feature 18, and A.D. 1050 (1100) 1140 for Feature 60a

(Table 5). The two sigma ranges for all three features overlap each other, indicating in all likelihood a single occupation episode (Figure 3). This hypothesis was tested using a T-test. Results indicate that there is no significant difference between the dates ( $t = .64$ ;  $p < .05$ ) and that they are contemporaneous. A single occupation is also suggested by the excavation data

in that the vast majority of the late Late Woodland/early Fort Ancient material in Blocks 1 and 2 was confined to a narrow vertical lense approximately 20 to 30 cm in thickness. Also, very few superimposed features were found further suggesting the occupation was likely small, of short duration, and of a single occurrence.

Table 3. Tabulation of lithic material in Block 2 by level within Block 2.

Block 2	Biface	Cobble Tool	Core	Flake Tool	Ground Stone	Unmodified	>1/4" Flakes	<1/4" Flakes	Total
Level 1	63	0	6	1	0	1	1032	741	1844
Level 2	119	2	13	0	2	1	2389	1712	4238
Level 3	46	0	3	2	1	0	1169	992	2213
Level 4	10	1	1	0	1	1	256	196	466
Level 5	0	0	0	0	0	0	11	0	11
Total	238	3	23	3	4	3	4857	3641	8772

Table 4. Tabulation of ceramic material in Block 2 by level within Block 2.

Block 2	Body	Rim	Sherdlet	Burned Clay	Base	Total
Level 1	99	0	736	54	1	890
Level 2	239	4	1865	207	2	2317
Level 3	133	6	1047	89	2	1277
Level 4	7	0	132	3	0	142
Level 5	1	0	9	2	0	12
Total	479	10	3789	355	5	4638

Table 5. Summary of Elk Fork late Late Woodland/early Fort Ancient radiocarbon dates.

Lab No.*	Provenience	Measured Radiocarbon Age	C13/C12 Ratio	Conventional Radiocarbon Age	Calib. Range 2 sigma	Calibrated Intercept	Calib. Range 1 sigma
Beta-192110	Feature 12	930±50 BP	-25.0 0/00	930±50 BP	AD 1010 to 1220	AD 1050(1100)1140	AD 1030 to 1180
Beta-192111	Feature 18	880±60 BP	-25.0 0/00	880±60 BP	AD 1020 to 1270	AD 1180	AD 1040 to 1230
Beta-192113	Feature 60A	930±50 BP	-25.0 0/00	930±50 BP	AD 1010 to 1220	AD 1050(1100)1140	AD 1030 to 1180

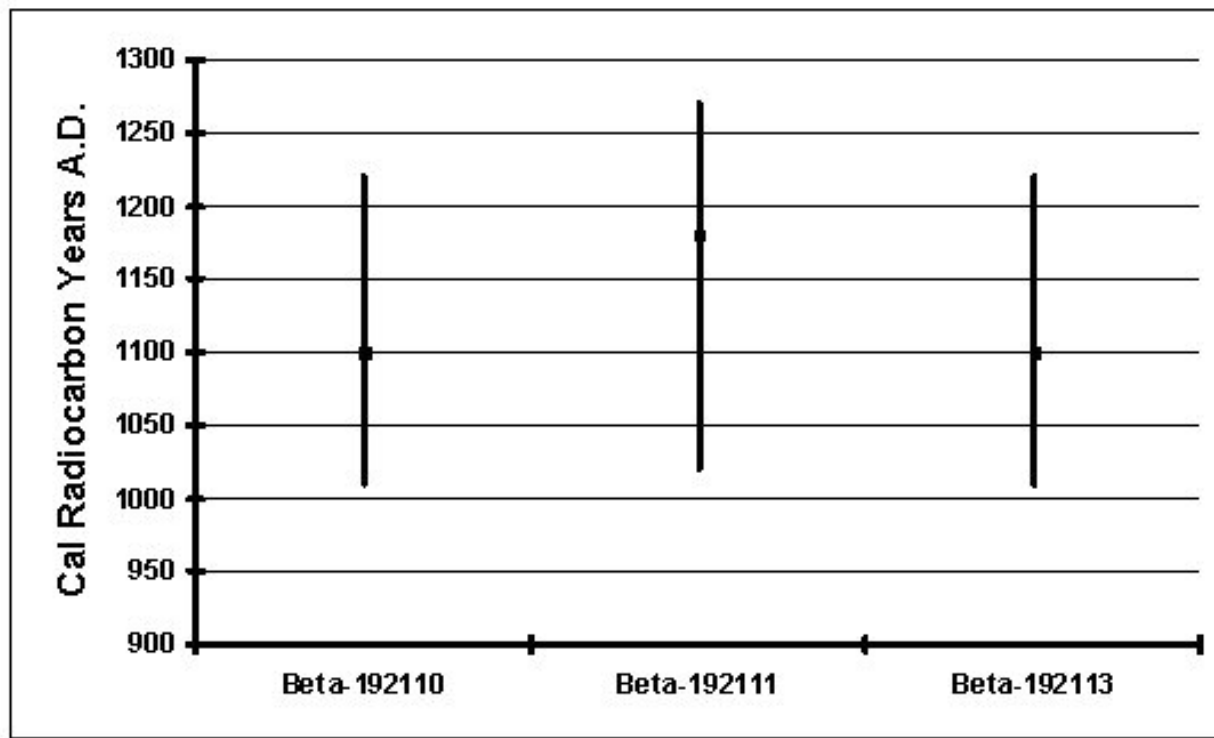


Figure 3. Late Late Woodland/early Fort Ancient radiocarbon dates from Elk Fork.

The radiocarbon data, lack of maize, and ceramic data all indicate a single Late Woodland to early Fort Ancient component. This horizon was sandwiched between two sterile layers and represented the only Fort Ancient component at the site. Given its temporal placement, if the Railey typology is correct, then we should only see Late Woodland and early Fort Ancient types in the assemblage. With modifications by Henderson and Carmean, we might also expect some Type 5 points in addition. However, the 90 points recovered from this site included all of the subtypes which were previously thought to mark different time frames within the Fort Ancient period (Figures 4 and 5). Type 2: flared base small triangular, which should be the dominant type according to the Railey typology, represents less than 25 percent of the points ( $n = 21$ , 23.3%). In addition, some of the classic types (e.g. Levanna and Hamilton) common for Late Woodland sites were also recovered ( $n = 10$ , 11.1%). We should also point out that there were 2 Jacks Reef corner notched and 2 Jacks Reef Pentagonal points, not included here. The

unknowns here include some points that could be placed in more than one type.

The C14 module in Kintigh's (2006) "Tools for Quantitative Archaeology" program was used to provide a graphical analysis of the radiocarbon dates. The uncorrected dates were used for this analysis. The assumption is that for any time interval, the probability that the true date of a sample is within the interval can be calculated from a normal distribution. Each date from a site, or specific context, is treated as a normally distributed probability with a mean and standard deviation given by the lab (Kintigh 2006:102). In examining multiple dates, for each interval the probabilities for the dates are summed. For each interval, an expected number of dates can be determined for that time period. These can then be used to graphically show the dates obtained from a site. If a single occupation is indicated, a unimodal graph will result. A distinctly multimodal graph may indicate multiple occupations. Output from the C14 module was imported into Excel for graphing purposes. Analysis of the dates for Elk Fork indicate a single occupation (Figure 6).

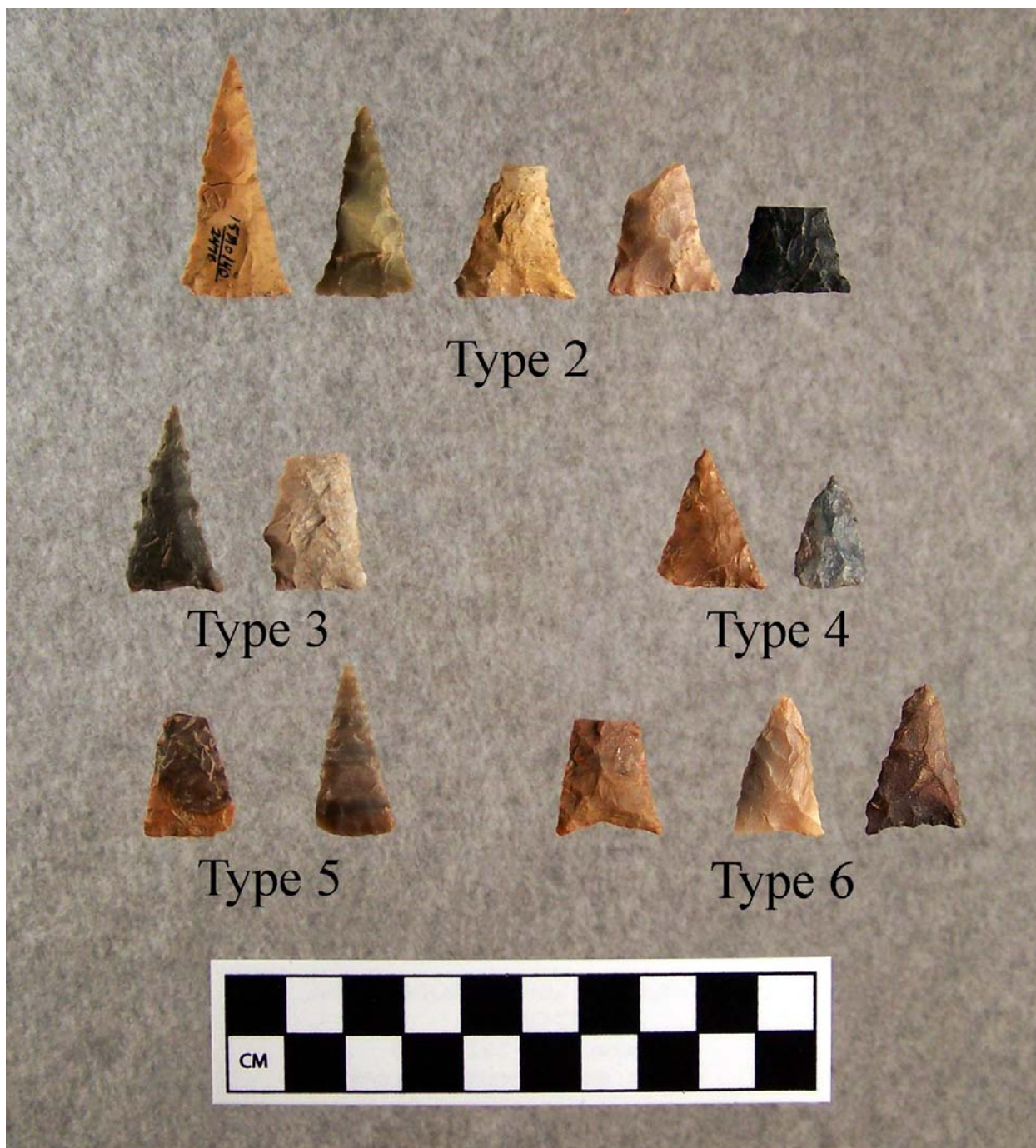


Figure 4. Type 2-6 Fort Ancient triangular points from Elk Fork.





Figure 5. Late Woodland triangular types (top row) and various indeterminate triangular points (bottom two rows) from Elk Fork. The indeterminate triangular points either matched multiple Railey types, or no type.

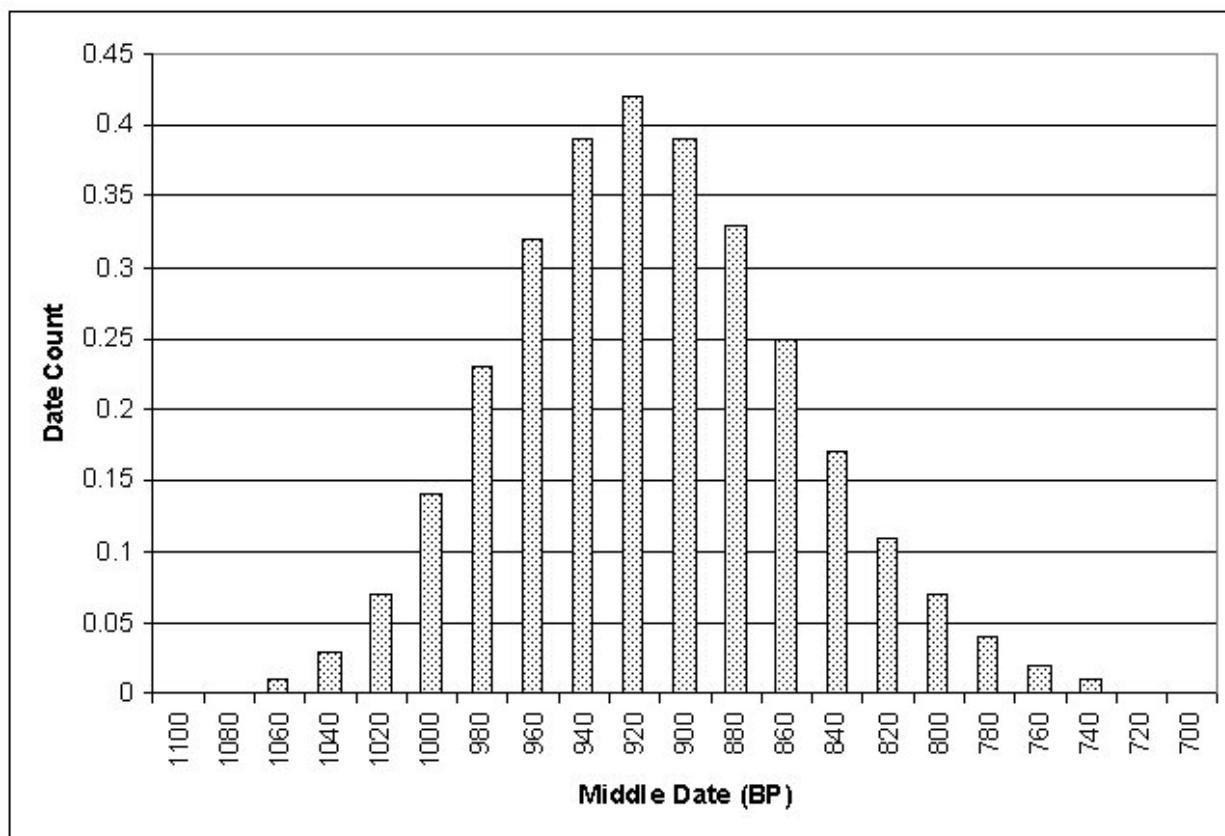


Figure 6. Graphical representation of radiocarbon dates for Elk Fork.

Of note is that one of the main concentrations of debris encountered at Elk Fork was associated with an alignment of post molds designated Structure 1. Twelve triangular points were found inside this structure. Types recovered from the house were two Type 1's, a Type 2, and a Type 6. The Type 6 was recovered from the level below a Type 2. There was also a Levanna, and an apparently unfinished point. Six small triangular points from the house could not be more specifically typed. Elsewhere on the site, in at least 5 cases, points of supposed later

type were found in the same level of the same excavation unit as points of earlier type.

Given the types of triangular points recovered, without the tight stratigraphic controls that were possible at Elk Fork, it would be natural to conclude that the points represent a long series of occupations spanning the Late Woodland and Fort Ancient periods. And in fact, that was the conclusion of the phase II report (Martin 2002). However, on closer examination, this conclusion, based in part on the form of the small triangular points, was erroneous.

### Reexamining the Original Data Set

As Berle Clay often commented to us, "you have to examine the primary data and the context for yourself." This led us to further investigate the Fort Ancient triangular point typology as it was originally conceived.

Railey (1992:168) summarized his study by stating the "[a]nalysis of the chipped stone

artifacts focused on the identification of patterns that might contribute to the development of a Fort Ancient chronology for northeastern Kentucky. With the basics of the triangular projectile point sequence established for the study area, it should now be possible to identify the temporal placement of components lacking

diagnostic ceramics, such as small hunting camps (e.g., Seeman and Munson 1980) or sites identified through surface reconnaissance." More recent assessments have suggested that Railey's study relied on characterizing site assemblages, not dating a site's component based on a single point style (Henderson 2008:742). Here we examine the original study, the context of the points used in that study, and further examinations with more recently recovered data.

One hundred thirty-three points recovered from five sites comprised the original sample. Of these points, 78 were from unmixed contexts. Examining the original data on which the triangular point study was based indicates some discrepancies between point types and periods of occupation (Figure 7). For example, there are a number of Type 2 points at Snag Creek and Thompson Upper, both of which are suggested to be late Fort Ancient. The upper component at Thompson (late Fort Ancient) has more "early" points than "late" points. Half of the points at Fox Farm (lower) are late, rather than middle.

What the data do suggest is that there may be a "general trend" of certain types through time, but they are not diagnostic of a tighter temporal range. Sample sizes for some sites are also somewhat small and questionable. Laughlin is the only site that has all the "right" points associated with it (all are late Fort Ancient as is the site), but the sample size ( $n = 9$ ) is low. Note that only 2 were from unit contexts, the rest are from surface context. It should also be noted that the sampling at these sites consisted of surface collection and the excavation of 3 to 6 units (Table 6) and features identified within these units. While the sites were suggested to represent, for example, early Fort Ancient, middle Fort Ancient, or late Fort Ancient, an examination of the radiocarbon dates for these sites suggests that multiple occupations are indicated for all of the sites. Radiocarbon dates from the reports were examined as was conducted above for Elk Fork. In many cases, multiple occupations are indicated. For example, three occupations are suggested for Thompson (Figure 8), two for Fox Farm (Figure 9), two for

Snag Creek (Figure 10), and two for Augusta (Figure 11). Some of these components were noted by the original researchers. However, in no case were any of the sites demonstrated to represent single occupations. In addition, the mixing of several components was noted on some sites. In short, while the Railey study represents an interesting first step into the variation in Fort Ancient points, the original data were recovered from somewhat questionable contexts and do not support the interpretations of the original study. When the point typology is applied to sites with sealed deposits, short temporal spans, and large point assemblages, the initial finds of the study can be called into question.

Since the original study, much work has been conducted in Fort Ancient sites in Kentucky owing much to the efforts of Pollack and Henderson and their colleagues. Examining triangular types reported for various sites within the Central and Eastern Bluegrass indicates variation in the percentages of the triangular types (Figures 12 and 13). Similarly, when Middle Fort Ancient and Late Fort Ancient sites are examined there are no consistent patterns in the percentages of the types represented in the respective time periods (Figures 14 and 15). Types 2 and 5 are common on the Middle Fort Ancient sites and often out number the Type 3 points, contra the original study. Likewise for the Late Fort Ancient sites, Type 2 points appear in large numbers on some sites. For example, at Thompson, Type 2 points predominate and at Snag Creek Type 2 points are the second most common type represented. The data indicate that there is much variation in the point types recovered from, for example, middle Fort Ancient sites, and there is no consistent pattern to this variation across space. The typology fails no matter if one tries to use individual points or tries to characterize an assemblage to determine temporal placement. What we do note is that: Type 6 points appear most commonly on late Fort Ancient sites and Type 3 are most common on middle Fort Ancient sites. However, these types appear on sites from other temporal periods too, and there is no consistent pattern.

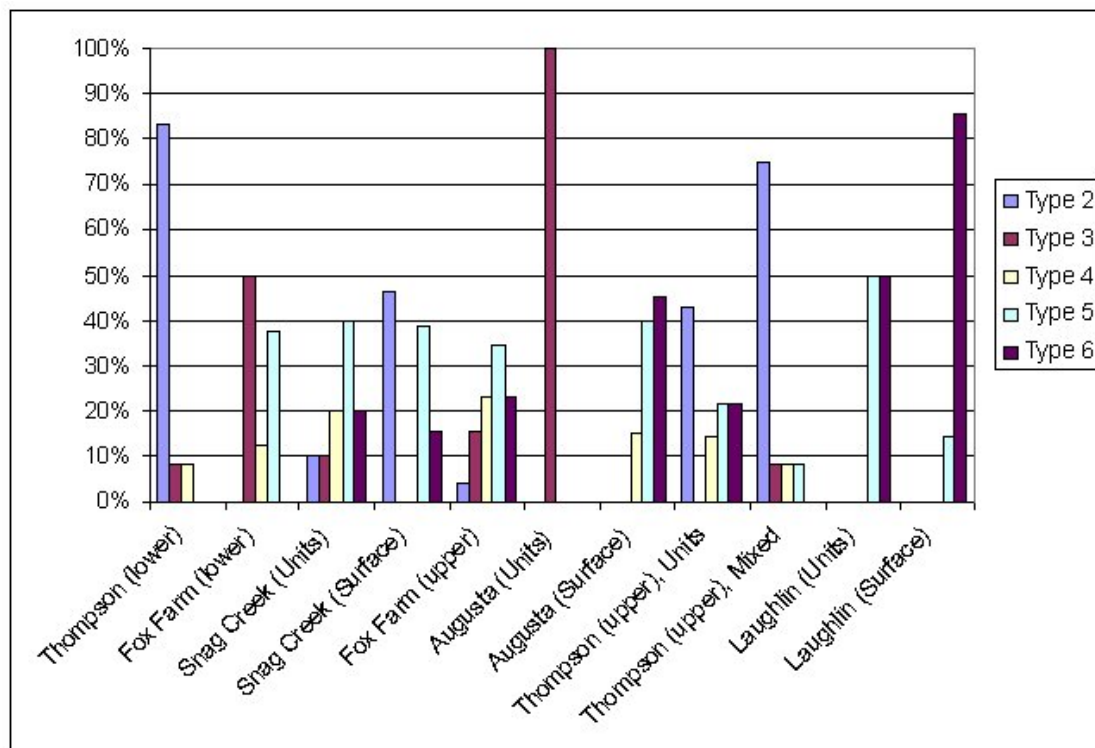


Figure 7. Point types by sites for the original Railey (1992) study.

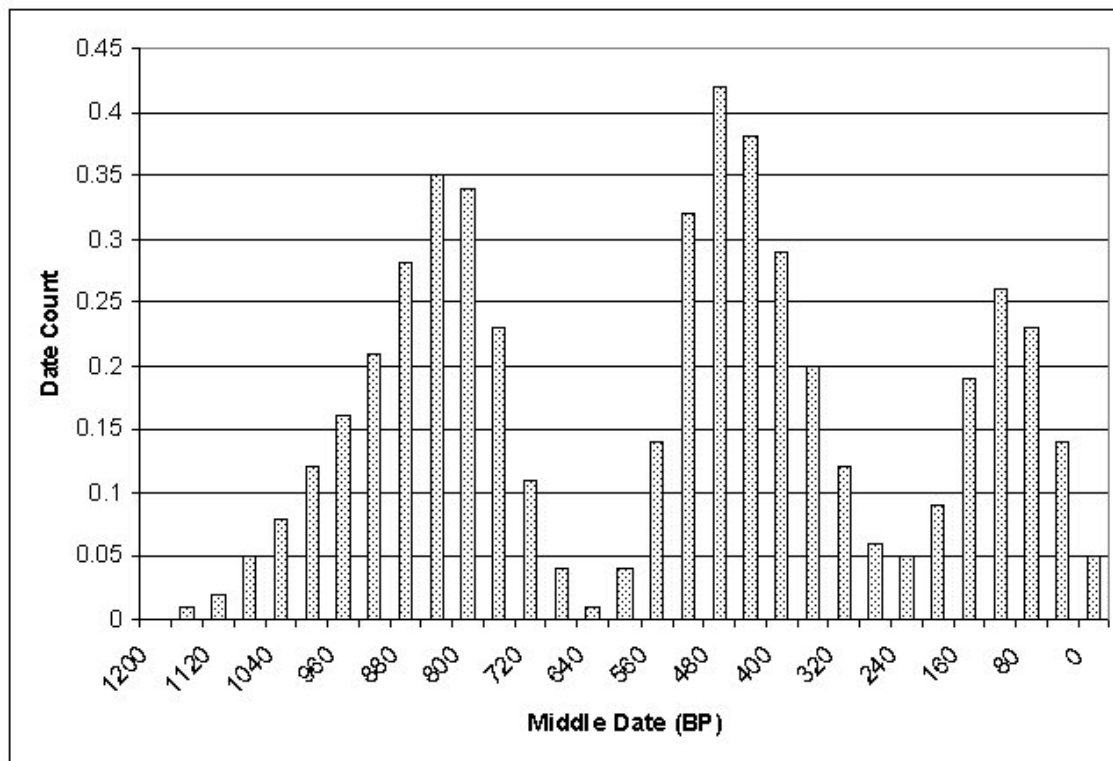


Figure 8. Graphical representation of radiocarbon dates for Thompson.

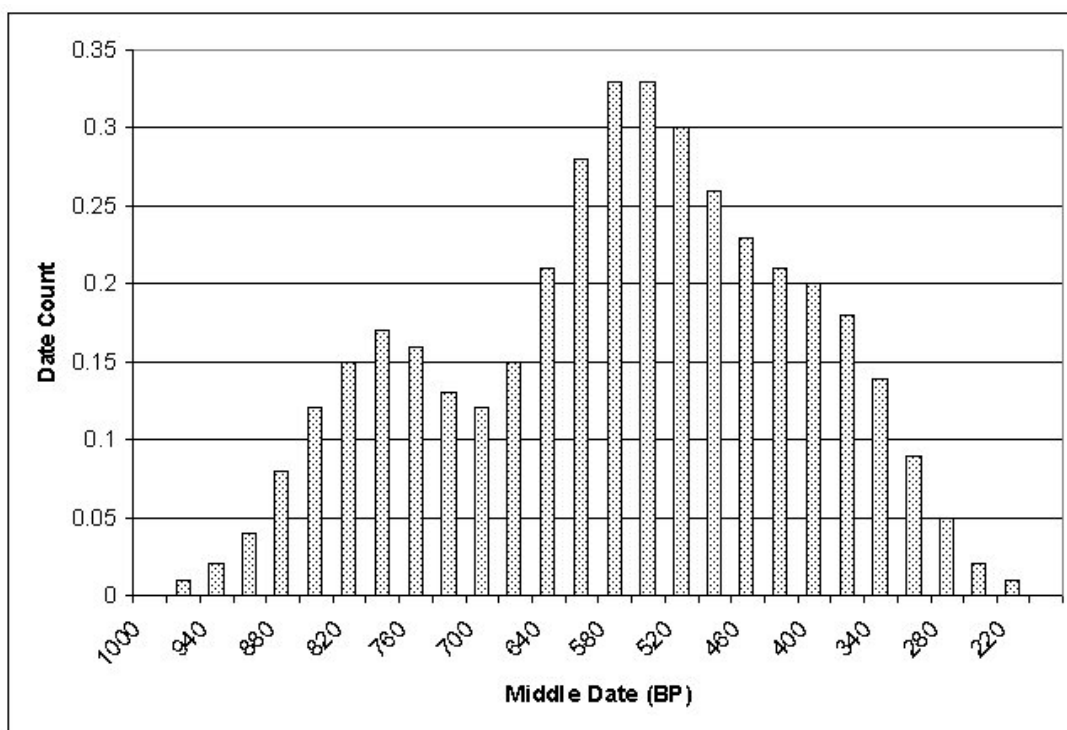


Figure 9. Graphical representation of radiocarbon dates for Fox Farm.

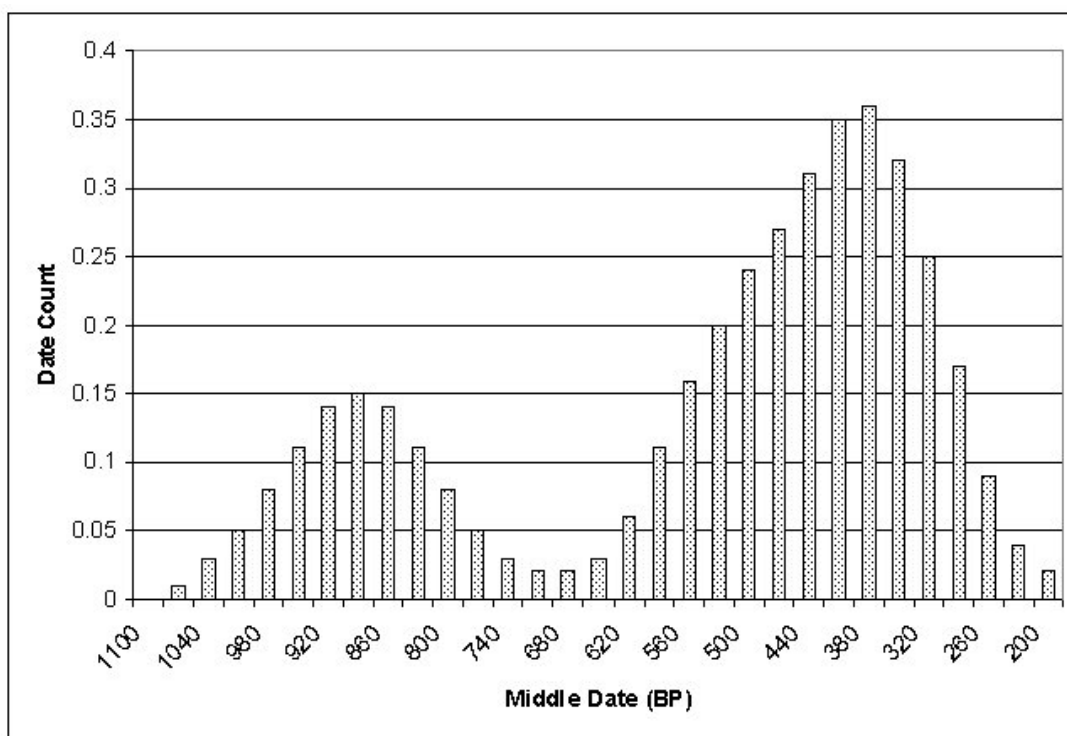


Figure 10. Graphical representation of radiocarbon dates for Snag Creek.

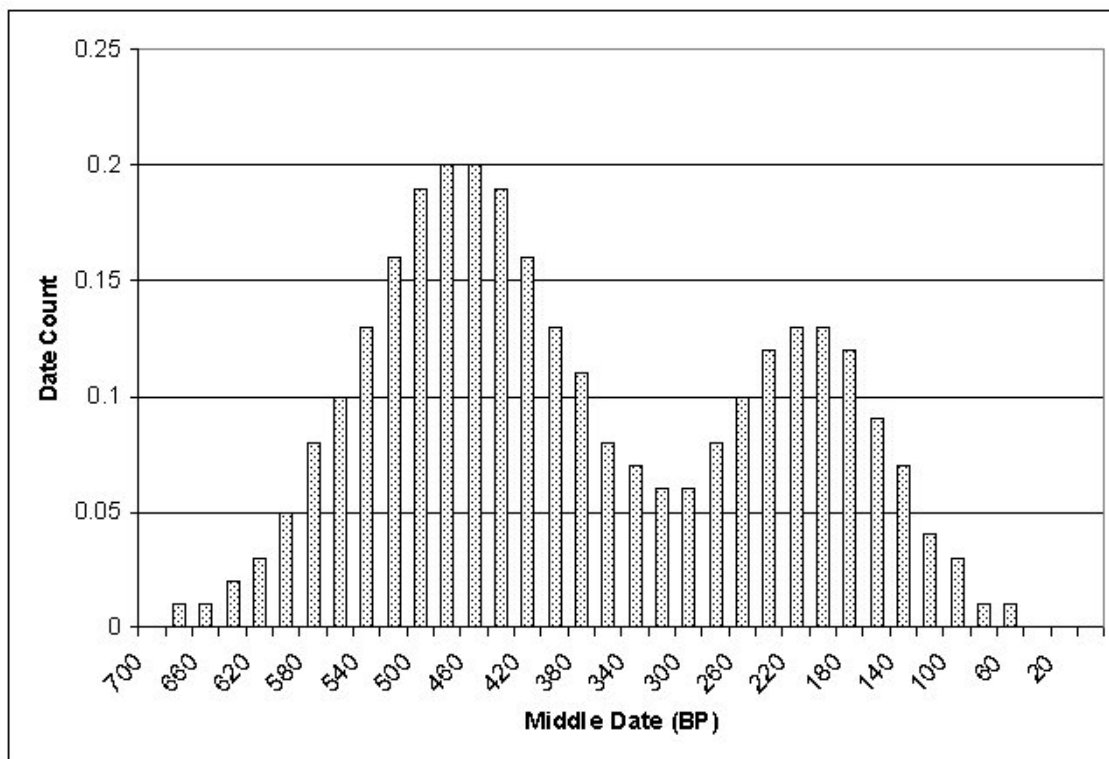


Figure 11. Graphical representation of radiocarbon dates for Augusta.

Table 6. Data on Excavations (Compiled from Henderson 1992).

Site	Excavations	Dates BP	Components	Temporal
Thompson	Surface Collection, 4 2-x-2m units, and 4 features	110+/-60; 490 +/-50; 400 +/-70; 810 +/-60 ; 920 +/-100	Two, possibly three	Early and Late Fort Ancient
Fox Farm	4 1-x-2 m units and 4 features	390+/-70; 530 +/-70 ; 790 +/-70 ; 590 +/- 60	Two, upper and lower	Middle and Late Fort Ancient
Snag Creek	1 1.5-x-2.5 m unit and 5 1-x-2 m units, and 5 features	360+/-70 ; 390+/-70 ; 520+/-70 ; 890+/-80		Late Fort Ancient
Laughlin	surface collection, shovel tests, 1 1-x-1 m unit, 3 1-x-2 m units and 1 feature		One	Late Fort Ancient
Augusta	3 1-x-2 m units and 6 features	470 +/-90 ; 210 +/-60 ; 470+/-70	One	Late Fort Ancient

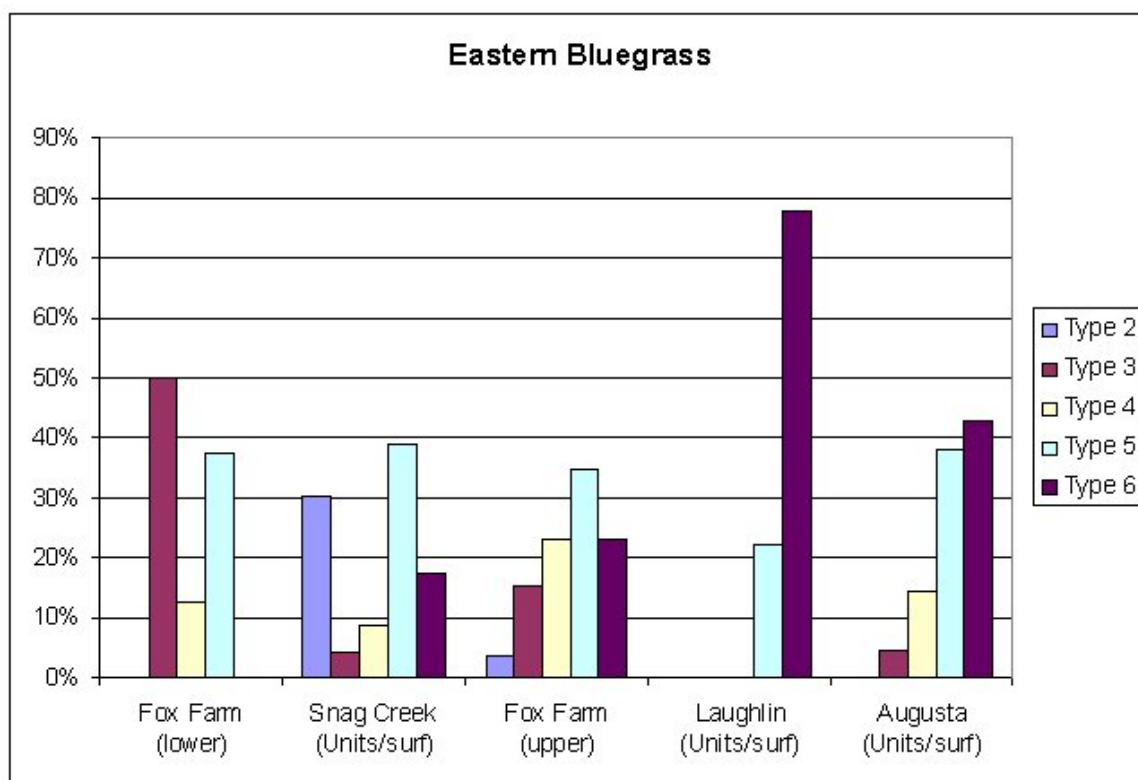


Figure 12. Railey types for Eastern Bluegrass sites.

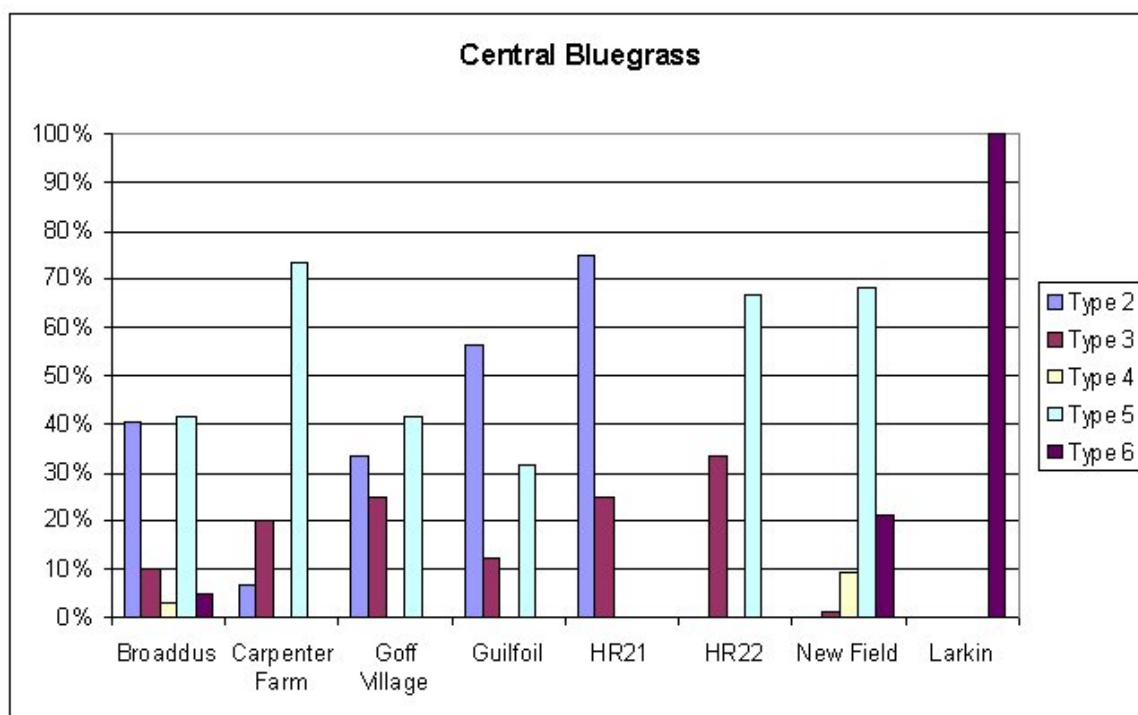


Figure 13. Railey types for Central Bluegrass sites.

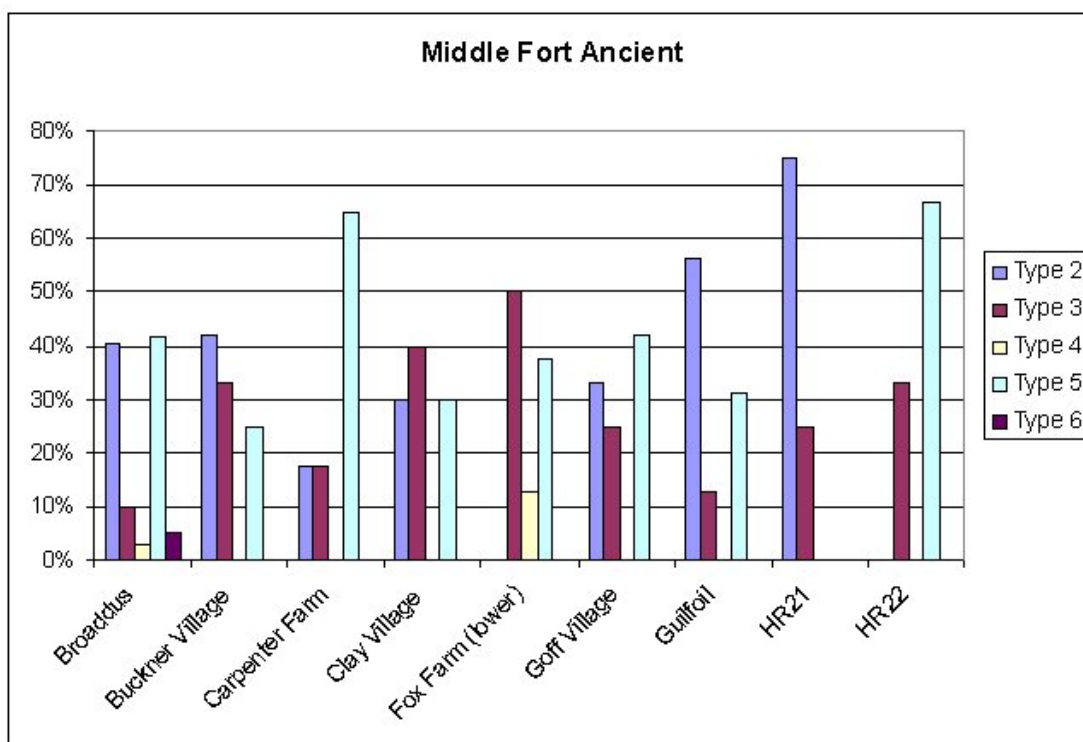


Figure 14. Railey types for Middle Fort Ancient sites.

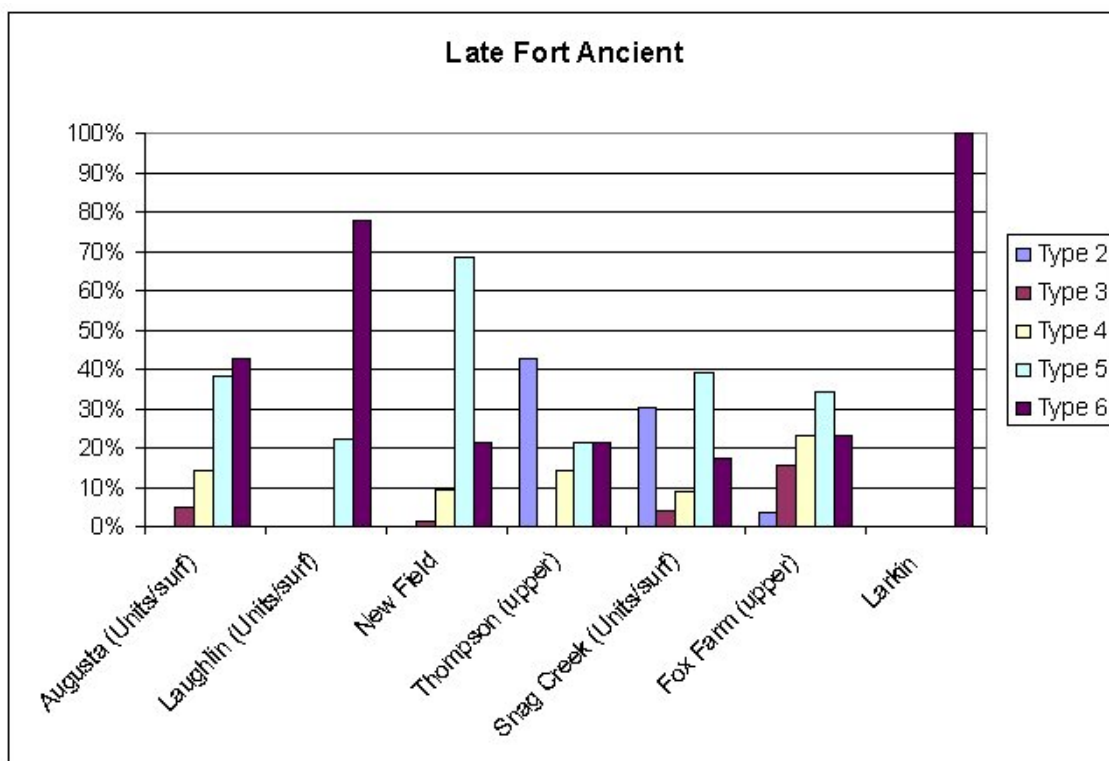


Figure 15. Railey types for Late Fort Ancient sites.



With respect to early Fort Ancient, the Type 2: Flared base triangular was the most common subtype at Elk Fork, but only 21 of the 90 small triangular points fit exclusively within this type. This contrasts somewhat with the lower component at Thompson, where 10 (83%) of the triangular points were Type 2. Lower Thompson also included a Type 3 and a Type 4. Small triangular points at the contemporaneous Muir site in Jessamine County were described as being on a continuum, with some points being straight sided with concave bases, but most points having straight to convex bases and lateral basal projections (Turnbow and Sharp 1988). The latter fit the definition of Railey's Type 2, flared base triangular. At the Dry Run site, described as a transitional Late Woodland/Early Fort Ancient site in Scott County, only two of the 38 small triangular points recovered fit within Type 2. Most (n = 23) were described as "Straight Base Triangular" (Sharp 1984). These correspond most closely to Railey's Type 5 (Herndon 2005).

While the original definition of Type 3 points was based on the presence of coarse serrations, Henderson (2008) has defined a Type 3.1. These are finely serrated points. She suggests that Type 3.1 are early Fort Ancient. Finely serrated triangles have also been recovered from a late Fort Ancient context at the Burning Springs Branch site near Marmet, West Virginia (Bradbury 2008: 762). Also of note is that Henderson (2008) suggests that Type 2 and 3 represent the same general form with the coarse serrations of the Type 3 creating the difference. Conversely, Carmean (2010)

considers Types 3 and 5 as representing the same general form.

To further examine the relationship between Types 2, 3, and 5, we pulled the metric data collected by Bradbury and Richmond. A discriminant function analysis was conducted to determine if the three types (2, 3, and 5) could be separated based on metric attributes (Figure 16). Blade shape (blade shape = metrically measured incurvate, excurvate, straight) and edge angle were determined to be the best variables to separate the three groups. A 70.8 percent correct classification rate was achieved. Of note, no Type 2 points are classified as Type 5 and vice versa. Misclassifications were: Type 2 points being classified as Type 3; Type 3 being classified as either Type 2 or Type 5; and Type 5 being classified as Type 3. Henderson suggested that Type 3 was a serrated version of Type 2 while Carmean suggested that Type 3 was a serrated version of Type 5. The data presented here suggest that they are both right. The discriminant function analysis indicated that edge (blade shape) and (blade) angle were the best variables for separating the three types. ANOVA results indicated that these two variables, along with lower width and thickness, were the only variables that were significantly different across the types. No real pattern was seen in the lower width and thickness data. However, the edge and angle data do show an interesting pattern. As edge shape increases so does angle. In addition, there is a general trend from Type 2 to Type 5, with Type 3 overlapping the other two types.

## Discussion

Examining all of the point data, it would appear that there are some basic trends in Fort Ancient triangular point morphology. Basically, Type 2 points occur more often early and Type 6 points occur more often late. However, in no case do you have only one type of point present. In many cases, points are mostly of one or two types, but the other types can also be present. Further, there does not appear to be any consistency in the types that appear together. Again these data indicate that if you have a large assemblage, the dominant type present will give you a ball park estimate of the age. If you have a

small sample size, it is best not to use points to do anything more than say it is Fort Ancient. In addition, Bradbury and Richmond (2004) suggest that based on morphology, the Type 2 and Types 4/5/6 are most similar. Likewise, Type 3 points are similar to both Type 2 and Type 5 if the serrations are not considered. These data suggest that variation in point metrics forms a continuum from early to late in the Fort Ancient sequence. Rather than distinct types being present in each of the sub-periods of Fort Ancient, there is gradual change over time in point size/shape.

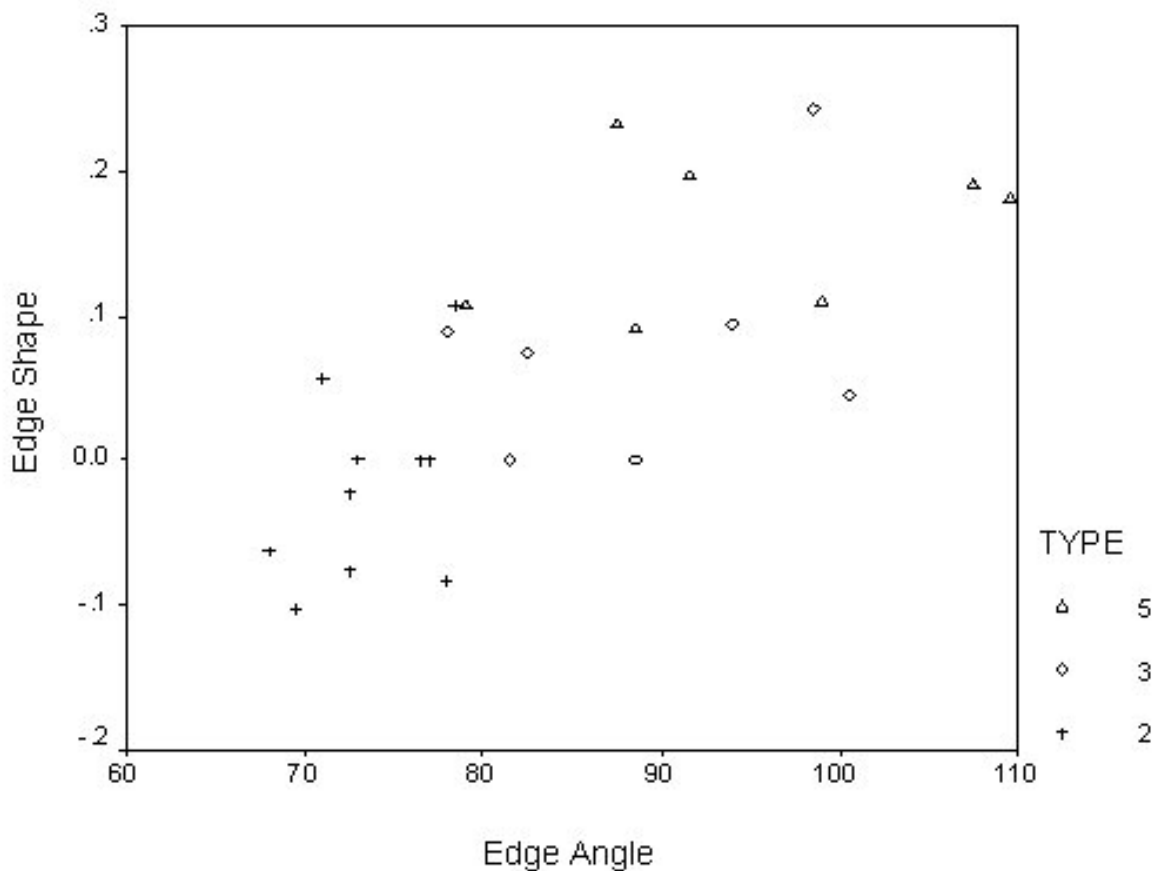


Figure 16. Discriminant Function Plot.

Many factors may influence point morphology. For example, there are likely idiosyncratic differences between different knappers, or different cultural groups. In addition, some knappers are simply more skilled than others. Bob Dawe (1997) has described similar mixed results in efforts to develop arrow point typologies in the northern plains region. In a study of points from the Head-Smashed-In bison kill site in southern Alberta, Canada, he noted much greater consistency in size and greater skill in craftsmanship for points from the actual kill site than for points from the adjacent camp and meat processing area. He suggested that the more radically made points were tips for toy arrows. Whereas the points from the kill site could be attributed to the actual hunters, the processing area would have been occupied by entire family groups, including children, who would probably be reenacting the hunt they had just witnessed.

Even the range of variation for points made by a single knapper is not clear. Timothy Wright (2004) recently described 43 triangular points found together in a Late Woodland burial at the Secret – Reasoner site in east-central Indiana. Several lines of evidence were presented which suggest the points were made by a single knapper, possibly the individual they were buried with. The strategy of reduction was similar and the same raw material was used for nearly all of the points. Some points even appeared to have been produced from the same core. But there was obvious variation in their size and shape. His illustration shows some specimens with straight basal margins and some with incurvate bases. Some have incurvate sides and some have straight sides. This is also seen historically with Wiessner's (1983) study on !Kung arrow points.

Other factors that may have an influence on point morphology include the species of prey

hunted, the method of hafting the point, resharpening of points, or even modifications to the point to facilitate hafting in a previously manufactured haft. All of these factors would create variation in point morphology and none are specifically temporal.

In the central Illinois Valley, Shott (2003) noted temporal trends in triangular point form. He concluded that changes were complex and continuous, and could not be viewed as a succession of discrete types. The same might be true of the Fort Ancient area of Kentucky. At

Elk Fork we can clearly see a trend towards larger and more widely based points around 1100 AD, but the overall range in small triangular point form from this discrete component suggests that subtypes of small triangular points, as currently defined, cannot be used to accurately determine relative age. The traditional “index fossil” approach used to determine the ages of hafted bifaces from earlier periods cannot be applied with equal confidence to subtypes of small triangular points within the narrow timeframe of Fort Ancient.

### Point Classification: A Proposed Solution

Part of the problem with the current typology is the lack of mutually-exclusive types (Table 7). For example: Type 2 points have a convex OR straight base and an incurvate blade; Type 6 has an incurvate base and excurvate OR straight blade. Two different researchers could

type points from the same site and come up with different types. In essence, this problem defeats the purpose of a typology, and for all practical purposes, invalidates any results that may be produced through its use.

Table 7. Railey (1992) Type Descriptions.

<i>Type</i>	<i>Base</i>	<i>Blade</i>	<i>Serrations</i>
2	Excurvate or straight	Incurvate	None
3	Straight or excurvate	straight	Coarse
4	Excurvate, straight or incurvate (rare)	Excurvate	None
5	Straight	Straight	None
6	Incurvate	Excurvate or straight	None

Based on the above problems that have been observed with the Fort Ancient point typology, we recommend the abandonment of the typology. While we see the typology as a good start in examining the variation in Fort Ancient triangular points, additional data amassed since the original study has indicated a number of inconsistencies. In order to determine what is changing, and why, we need to be able to graph the changes, and the direction of change, of specific attributes. This needs to be done over large geographic areas to determine if there is geographic variation in point morphology too.

Part of the solution is the use of a paradigmatic classification system (sensu Dunnell 1971). We provide a possible example here (Table 8). Three attribute dimensions are

used with various attribute states under each dimension. For the Fort Ancient points, we suggest four attribute dimensions: base shape, blade shape, serrations, and basal flaring. Attribute states under both base and blade shape would be: convex, straight, and concave. These shapes are defined by laying a straight edge along the point base or blade. Attribute states under serrations would be: not present, fine serrations, coarse serrations. Basal flaring could be used as a presence/absence variable. The intersection of these attribute dimensions creates the classes. For example; convex base-straight blade-no serrations-flared base; convex base-concave blade-fine serrations-non flared base, etc.

Table 8. Suggested Classification System

<i>Attribute</i>	<i>Dimension</i>		
Base	Incurvate	Excurvate	Straight
Blade	Incurvate	Excurvate	Straight
Serrations	None	Coarse	Fine
Basal Flaring	Absent	Present	

In using this classification, we can then map the classes over time and space. In addition, as each of the classes are well defined and mutually exclusive, analyst bias should be at a minimum. One can then examine temporal changes in each of the attributes (base, blade, serration) and the intersection of these attributes over time. In addition, data will need to be recovered from sealed sites, with short time frames indicated, and well dated contexts. Alternatively, metrics can be used to define concave vs. convex and these differences mapped both spatially and temporally. Once such data are collected from secure, well-dated contexts, the serration might be attempted using either attributes or classes (e.g., Duff 1996.).

For example, plotting the base shape by edge shape using metric data produces the plot in Figure 17. What these data show is that there is continuous variation in point base and blade shape. There is no indication of attribute clusters that would indicate the presence of discrete point types. We infer that there is a possible temporal component to the data based on previous data suggesting that flared bases are more common early in the Fort Ancient sequence while excurvate blades are more common late in the sequence. Finer temporal resolution, if it exists, cannot be derived from the Railey typology due

to problems as noted above. We also note that the data used here was based on the original Railey (1992) data set, thus we cannot examine potential geographic influences within the point sequence as they are all from the same general region. Other data that we presented above suggest that geographic differences in points exist, so the temporal component suggested here may be geographically specific.

At a general level, it might be possible to derive very basic information from point types; however, such information cannot be used in and of itself to provide temporal information for a site without the presence of other temporal indicators (e.g., ceramics, radiocarbon dating) or without large samples of points. The use of the typology is masking much of the variation in point morphology so that finer resolution of potential spatial and temporal relationships of various attributes cannot be examined. To further test the hypotheses suggested here based on a sample of points, a larger dataset needs to be amassed. These data will need to be from contexts with tight temporal control. In addition, metric data is needed to provide fine-grained resolution to point variation. The use of point types for addressing such questions is wholly inadequate and should be abandoned.

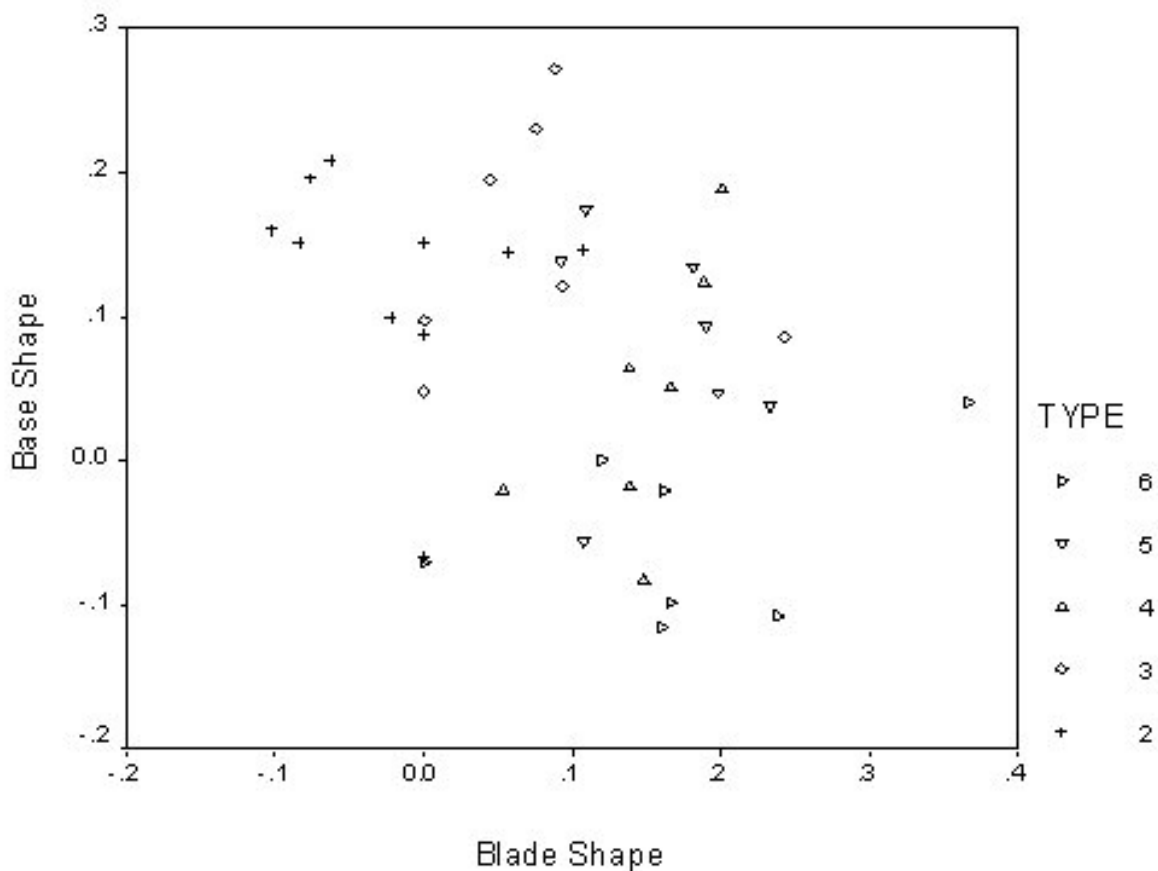


Figure 17. Base shape by blade shape.

### Summary/Conclusions

While Railey's typology was innovative for its time, we must conclude that it is way past time for the typology to be abandoned. We see the original typology as a good starting point, but subsequent data has indicated that the temporal sequence that was originally proposed is not accurate, either for temporal placement of single points or for characterizing an assemblage of points. The use of the current point typology stifles our understanding of triangular point variation, and it provides false data that masks many other aspects of Fort Ancient lifeways.

Concerning the variation in points, we agree with Henderson (2008:858) that an important question is, why the variation in Fort Ancient points? We recognize that some of this variation

may have a temporal component to it, but we should also ask, what other factors influence this variation and are these factors similar across all of the Fort Ancient area? New methods must be sought out, examined and re-examined, using data derived from secure, well dated, contexts with short temporal spans. In addition, any new classification system must be based on replicable measurements or discrete attributes, and it may not be possible to use data from sites in one part of the Fort Ancient area to establish a sequence for all Fort Ancient sites. The implementation of a new classification system is imperative before we can fully understand the variation in triangular point morphology and the forces that are driving these changes.

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