A Typology of Fluted Points from Florida

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Florida's Paleoindian Period is receiving increasing scrutiny and interest in recent years (Hemmings 1999; Thulman 2006b; Dunbar 2007; Dunbar and Vojnovski 2007; Faught 2004), but the effort is hampered by the lack of intact sites of undisputed Paleoindian age and an inventory of Early, Middle, and Late Paleoindian toolkits from Florida. Most of what we think we know has been inferred from out of context artifacts or by analogy to other areas of North America (Thulman 2006a). One area that has undergone recent reevaluation is the typology of Paleoindian points[1] in Florida (Dunbar and Hemmings 2004; Farr 2006; Schroeder 2002), which builds on the earlier comprehensive typology of Florida points by Ripley Bullen (1975). Efforts here focus primarily on fluted, lanceolate points with ground basal edges, which were presumably all made during the Late Pleistocene period. The purpose of this article is to create some hypothetical groups of fluted point forms from which we can model cultural chronology and continuity during this period in Florida.

Bullen (1975) identified two fluted forms: the Clovis, which is always fluted, and the Simpson, which is occasionally fluted. In their recent publication, Dunbar and Hemmings (2004), looking more closely at the variation in Florida lanceolates, added a Waisted Clovis form that is always fluted and included the Suwannee, which is occasionally fluted. Farr (2006) and others recognized that fluted forms from outside Florida are also occasionally found here, such as the Redstone, Quads, and Dalton points. Regardless, all these researchers would probably agree that Clovis comes in two varieties – waisted and straight-sided (or slightly excurvate) – and Suwannee and Simpson points are occasionally fluted.

Two major groupings of points were identified in this analysis from a dataset of 72 fluted, basally-ground lanceolate points from Florida: *Straight-sided* and *Waisted*. The straight-sided group includes narrow, medium, and deep-based subgroups, and the waisted group includes narrow and spatulate subgroups. The details of these categories are described below. These groups were discerned using both qualitative and quantitative data on the size and ratios of attributes of the points, such as minimum width or the ratio of minimum width to maximum width, hafting technique, and resharpening trajectory. Like Dunbar and Hemmings (2004), this article avoids the word "type," which implies a degree of finality, and uses "group," "subgroup," and "form" to emphasize the hypothetical nature of this typology. It also avoids using formalized and loaded terms such as "Clovis" in these descriptions.

I do not assert that these subgoups necessarily represent the types that would have been recognized by Florida's Paleoindians, only that these are reasonable groupings of these data. My approach to typology assumes that the Paleoindians made these points based on a particular culturally-appropriate mental model or template (i.e., the artifact design) and a degree of acceptable variation in mind, which would tend to produce highly patterned distributions of points that vary around a central tendency. These mental models would have included all aspects of the manufacture, use, resharpening, and ultimate discard of the point, including how the point was shaped, flaked, fluted, and hafted. Only points that retained intact bases and flutes were used in this analysis, because these would retain the original mental model.

It is assumed that over time, point forms (and any other artifact form) change as people make changes to the mental model. Typically, changes are made when the maker perceives that a change to the design is needed, probably a technical challenge that needs to be resolved, such as the haft does not fit well on the shaft.[2] These changes are usually made to relatively small aspects of the artifact design, such as the size the ears on the base or the ratio of the width of the base to the width of the waist. Over time these design changes are compounded, and distinct artifact forms are produced by different groups of people that archaeologists perceive as regional traditions (Thulman 2006b). With enough examples in proper chronological context, the evolution of a form could be reconstructed. Without these examples, we can nonetheless posit continuity between "types" by speculating how the form changed.

The Data

The data used in this typology were gathered as part of a larger effort to collect and preserve information about the distribution of Paleoindian points in Florida, which are defined as lanceolate-shaped, bifacial, chipped stone artifacts with ground bases. Virtually all of the data were gathered from private collectors, who generously made their collections available to me. In total, nearly 1000 scanned images of Early, Middle, and Late Paleoindian points from north-central Florida were collected. Several attributes were measured with the digital measuring tool in Photoshop (Figure 1), and the data were recorded for statistical analysis. In addition to the scans, data on thickness, grinding, and location were also collected. Seventy-two of the fluted points were used to develop this typology. All of the fluted points were collected as individual specimens, which means they did not come from an undisturbed stratigraphic context. The data only includes finished artifacts, which do not provide the kind of

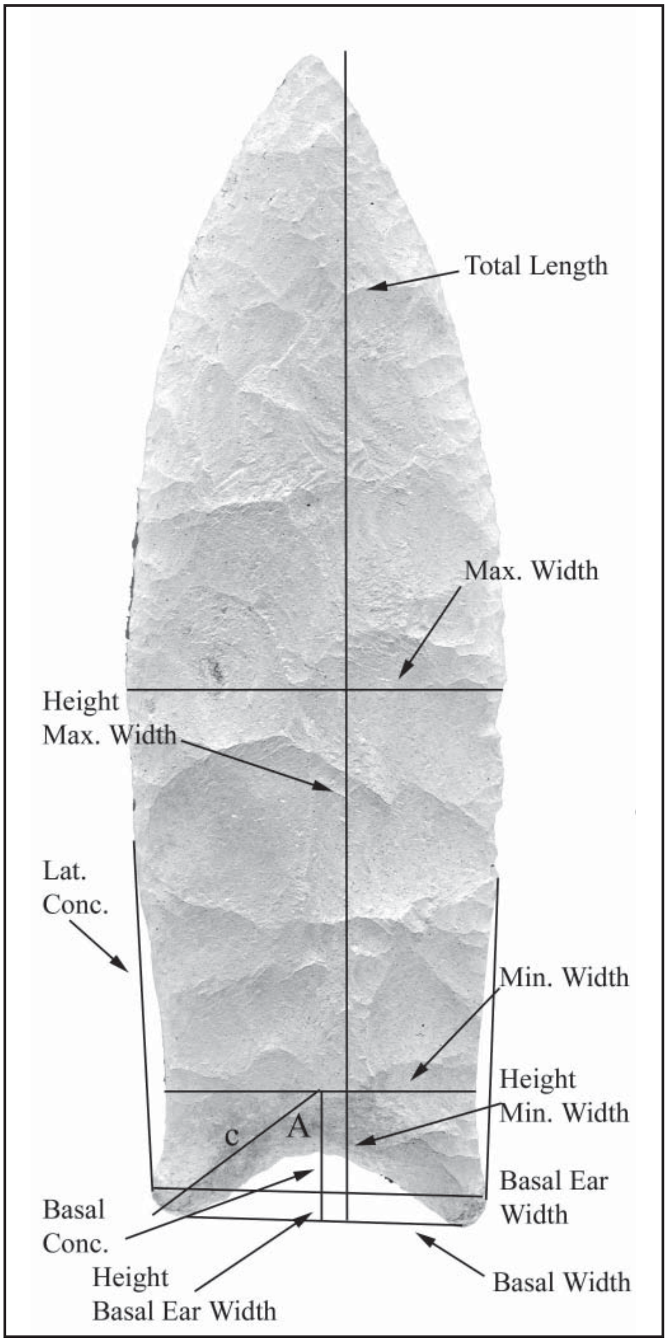

Figure 1. The attributes measured on the points.

information on manufacturing trajectories that can be gleaned from preforms, manufacturing debris, raw material size, or discarded manufacturing mistakes. While potentially important for parsing out regional variation in manufacturing technique, the lack of such data are not crucial for this effort.

Fluting, which is the defining characteristic of the, presumably, earliest points in Florida (Sellards 1952; Bullen 1975), can be a problematic discriminating criterion. Most everyone agrees that flutes are intended to facilitate hafting, perhaps by thinning the base (Wormington 1957; Lahren and Bonnichsen 1974; Musil 1988). Basal thinning is simply the removal of flakes from the base of the point for the purpose of thinning the haft of the point. Several basal thinning techniques are apparent on the lanceolate points from Florida, which are generally grouped into basal flaking, in which flakes are removed by blows to the base of the point; lateral flaking, in which flakes are removed by blows from the lateral edge; a combination of basal and lateral flaking; and fluting, which is specialized basal flaking (Goodyear et al. 1983). To distinguish them from a more general basal flaking, fluting is defined here as one or more basal flakes with generally parallel sides that are taken from the approximate center of the base. To be included in this discussion, the flutes must be at least as long as the lateral flakes taken from the lateral margins of the point. If you were to query Paleoindian archaeologists, most would envision the classic flute as one or more long parallel-sided flakes that are significantly different in width, length, and shape than flakes taken from the edges of the tool (Howard 1990; Fitting 1965). Callahan (1979:15) proposed that "nearly 50 different and specialized means of executing final true fluting" were possible. Sometimes flutes are unmistakable, but often it is not clear whether a point was intentionally fluted.

Since fluting is not the only way to thin the base of a lanceolate, it seems likely that the technique was developed to facilitate a specialized shaft, although this is speculative since no fluted point has been recovered still attached to the shaft. Regardless, the fluting technique was apparently developed in the New World, where it was widely employed in North, Central, and South America for several centuries and then replaced by different hafting techniques and never revived or reinvented. For this reason, the presence of fluting is a reliable morphological trait for placing various fluted point forms in the same or successive time periods.

Assumptions and Definitions

This analysis makes some assumptions about how lanceolate points were hafted and used. First, they were hafted to an organic handle or shaft, as opposed to hand-held. They were likely attached with a binding, such as sinew, and probably further secured with mastic (Tankersley 1994). Second, the ground edge of the point defines the approximate extent of the binding, while the sharp edge of the point is the working edge. Edges were resharpened when they became dull through use or damage, although edges could also be resharpened even when they were not fully dull, if it was important to maintain a consistent width-to-length ratio or continuous cutting edge. Third, a completed but unused point was symmetric around the midline, with blade edges that described a gentle arc, meaning the blade edge did not have an abrupt change in direction. An abrupt change in direction indicates that the blade was resharpened, starting at the location of the change. In practice, sometimes it is difficult to identify where on the blade resharpening started.

The pertinent attributes used in this analysis are described in Table 1 and illustrated in Figure 1. The *blade* is the working end of the point above the haft, i.e., it is the part of the point with a sharp edge. The *distal end* of the point is the part of the blade that includes the tip. The *resharpening shoulder* refers to the location where the ground edge meets the resharpened edge. On some points, this location forms a distinctive step or

Table 1. The attributes used in the typology. Refer to Figure 1 for the location of most of these attributes.

TL: This is the total length from the baseline (which is an imaginary line that connects the bottom of the base of both ears) to the tip. Total length is affected by resharpening and was not used in any analysis.

MW: Maximum Width of the point measured above the base. The maximum width is approximately parallel with the base line. Resharpening can affect both the size and location of maximum width and the other measurements that depend on its location on the point. Figure 4.4 shows the effect of resharpening on this measurement.

BEW: Basal Ear Width is the measure from the outside point of both ears. If one ear is missing, the BEW is estimated by doubling the distance from one ear to the approximate centerline.

MBW: Minimum Basal Width is the narrowest width above the ears and below the maximum width that is close to parallel to the baseline.

BCV: Basal Concavity is measured from the baseline to the top of the center of the basal concavity.

LI: Lateral Index is the average ratio of the length of the left and right axes divided by the length of the left and right indentations. It is a measure of the incurvature of base, or waist.

GR: Grinding is the average of the length of grinding, measured in a straight line from the outer edge of the ear up the edge of the point.

AFL: Average Flute Length was only calculated for points that were fluted on both sides. If a point had only one flute, the AFL was the length of that flute.

AT: Average Thickness. The thickness of each point was measured at 10 mm increments up the centerline of the point from the top of BCV to the tip. AT is supposed to measure the body of the point, as opposed to the distal end, which tends to get thinner towards the tip. An assessment was made about when to cut off the measurements for the average; AT does not include the part of the point that tapered. Tapering starts when the thickness decreases by more than one millimeter from one interval to the next and then continued decreasing. For example, if the measurements were 7, 6, 4.5, and 3, then 7 and 6 were included in the average. If the measurements were 7, 5.5, 6, 4.5, and 3, then 7, 5.5, and 6 were included in the average.

indentation when the width of the resharpened edges on the blade of the point is narrower than the width of the ground edge on its haft. Several examples of the resharpening shoulder are illustrated below. A *smooth profile* is a qualitative assessment of the edge of the blade. A smooth profile maintains a continuous arc; a *jagged profile* includes an abrupt change in the arc.

The Analysis

The point groups were parsed from the data using a version of exploratory data analysis (EDA), which uses visual descriptive tools, such as histograms and bivariate plots, to partition the data into different groups (Hartwig and Dearing 1979; Whallon 1987). One method in EDA is to look for "natural" breaks in the visual display of the data, which may represent different forms. For example, the data may clump into wide and narrow points. However, EDA, like any statistical approach, is limited because it is difficult to describe some differences simply through the measurement of attributes or ratios. Thus, several executive decisions were made in the differentiation of points. Qualitative assessments, such as the shape of the base or whether the tip is pointed or rounded, were considered in the analyses. Initially, the images were reviewed to generally discriminate between the forms. The sample size is too small for rigorous statistical analysis, and so these classifications are tentative hypotheses. The partitions in the data are illustrated in Figure 2. Figure 2 is not meant to represent the evolution of fluted point forms in Florida; it simply illustrates how the data was partitioned in this analysis. These are not the only possible partitions, and other researchers may partition the data differently – or not at all. Figure 3, which illustrates the divisions in Figure 2, provides an example of a typical base of a point from each of the five groups and summarizes the major distinguishing differences in each group.

In the initial data partition, points were divided into two groups of 37 waisted and 35 straight-sided points (although the latter group includes straight, excurvate, and slightly incurvate points). The waisted and straight-sided points were discriminated by the Lateral Index (LI), which is a measure of the curvature in the haft: the greater the curvature, or indentation, in the haft, the smaller the LI. The LI discriminated two distinct groups of points. The straight-sided points had either an LI of 0 or greater than 27; an LI of 0 indicates the sides of the points were straight or excurvate, whereas a value greater than 27 indicates the sides were only slightly incurvate. The waisted points had LIs of > 0 and < 27.

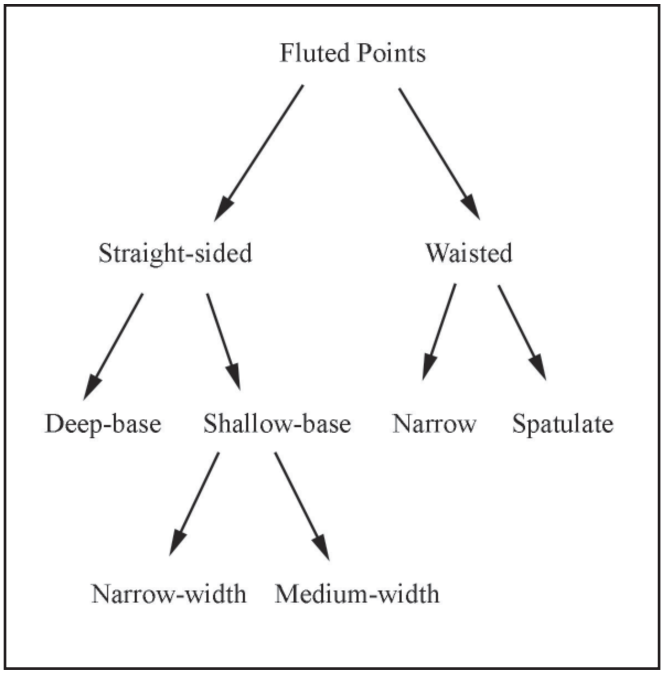

Figure 2. The data partitions.

The Straight-sided Group

The straight-sided group was partitioned into three subgroups: deeper-base, narrow-width, and medium-width. Examples from the straight-sided group are illustrated in Figures 3-5.

Deeper-base subgroup. The basal concavity (BCV) and minimum basal width (MBW) attributes were used to make the initial partition of the straight-sided group into two subsets (Figures 2 and 3). All of the deeper-base points had basal concavities > 4.8 mm, C-shaped concavities, and were on average the widest of the straight-sided points with MBWs. The combination of these three attributes (BCV > 4.8 mm, C-shaped concavities, and wider MBW) defined this subset. These points also had tips that were more pointed, as opposed to more rounded, indicating a potentially significant difference in the morphology of the tip.

Several points with BCV > 5 were not included in this subset because they were narrower and had V-shaped concavities. These were included in the medium-width subgroup described next. Figure 4 shows examples of the deeper-base points with C-shaped basal concavities (Figures 4A-C) and examples of medium-width points with the deeper V-shaped concavities (Figures 4D-E).

Narrower-width and medium-width subgroup. The remaining straight-sided points appear to fall into narrow-width (17 – 21 mm; Figure 5) and medium-width (22 – 28 mm; Figure 4D-E and Figure 6) groups based on MBW. The points in the narrow-width subgroup are about 1 mm thinner in average thickness (AT) than the medium-width subgroup.

The Waisted Group

The waisted group can be partitioned into two subgroups: narrow-based points and spatulate points. Examples from the waisted group are illustrated in Figures 7-9.

Narrow-based subgroup. This subgroup includes points with minimum basal widths of < 19 mm. In addition, these points are relatively long and narrow at the maximum width, in

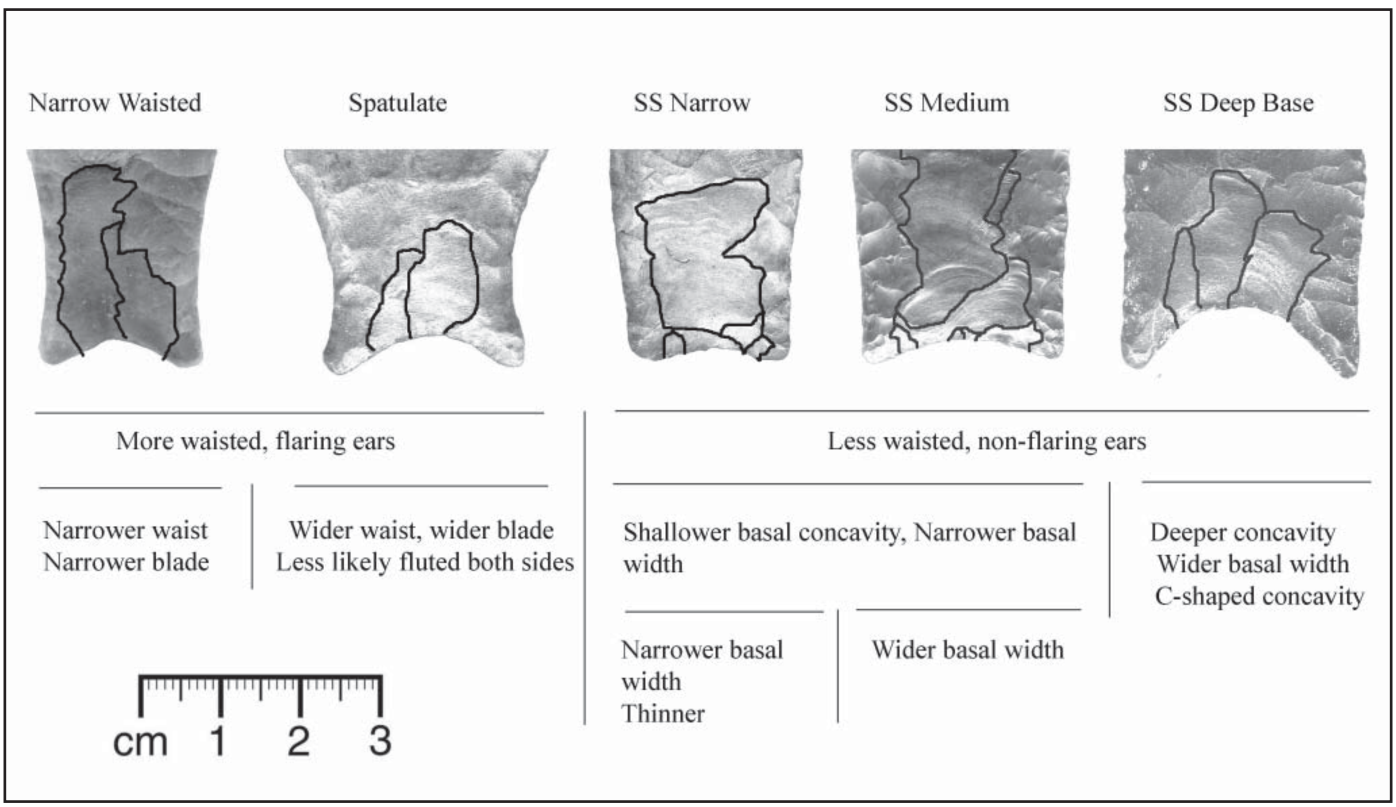

Figure 3. Examples of each of the five groups of fluted points identified in this analysis and descriptions differentiating each group. This figure complements Figure 2.

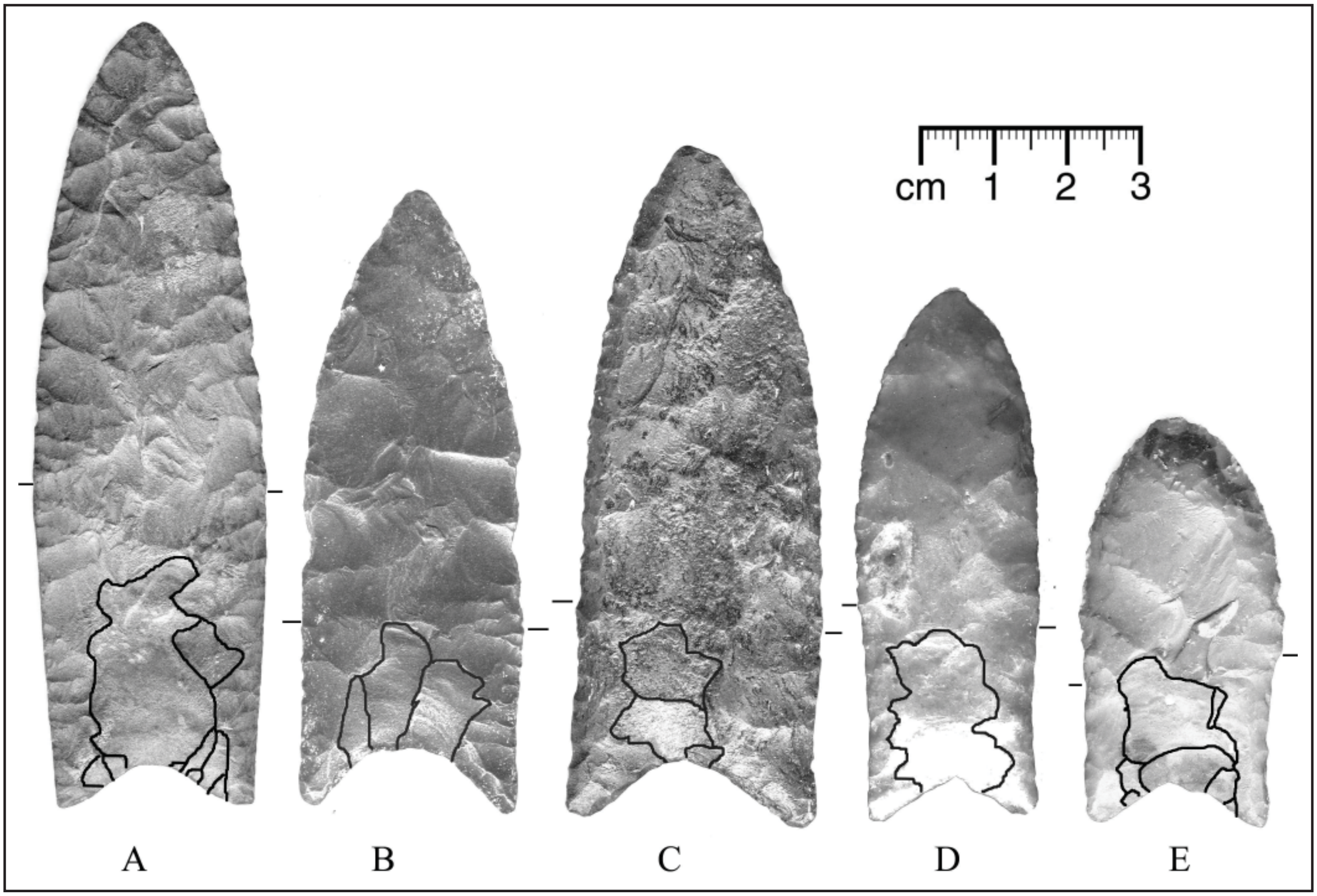

Figure 4. Deep-based (A-C) and V-based (D-E), straight-sided points. The flutes are outlined, and the limits of basal grinding are indicated by the solid bars.

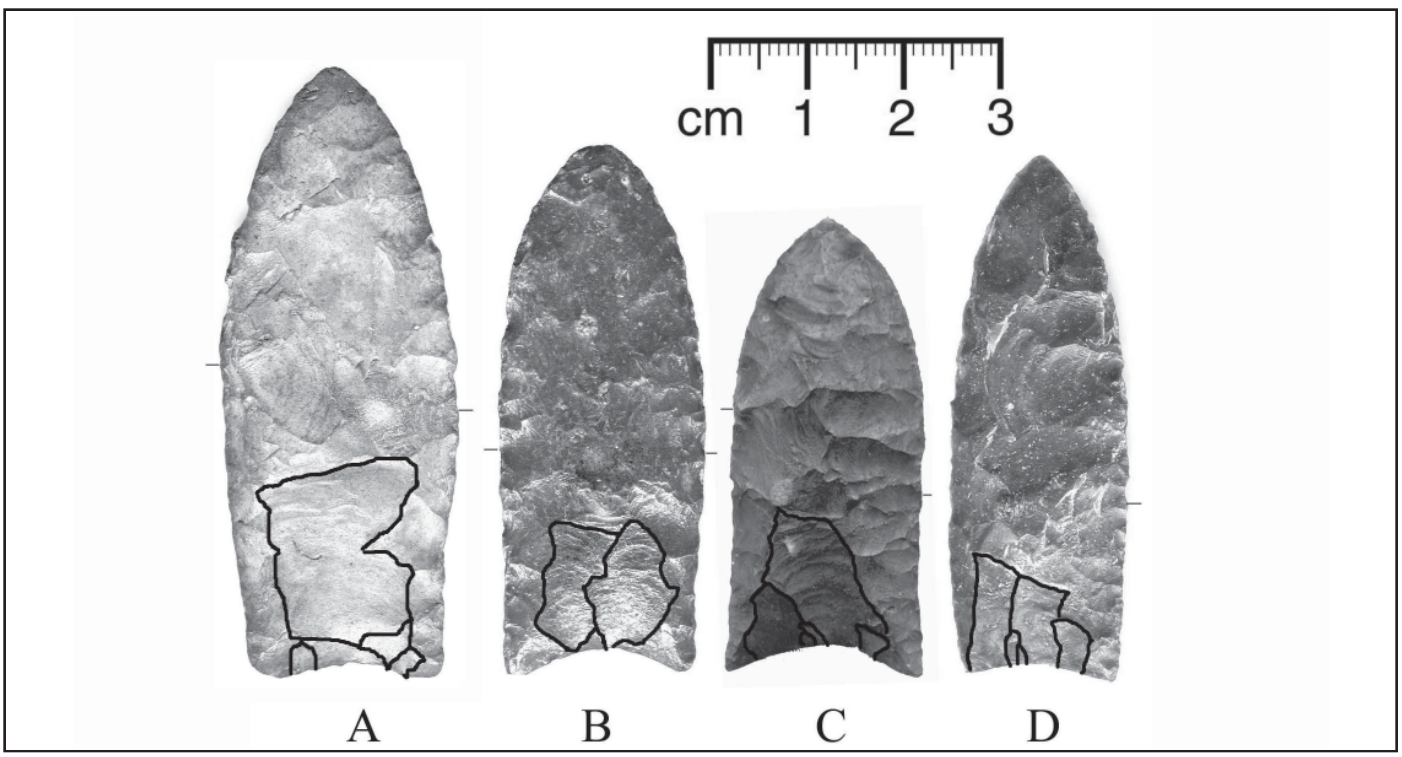

Figure 5. Narrow straight-sided points. The flutes are outlined, and the limits of basal grinding are indicated by the solid bars.

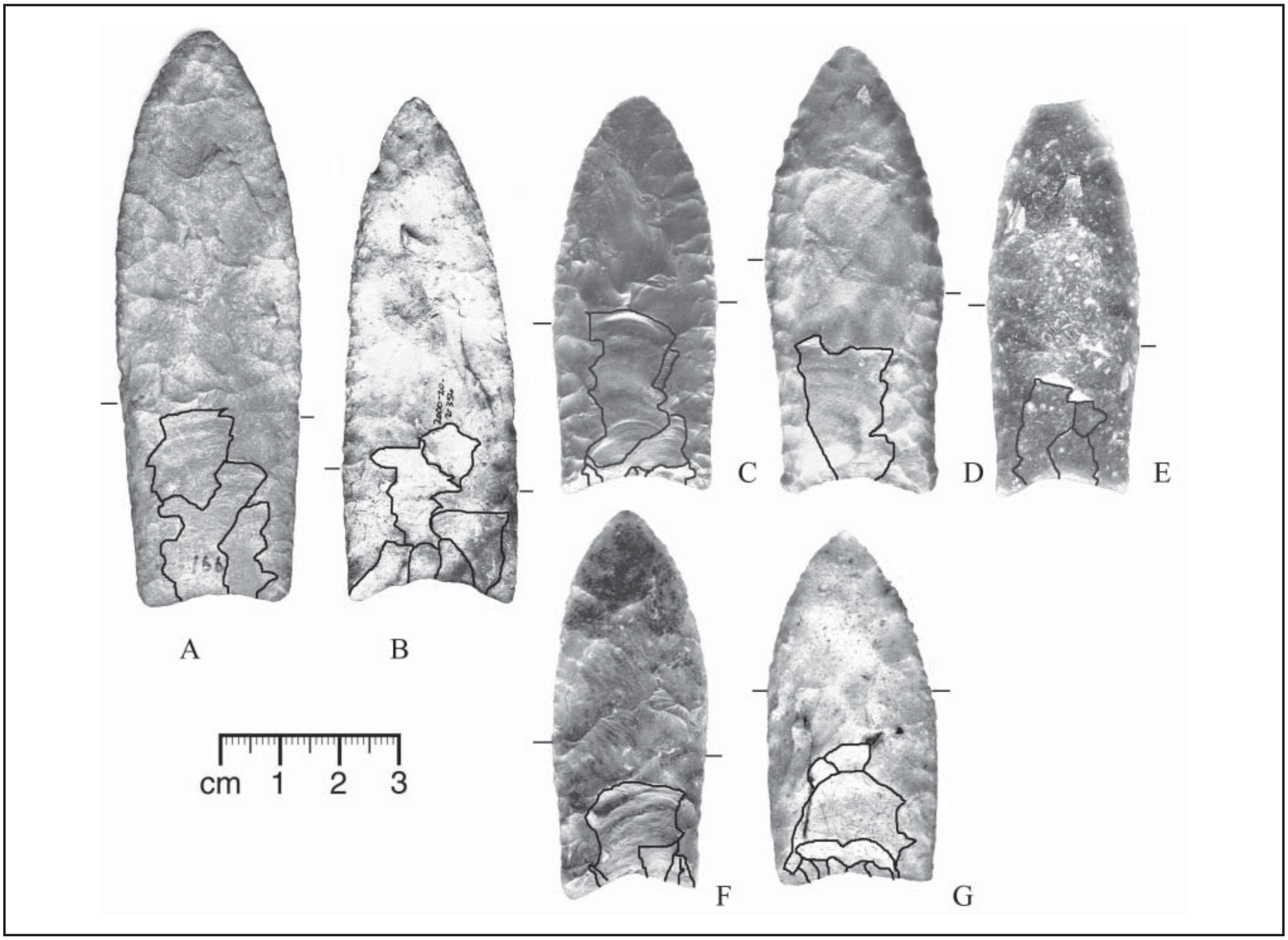

Figure 6. Medium width, straight-sided points. The flutes are outlined, and the limits of basal grinding are indicated by the solid bars.

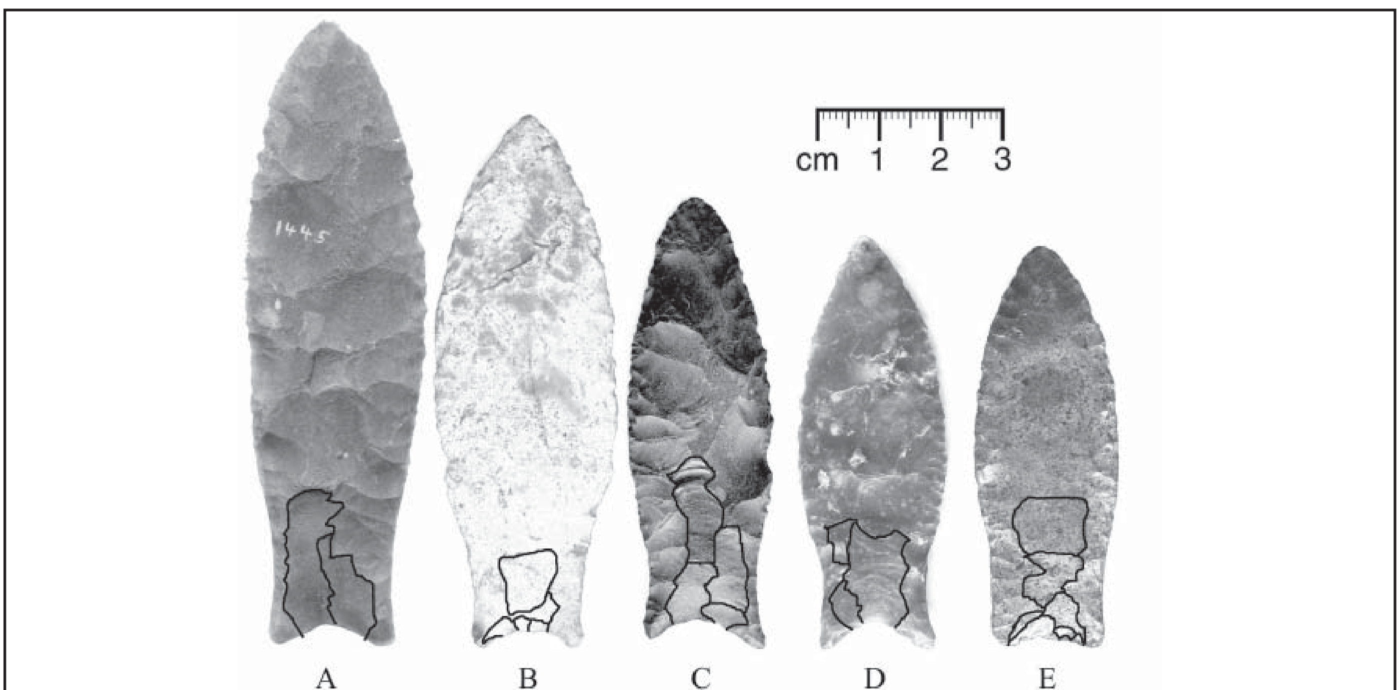

Figure 7. Narrow waisted points. The flutes are outlined, and the limits of basal grinding are indicated by the solid bars.

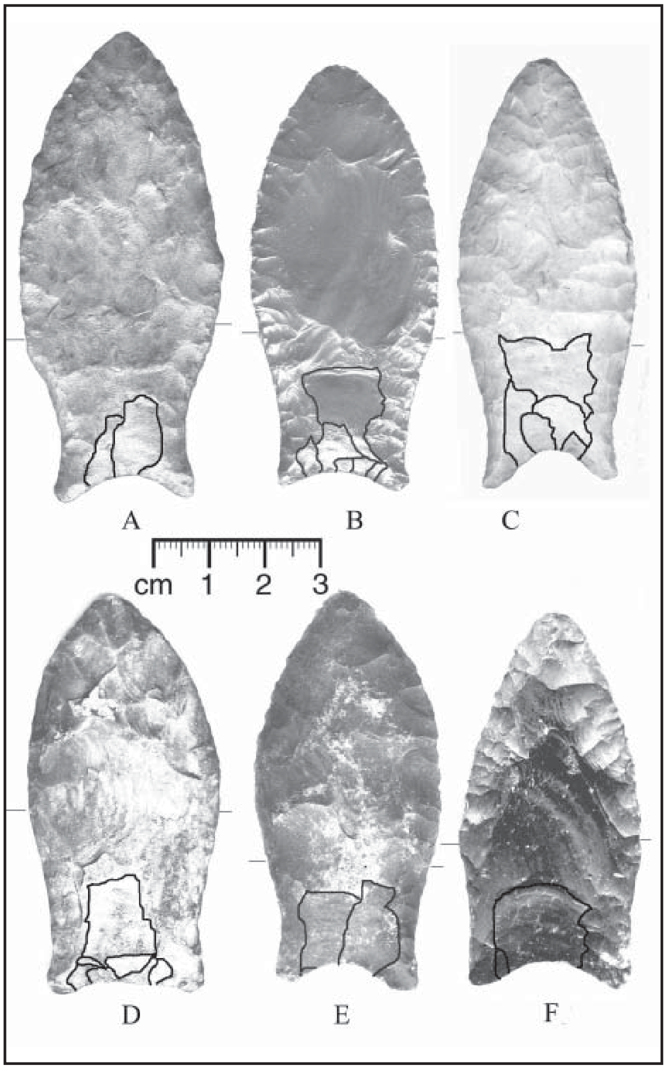

Figure 8. Spatulate waisted points. Flutes are outlined, and the limits of basal grinding are indicated by the solid bars.

contrast to the spatulate subgroup. Figure 7A may represent an unretouched or barely retouched point within this subgroup.

Spatulate subgroup. The spatulate subgroup has a significantly wider blade and wider base than the narrow-base subgroup. Spatulate forms are illustrated in Figures 8 and 9. Although the blades are of different widths, it appears from the presence of the resharpening shoulder and smooth edge, which can be clearly seen in Figures 8A, 8E-F, 9A-C, that the blades were resharpened. The differences in blade width may simply result from different degrees of resharpening. It is difficult to determine how wide the blade was when a typical spatulate point was completed since none of the examples is obviously unresharpened, but if we assume that only the top part of the blade above the maximum width (MW) was first resharpened, then the width of Figure 8A may come close to a typical width. The MW of this point is 37 mm, but it clearly has been resharpened, and its MW may have been approximately 40 mm wide when initially complete.

Discussion

Resharpening Trajectory

Figure 10 overlaps the profiles of the points illustrated in Figures 4 – 9 and shows how the hafts of the points within each subgroup maintain consistency while the blades change length and shape through what appear to be their resharpening lives. It appears that all points were resharpened while still in the haft, and initial resharpening was concentrated at the tip (Figures 6A, 8A, 8E). However, the entire blade edge was modified from the tip to the haft in subsequent resharpenings. This can be seen in the jagged profiles of Figures 4A, and 6B-C where the jag starts at the approximate limit of grinding. More pronounced resharpening shoulders are illustrated in Figures 7C, 8F, 9A, and 9C.

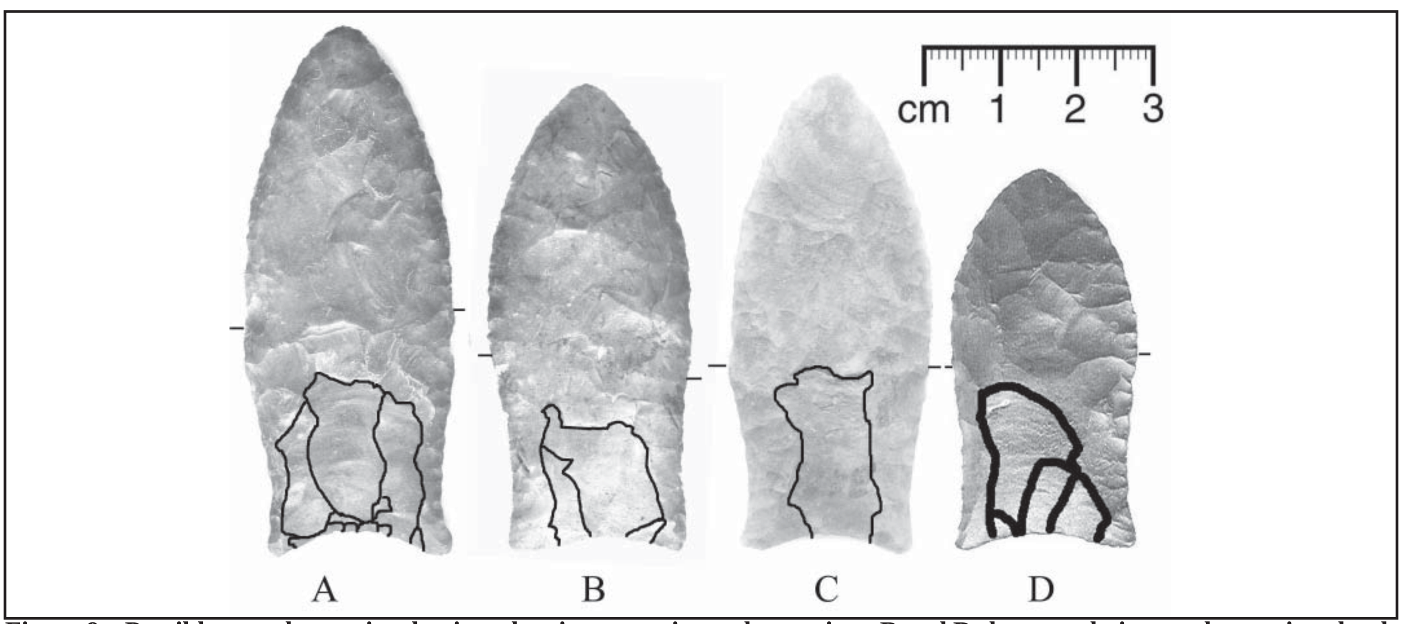

Figure 9. Possible spatulate waisted points showing extensive resharpening. B and D show no obvious resharpening shoulder. Flutes are outlined, and the limits of basal grinding are indicated by the solid bars.

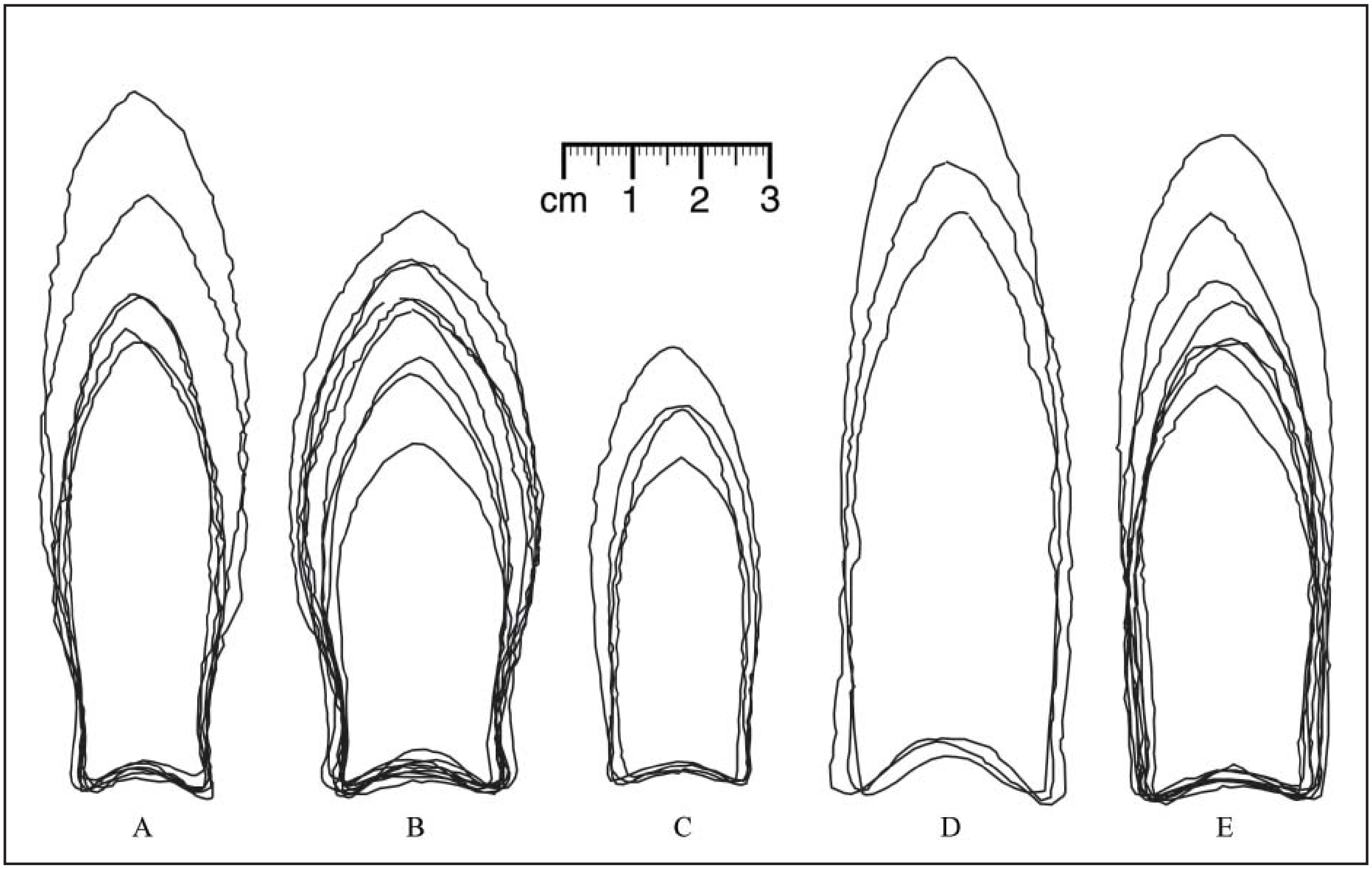

Figure 10: Outlines of the images in Figures 4-9. A – waisted narrow, B – waisted spatulate, C – straight-sided narrow, D – straight-sided deeper-base, E - straight-sided medium-width.

Hafting

Other than blade width, the straight-sided and waisted groups show the greatest differences in hafting design. Excluding the deeper-base subgroup, members of which are simply larger in all dimensions than the other subgroups, the main differences between the waisted and straight-sided subgroups is in the MBW and the number and size of the flutes (Table 2). The "waisted" appearance is created by an average difference of 2 mm between the size of the basal ear width (BEW) and the size of the MBW. The highly constrained variation in the dimensions of the BEW and MBW is notable in all groups, which can be seen in the small standard deviations of these attributes (Table 2) and Figure 10, indicating that partitioning the data based on these size dimensions likely represents real differences in the Paleoindian cultural model. In other words, the five subgroups may accurately describe actual types of Paleoindian points.

Fluting is another attribute that distinguishes the straight-sided and waisted groups. Points in the waisted group have shorter flutes on average, and the spatulate points are less likely to be fluted on both sides (Table 2). The number of flutes per face and whether flakes had been taken off the base after fluting were also examined. Figure 8A illustrates multiple fluting and post-fluting flaking, while Figure 9C illustrates single fluting and no post-fluting flaking. Both groups showed essentially the same percentage of post-fluting flaking (straight-sided 40%, waisted 42%). But, when a face of the point was fluted, 77% of the straight-sided points had single flutes compared with 68% of the waisted points. In sum, waisted points had shorter flutes, were less likely to be fluted on both sides, and were more likely to have multiple flutes than straight-sided points.

The difference in size and number of flutes may have had something to do with the method of hafting. Since the average grinding length is essentially the same in both groups (Table 2), we can infer that the size of the binding (i.e., the length of the binding from the base to the blade) was also essentially the same. In addition, the fluting does not appear to have made a significant difference in the thickness of the points; there are essentially no differences between the waisted and straight-sided points in average thickness, average flute thickness, and average difference between the average thickness of the flute and adjacent thickness of the point (Table 3). Firm conclusions are difficult to draw from these data, but they indicate that fluting may not have been as significant a technological necessity for hafting the waisted points.

Function

A functional interpretation is tempting but highly speculative and potentially treacherous. Notwithstanding the danger, it seems clear that the differences in haft shape, fluting, blade shape, and resharpening trajectories indicate functional

Table 2. Summary of attribute differences between the subgroups. The mean, standard deviation (s.d.), and range for the attributes are listed for each attribute. All values are rounded to the nearest millimeter, except basal concavity (BCV) and average thickness (AT), which are rounded to the nearest tenth of a millimeter. The attributes and abbreviations are described in Table 1.

Subgroup (no.) / Attribute	*Waisted Narrow (7)*	*Waisted Spatulate (30)*	*Straight-sided Narrow width (11)*	*Straight-sided Medium width (18)*	*Straight-sided Deeper base (6)*
MW mean	25	29	22	27	32
(s.d.)	(4)	(4)	(3)	(2)	(2)
[range]	[20-29]	[24-37]	[18-27]	[24-31]	[29-34]
MBW mean	17	23	19	25	29
(s.d.)	(1)	(2)	(1)	(2)	(2)
[range]	[15-19]	[20-29]	[17-21]	[22-28]	[26-33]
TL mean	74	68	57	71	96
(s.d.)	(16)	(14)	(12)	(16)	(8)
[range]	[55-102]	[39-106]	[39-82]	[45-99]	[85-107]
BEW mean	19	25	20	25	29
(s.d.)	(1)	(3)	(1)	(2)	(3)
[range]	[18-21]	[21-36]	[16-21]	[22-28]	[26-34]
BCV mean	2.9	3.4	2.1	3.4	6.6
(s.d.)	(1.1)	(1.2)	(.8)	(1.4)	(1.6)
[range]	[1.4-4.7]	[1.8-6.2]	[1.2-3.3]	[1.4-5.5]	[4.8-8.4]
AT mean	6.8	6.4	5.8	6.6	6.8
(s.d.)	(4)	(.8)	(.6)	(.9)	(.9)
[range]	[5-7.1]	[4.8-9.1]	[4.7-6.7]	[5.3-8.6]	[5.4-8.0]
AG mean	24	27	23	27	34
(s.d.)	(4)	(5)	(7)	(7)	(10)
[range]	[19-31]	[16-42]	[9-37]	[16-42]	[24-46]
AFL mean	17	18	22	26	26
(s.d.)	(5)	(4)	(8)	(7)	(10)
[range]	[6-26]	[5-23]	[6-23]	[7-35]	[9-40]
Number fluted on both sides (percentage)	6 (86%)	12 (40%)	10 (91%)	12 (67%)	4 (67%)

Table 3. The effect of fluting on average thickness (AT) for the straight-sided and waisted groups. Flute Thickness is the mean of the thickness measurements in the flute. Mean values and the standard deviation (s.d.) are rounded to the nearest tenth of a millimeter.

Groups	*AT (s.d.)*	*Flute Thickness (s.d.)*	*Difference (s.d.)*
Straight-sided	6.3 (.8)	5.9 (1)	.9 (.7)
Waisted	6.4 (.8)	5.8 (1)	1.1 (.8)

differences between the straight-sided and waisted groups, although the functional differences may be subtle and represent projectiles intended for hunting different prey. Several lines of evidence lead me to hypothesize that the straight-sided points, and perhaps the narrow waisted points, were principally designed as penetrating tools and the spatulate points were designed as cutting tools.

If we assume that the artifact differences were developed to modify perceived flaws in design, then we can infer that something about the use of the waisted points necessitated the waist in the haft and did not require longer flutes on both sides of the point. It is fair to assume that Paleoindians wanted their stone points to stay firmly attached to the shaft while they were being used. Thus, it seems safe to infer that the differences in hafting were meant to compensate for different stresses on the haft/shaft interface during the use of these tools. Whether the waisted haft was designed to better hold the point while it was being used as a knife, while the straight-sided haft was designed to facilitate thrusting penetration, is a hypothesis that requires testing, but it seems to be a fair initial interpretation of the differences in design.

Although the spatulate points were fluted, apparently it was not as critical for the proper functioning of the tool. Skilled stone-knappers, like Paleoindians, could thin the base of a point in several ways: fluting, lateral flaking, basal flaking, or a combination of these techniques. Since the thickness of both groups of points is essentially the same (Table 3), basal thinning probably was not the main reason for fluting. Thus, it is likely that fluting was perceived as necessary for the proper functioning of the straight-sided and narrow waisted points but less so for the spatulate points. It may be that fluting had something to do with the shaft, or the foreshaft, that fit in the channel created by the flute. Variations on this inference constitute the general consensus among Paleoindian archaeologists as to the purpose of the flute. A foreshaft may not have been required for the waisted points (Dunbar and Hemmings 2004).

Chronological Relationships

The chronological relationship among these forms is speculative without finding them in stratigraphic relation. Based on the notion that artifact designs change incrementally through time and in discrete ways that will affect a few of the design attributes, we can hypothesize that related forms that share more attributes are likely more closely related chronologically than artifacts that share fewer attributes in common. The number of attributes that the waisted and straight-sided groups share indicates that they were made at the same time or during immediately subsequent time periods. Hypotheses that they were made at the same time or the waisted forms preceded or followed the straight-sided forms can all be supported based on these data. While no fluted-knife forms similar to the waisted spatulates have been found in Clovis (i.e., straight-sided) assemblages from elsewhere in North America, it is possible this is a Florida-specific Clovis-age tool. It is also possible that waisted points were derived from the straight-sided point design, and the differences represent continuity through time as changes were made to the hafting and blade designs. Supporting this hypothesis is the unfluted Simpson type, common in Florida (Bullen 1975). Based on a preliminary assessment of the unfluted points in my database, there appear to be few morphological differences between the fluted spatulate and unfluted Simpson forms. The shorter flutes and prevalence of single fluting of the spatulate points could represent the transition to later Paleoindian unfluted Simpson and Suwannee forms (if, indeed, these are later forms). In contrast, the spatulate points, and unfluted Suwannee forms (Dunbar 2007), could have immediately preceded the straight-sided forms. The waisted points could represent the development of a nascent fluting technique that was perfected in the straight-sided forms.

Conclusion

Five hypothetical fluted forms from Florida are presented in this article, two of which have no obvious counterparts in North America: the narrow-base waisted and spatulate subgroups. It appears likely that the medium-width and narrow-width straight-sided points would be classified as Clovis points by most researchers, and the Florida examples likely fit neatly within the range of variation for Clovis points in North America. The deeper-based straight-sided points may represent post-Clovis forms that are more commonly found in the Northeast, but they too may simply fall within Clovis point variability.

While no "Waisted Clovis" form per se was identified in these data, there is no doubt that Dunbar and Hemmings' (2004: figure 1E) Waisted Clovis form is found throughout North America (e.g., Morrow and Morrow 1999; Anderson and Sassaman 1996; Justice 1987; Prufer and Baby 1963), although its frequency has not been established. The hypothetical spatulate subgroup is differentiated from the

Waisted Clovis form in the apparent resharpening trajectory (Figure 10B). It is possible that resharpened spatulates and Waisted Clovis points could be indistinguishable near the end of their use life, in which case several of the points attributed to the spatulate subgroup would be properly placed in the straight-sided medium-width subgroup or in a new subgroup. Several points used in the analysis, such as Figure 9B, may be examples of the Waisted Clovis form since they show no obvious resharpening shoulder.

The morphology of the spatulate points, especially their broad blades, has obvious parallels with "fishtail" points from Central and South America (Faught 2006). However, many fishtail points also show a long-fluting technique akin to the post-Clovis forms in North America (Faught 2006), and the similarities with fluted spatulates from Florida may be superficial. If the spatulate points were made at the same time as fishtail points, it is likely they are post-Clovis forms, since fishtail points consistently date to post-Clovis periods (Faught n.d.). Interestingly, Faught (2006: fig. 9.2) illustrates a fluted point from the Madden Lake site in Panama that looks very much like a Florida fluted spatulate, suggesting a potential Caribbean-Gulf of Mexico connection.

The general consensus among Paleoindian archaeologists is that post-Clovis lanceolates had long flutes, which likely represent the use of a new fluting technique (Patton 2005). Folsom, Cumberland, and Redstone points all exhibit flutes that extend a significant distance up the length of the point from its base (Goodyear 2006; Justice 1987). The Florida fluted points do not show this trait, which may indicate they are not a post-Clovis technology or that the long-fluting technique was not used in Florida. This is not to say that longer-fluted forms, such as Redstone, are absent from Florida, but these are rare and not likely part of the indigenous toolkit (Bullen 1969; Tesar and Whitfield 2002).

The five subgroups do not sort into any obvious or statistically significant regional pattern across north Florida, so it seems unlikely that the subgroups can be explained by raw material variation. It is also unlikely that the subgroups could be explained by the relative skill-level of the Paleoindian knappers. While variation in raw material and skill-level will cause variation within the subgroup, it does not account for the variation between the subgroups. Whether fluting was a defining characteristic remains an open question, however. It is possible that the fluted spatulate and narrow-waisted subgroups are simply variations on general, unfluted forms and do not represent a chronologically distinct cultural model.

The fluted-point traditions in North America represent a general trend from Clovis, which appears to be a continent-wide phenomenon, to later distinctive regional fluted forms, such as Debert and the long-fluted forms found in Folsom, Gainey, Cumberland, Redstone (Goodyear 2006; Justice 1987). The trajectory of changes in point design in Florida is not clear, but Florida appears to have a Paleoindian point evolution that is unique. Without sites with stratigraphic integrity or dates that would allow relatively fine-grained discriminations, we can only speculate about the chronological relationships among fluted forms in Florida.

Notes

1. I use the term point to refer to these artifacts because they have pointed ends in their unbroken state. They are referred to elsewhere as projectile points or projectile point/knives (PPKs).

2. The impetus to make an artifact design change may arise in a number of different ways, including methodical experimentation and serendipitous inspiration. Regardless of its origins, a design change will only make a lasting difference in the archaeological record if the maker and others adopt the changed design.

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