THE TOLTEC MOUNDS SITE IN SOUTHEASTERN PREHISTORY: INFERENCES FROM EARLY COLLECTIONS

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Toltec Mounds in central Arkansas was one of the largest sites in Eastern North America during the Late Woodland period. A diverse array of lithic artifacts have been found at the site over the past century that can help us determine events that took place on the site, and contribute to understanding how complex societies operated, both at Toltec and in the larger region. The current analysis is based on lithic artifacts found during excavations in Mound C in 1966, and in a massive surface collection made over a period of fifty years by a local avocational archaeologist, Frank E. Chowning, who generously donated his materials to the Arkansas Archeological Survey for use at Toltec Mounds State Park. Extensive chert, crystal quartz, and novaculite knapping occurred at Toltec, and an array of chipped, ground, and battered and abraded stone tools and unusual artifacts were present. A striking aspect of the assemblage was the appreciable crystal quartz and chert reduction, the latter employing intentional thermal alteration, that was directed toward the manufacture of arrow points. The clear/white and red colors of the finished arrow points were selected, it is argued, for their symbolic value rather than functional considerations, such as improved knapping efficiency or sharper or more durable edges. The collapse of Toltec and the abandonment of these esoteric arrow points in the subsequent Mississippian period locally, it is suggested, came about in part because prestige and power in Toltec society was associated with artifacts that were too commonly available and adopted, undermining elite prerogatives.

INTRODUCTION

A long time ago in a galaxy far, far away, in the spring of 1975, I loaded everything I owned into my 1965 Chevy Malibu, and headed from Columbia, South Carolina to Fayetteville Arkansas to begin graduate school in anthropology at the University of Arkansas. I went to Arkansas to obtain an MA degree and to study archeology with Dan Morse and Mike Schiffer. I wound up spending two summers excavating at the early Mississippian period Zebree site in Northeast Arkansas with Dan and Phyllis Morse, and over a year in Jonesboro helping write up the final technical report on the fieldwork. My first week in Fayetteville, however, I helped Mike Schiffer pack a moving van up, since he was leaving for a new job he had just accepted at the University of Arizona. Fortunately, I did get to work with Mark Raab, his replacement, for the next two years, himself a great scholar if not exactly the one I had thought I'd be working with in graduate school.

It was in Fayetteville, however, that I met and was able to work closely with another outstanding scholar and southeastern archeologist, Dr. Martha A. Rolingson, whose life is honored in the papers in this volume, and whose legacy is seen every time someone visits the remarkable Toltec Mounds site, which she more than anyone has helped us to understand.

In the mid-1970s archeology students arriving at the University of Arkansas quickly gravitated to the Arkansas Archeological Survey, ably directed at the time by Charles R. (Bob) McGimsey, and where Hester A. Davis, then Arkansas State Archeologist, maintained her office. These two quickly put students to work and instilled in them the value of public archeology. The Survey offered employment and opportunities for real world experience. I was extremely fortunate to have been offered a Survey Assistantship, which meant that in exchange for 20 hours of work per week during the school year, and full time work during the summers, usually on an excavation project somewhere, a student received tuition and what was then the quite princely sum of about $3600/year.

Although in the summers I dug at the Zebree site in Northeast Arkansas, and ultimately wrote my MA thesis on that project as well as several chapters in the final CRM report (Anderson 1979a; Morse and Morse 1980), during the three semesters I spent taking classes in Fayetteville, Hester and Bob decided that I should work on other things, to broaden my horizons. I was assigned to work with Martha Rolingson with materials from the Toltec Mounds site, which was then being acquired and transformed into a state park.

My first semester in the MA program, under Martha's direction I was asked to write a report on the artifact assemblage recovered from the 1966 Arkansas Archeological Society dig in Mound C, a trench of 11 2x2 m units opened up on one side of the mound. The excavations had been summarized in a short article soon after the fieldwork by Hester Davis (1966), in *Field Notes*, the monthly newsletter of the Arkansas Archeological Society (see also Rolingson 1982:2, 1998:110). My second semester, with the analysis of the materials from the 1966 dig nearing completion, I was then assigned to examine a collection of almost 3000 lithic artifacts from the Toltec Mounds site, a remarkable assemblage acquired over 30 years by a local collector, Frank Chowning, who generously bequeathed these materials to the Survey for use at the Toltec Mounds State Park upon his death in 1981.

The results of this research will be discussed shortly, but I first want to reminisce a bit about working with Martha Rolingson. A 1967 Michigan PhD trained by James B. Griffin, Martha had a no-nonsense approach to science and archeology, and paid careful attention to how artifacts were to be examined and classified (see also White 1999). I little knew then that her work documenting Paleoindian artifacts in Kentucky in the 1960s (Rolingson 1964, Rolingson and Schwartz 1965) would to this day still be some of the best sources of primary data on the early occupations of that state, or that I would be making use of her data in my own Paleoindian research years later (e.g., Anderson 1990). I remain impressed with her acumen about artifacts, and know that many of the observations I was making about the materials from Toltec were guided and encouraged through the weekly and often daily conversations we had about how the analyses were proceeding.

I took southeastern archeology from Martha in 1976, one of the hardest but simultaneously best courses I ever took in graduate school. Martha didn't have us read summaries about the archeology of the region; she had us read the primary monographs, from cover to cover. Each week we were expected to read a major monograph and summarize it for the class. We did this both verbally and in a longer written synopsis that we mimeographed copies to provide to each student. I still have my folder of summaries, and have in fact adopted a similar practice in my own teaching at the University of Tennessee, although now word processing, PowerPoint, photocopies, and pdf files substitute for the earlier manual typewriter and mimeograph-based technology. My first exposure to many of the classics of southeastern archeology, by the likes of Phillips, Ford and Griffin, Clarence and William Webb, and Lewis and Kneberg came in Martha's class. She taught me that primary sources are where one should always go first to learn what happened and was found during a project, and that monographs documenting primary research, data, and interpretation are the most lasting and important scholarly contributions we produce as archeologists. I hold this view to this day, even though short summary articles and theoretical pieces are what are more typically expected of archeologists today, at least those in university settings (Anderson 2000:143-145; 2003:116-117).

Turning back to the subject of this paper-early materials gathered from the Toltec site-my analysis of the 1966 excavation materials was completed in June of 1976, when my handwritten manuscript was submitted, running to almost 150 pages counting figures and tables (Anderson 1976). Although I had completed the analysis of the Chowning lithic collection materials before leaving that summer to work on the Zebree project, my detailed manuscript on the collections was not written in final form until a decade later (Anderson 1986). Martha's 1982 volume "Emerging Patterns of Plum Bayou Culture" was subtitled Toltec Papers II, in fact, because my manuscript (which was to be part of 'Toltec Papers I') was not done, something I good naturedly heard about at every meeting of the Southeastern Archaeological Conference (SEAC) for several years until I finally completed it. Plum Bayou Culture, parenthetically, which was defined by Martha, is the Late Woodland archeological culture associated with the major mounds and earthworks at Toltec Mounds and over the surrounding region, and characterized by "distinctive attributes in pottery decoration, the stone tools and sources of stone used, mound construction, arrangement of the mounds, and in the related settlements of the Arkansas River Lowland" (Rolingson 1982:87).

Graduate students coming to Arkansas should be aware that the Arkansas Archeological Survey will get final manuscripts out of you, however long it takes! My Arkansas graduate school experience, in which in two years from 1975 to 1977 I analyzed two major collections from Toltec and participated in the intensive excavation, analysis, and write-up associated with the Zebree project, leaves me with great admiration for Martha Rolingson, Hester Davis and Bob McGimsey, and Dan and Phyllis Morse, particularly for their ability to motivate students to produce. At the same time, given what was expected of me as an MA student, I have little sympathy for any graduate student foolish enough to complain about ‘heavy’ workloads. I was also taking MA classes at the time all this analysis was going on, typically three or four courses per semester. I still marvel that I managed to get through, and also had a great time and learned a lot in the process!

Many of the observations about stone tool reduction and use at Toltec in what follows were independently documented by Teresa Hoffman (1982a, 1982b, 1998), whose 1982 MA thesis and subsequent publications explored lithic reduction and manufacturing activity at Toltec. Research by Michael Nassaney (1991, 1992, 1994, 1996a, 1996b, 1999; Nassaney and Pyle 1999) has also explored the implications of lithic technology at Toltec in great detail. Both of these scholars have done exceptionally fine work on the subject, and what is offered here complements and builds upon their efforts.

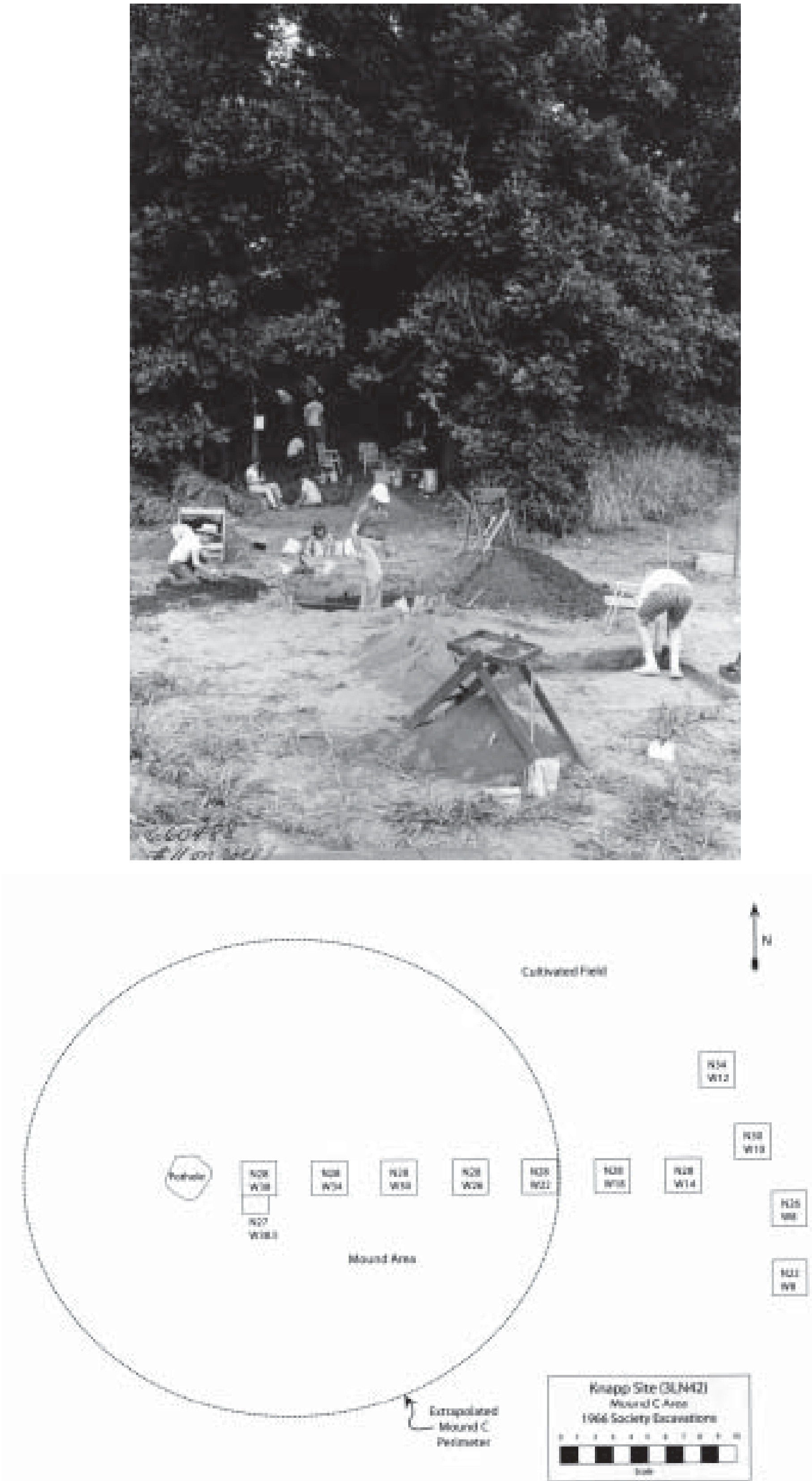
THE 1966 EXCAVATIONS

In 1966, as part of excavations undertaken by the Arkansas Archeological Society, eleven 2 m pits were opened on and beside Mound C. Six units were opened in the field and five on the mound, under the direction of Davis and McGimsey (Figure 1). At the very top of the mound was an old pothole, possibly the weathered remains of the 5 foot x 5 foot unit that Edward Palmer opened 11 feet into the mound in 1883, finding little in the fill beyond a broken pot and “two fine quartz crystals” (Thomas 1894:244). With the exception of the plowzone, which was removed as a natural level in the field units, all eleven squares were dug in 20 cm levels. The five squares excavated on the mound were removed in 20 cm levels, one to 40 cm below surface, one to 60 cm, one (with a feature) to 70 cm, and two to 120 cm. The units in the field had a ca. 30 cm thick plowzone, which was removed separately, and most were taken down one or two additional levels to ca. 60 cm, below which no artifacts were found. Two burials were found in the mound, one a flexed adult male with a pottery disk and a clear crystal quartz point in apparent association, and the other an extended adult with no artifacts associated (Davis 1966:4-5).

The 1966 excavation sample was the first assemblage recovered from the site for which both recovery procedures and provenience data were well known, and, hence, was the first collection amenable to detailed analysis and description. Four major areas of investigation, or research problem domains, were the focus for the artifact analysis, encompassing: (1) the description of the recovered artifacts, (2) the distribution of the recovered artifacts, (3) the post-depositional modification the archeological remains had undergone, and (4) an attempt to use the assemblage to advance our understanding of the site’s function and occupational history. Given recent pleas by Pauketat (2007; see also Yoffee 1993) and others to avoid reifying concepts like the chiefdom, I was gratified to see that in my 1976 manuscript I had observed: “Determining whether Toltec represented the focal point of a chiefdom as defined by Service, or whether it was the first complex society in the region is not in itself particularly important. Understanding why the site was a focal point and why it developed to its level of complexity should override questions of terminology or temporal classification.”

Just over 2,100 lithic artifacts of chert, novaculite, quartz, fine and coarse grained sandstone, quartzite, and lamprophyre were recovered from the 1966 excavations, along with almost 2600 potsherds (Table 1). These artifacts were investigated by raw material or paste category. The analysis of the lithics focused on the occurrence and distribution of each material, the nature of the reduction debris and finished products, and the delimitation of reduction-manufacturing sequences. Fortunately, I had saved photocopies of my manuscripts and the draft plates, and Martha found and sent me the computer cards and coding sheets I used in the original analyses, and had dutifully curated with the Survey, so I could recheck the analyses in the manuscripts and as reported herein. I had to retype the data, though, since card readers are a thing of the past. It was a depressing sign of my age, in fact, when a graduate student I thought particularly sharp looked at a deck of computer cards and asked “What’s that?”

The vast majority (n=1686, 79.4% by count) of the lithic artifacts recovered in the 1966 excavation units from Mound C were made of chert from the reduction of pebbles and small cobbles that occur in alluvial deposits in the Arkansas River and eastern Arkansas in general (Banks 1990; Hoffman 1982b:54; House 1975:82-85; Morse and Morse 1983:7; Nassaney 1992:61-64, 298-301) (Table 1). Some of this material was bright red and glossy, and exhibited signs of thermal alteration (e.g., Crabtree and Butler 1964; Purdy 1971). Nonretouched chert artifacts



a

b

Figure 1. a) General view of 1966 Mound C excavation with units off the mound and up the mound slope (photo courtesy of University Museum Collections, University of Arkansas, #660488). b) Sketch of 1966 Mound C excavation area. The mound was reported as being “12 feet high and about 100 feet long and 90 feet broad at the base” in the late 19th century (Thomas 1984:244).

Table 1. Artifacts from the 1966 excavations on and near Mound C, Toltec Mounds (3LN42): Summary data by raw material and functional category.

	No.	Wt. (g)	No.	Wt. (g)
Quartz Crystal	**Crystal Facets**		**No Crystal Facets**	
Crystal Tips	11	41.5		
Crystal Fragments	27	164.5		
Primary	3	12.0	1	3.5
Secondary	81	133.5	2	2.5
Interior	4	3.0	36	38.0
Shatter	0	0	53	97.0
Subtotal	*126*	*354.5*	*92*	*141.0*
Arrow Points	2			
Total No. Quartz Crystal = 220				
Chert	**ITA***		**No ITA***	
Cores	13	227.5	90	2370.0
Primary	9	32.0	53	233.5
Secondary	178	182.0	677	1492.5
Interior	173	66.5	396	260.0
Shatter	1	1.0	8	26.5
Subtotal	*374*	*509.0*	*1224*	*4382.5*
Unifaces (wear retouch)	11		23	
Unifaces (intentional retouch)	5		14	
Arrow Points	9		5	
Dart Points	1		5	
Misc. Point Fragments	2		3	
Preforms	4		2	
Crude Bifaces			2	
Adzes/Celts			1	
Irregular Tool			1	
Subtotal	*406*		*1280*	
Total No. of Chert artifacts = 1686				
Sandstone				
Fine Grained	34	340.5		
Coarse Grained	41	2790.0		

	No.	Wt. (g)
Novaculite		
Cores	2	23.0
Primary	2	8.5
Secondary	6	12.0
Interior	99	63.5
Shatter	3	16.5
Subtotal	*112*	*123.5*
Unifaces	7	
Preforms and Crude Bifaces	2	
Misc. Bifacial fragments	4	
Arrow Points	2	
Dart Points	2	
Total Novaculite	*129*	
Unusual Lithic Artifacts		
Hammerstones/Faceted Pebbles	2	
Slate fragment	1	
Quartzite flakes	3	
Stone bowl fragments	2	
Lamprophyre fragments	4	
Plummet (lamprophyre)	1	
Total unusual	*14*	
Prehistoric Pottery Fragments		
Plain grog tempered	2391	17590.5
Incised grog tempered	47	496.5
Notched grog tempered	10	77.0
Cordmarked grog tempered	9	154.5
Red Filmed grog tempered	60	331.0
Punctated grog tempered	4	4.0
Grog/Bone tempered	54	659.5
Shell tempered	6	27.5
Total Pottery	*2581*	*19340.5*
Unusual Ceramic Artifacts	8	
Grand Total:	***2124 lithic artifacts***	
	2589 ceramic artifacts	

*ITA = Intentional Thermal Alteration

Uniface totals include 6 blades and blade like flakes were further sorted by decortication and reduction stages, with each stage subdivided into what were assumed to be intentionally thermally altered and unaltered categories. Experimental confirmation of both the possibility of intentional alteration and the suspected color and texture change was accomplished through controlled heating experiments using a kiln. The results of the thermal alteration experiments with chert pebbles and cobbles from the Toltec area, together with the analyses of the incidence of alteration over the 1966 and Chowning collection assemblages was, in fact, written up for a term paper in my 1976 southeastern archeology course with Martha, a version of which was presented at the 1977 SEAC meetings in Lafayette, Louisiana, and that was subsequently published in 1979 in the *Midcontinental Journal of Archaeology* (Anderson 1979). Approximately 23.4% of the nonretouched chert, by count, exhibited intentional thermal alteration, and the percent of alteration increased with successive reduction stage, accounting for 14.5%, 20.8%, and 30.4% of the primary, secondary, and interior flakes of chert found in the excavation units by count, respectively (Table 2). Thermally altered cherts were thus increasingly selected as advanced reduction stages were reached, or when the intent of the knapper was to detach smaller flakes, since average flake weight decreased with advancing reduction stage; flakes of intentionally thermally altered chert were appreciably smaller, on the average by reduction stage, than those of unaltered chert.

A total of 14 arrow points were found in the 1966 excavations, nine flaked from thermally altered chert, the highest incidence of alteration observed for any tool or debitage category (Figure 2). Many of the Toltec arrow points exhibit straight, squared, or expanding stems that Hoffman (1998:68) places in a Rockwell Cluster (sense Perino 1971, 1985:328; Sollberger 1970). Several other chert tools were recovered, including a number of wear and intentionally retouched unifacial flakes, several dart points from earlier Woodland or Archaic use of the area, a number of preforms and crude bifaces, and a complete chert adze-like biface (Figure 2). The adze-like tool and the other bifaces suggest both hunting/food processing activities as well as woodworking was taking place at the site. One true blade (Bordes and Crabtree 1969:1) and five blade-like flakes, including two possible *lames á crete*, were recovered in the excavation units. All but one of the specimens exhibited pronounced wear and/or intentional retouch along one or both lateral edges. The presence of microblade shaped flakes was also observed in the 1966 crystal quartz assemblage.

A small fraction (n=129, 6.1%) of the 1966 assemblage by count was novaculite, mostly late stage debitage. Very few flakes exhibiting cortical material were found, suggesting initial reduction of novaculite took place elsewhere (Table 1). Ten bifaces and seven unifaces of novaculite were also found in the excavation units. Most or all of the novaculite was thought to have been intentionally thermally altered, since it almost invariably exhibited a glossy or milky appearance.

Just over 10% of the lithic artifacts by count recovered in the 1966 Mound C excavation units were quartz (n=220 artifacts), much of which appeared to be debitage and fragments produced by the reduction of clear quartz crystals. Only two tools were present, two small clear quartz arrow points, although a few of the flakes were microblade-like in appearance and may have been tools as well. Quartz debitage was sorted into reduction stages, using a crystal face as a measure of cortex; about two thirds (66.1%, 84 of 127, excluding shatter) of the quartz flakes, by count, had evidence for crystal facets present. The remainder of the quartz included a small amount (3 pieces with cortical material) that likely came from the reduction of quartz cobbles, but much of the remaining material could have come from crystal reduction as well, since it was interior or shatter fragments providing no evidence for cortex or crystal faces. The amount of quartz debitage recovered in the excavation units, about 500 g, was about one-tenth of the weight of the chert debitage recovered, suggesting crystal was a significant raw material worked at the site. A considerable number of flakes of bifacial retouch were also observed among the quartz debitage, suggesting biface manufacture was important, something supported by the recovery of the two quartz arrow points. The use of these points as possible grave goods or status indicators was suggested from the burial association. The amount of quartz and quartz crystal reduced in no way appears to corresponds to the number of quartz tools recovered—the flake to tool ratio was 90 to 1, excluding crystal tips and fragments, while for chert the flake to tool ratio, excluding cores, was 17 to 1—suggesting that finished quartz products were taken elsewhere, either on the site or on other sites.

Six fragments of lamprophyre were also found in the excavations, including two highly polished fragments that appear to derive from a plummet and from an atlatl weight. The remaining four pieces were roughly flaked fragments, suggesting initial reduction as well as final manufacture of lamprophyre artifacts was occurring on the site.

Table 2. Chert debitage from the 1966 excavations on and near Mound C and from the Frank Chowning Collection, Toltec Mounds (3LN42): Summary data by reduction stage and incidence of intentional thermal alteration.

	1966 Mound C Excavations			Frank Chowning Collection		
	No.	Wt. (g)	Avg. Wt. (g)	No.	Wt. (g)	Avg. Wt. (g)
Cores						
ITA	13	227.5	17.50	7	375.5	53.64
No ITA	90	2370.0	26.33	30	1909.4	63.65
% ITA	12.62	8.76	39.92	18.92	16.43	45.74
Primary Decortication						
ITA	9	32.0	3.56	25	167.5	6.70
No ITA	53	233.5	4.41	91	870.5	9.57
% ITA	14.52	12.05	44.66	21.55	16.14	41.19
Secondary Decortication						
ITA	178	182.0	1.02	82	402	4.90
No ITA	677	1492.5	2.20	689	5868.3	8.52
% ITA	20.82	10.87	31.68	10.64	6.41	36.53
Interior Flakes						
ITA	173	66.5	0.38	25	46	1.84
No ITA	396	260.0	0.66	83	321.5	3.87
% ITA	30.40	20.37	36.93	23.15	12.52	32.20
Shatter Fragments						
ITA	1	1.0	1.00	-	-	-
No ITA	8	26.5	3.31	4	26.0	6.50
% ITA	11.11	3.64	23.19	-	-	-
Totals						
ITA	374	509.0	1.36	139	991.0	7.13
No ITA	1224	4382.5	3.58	897	8995.7	10.03
% ITA	23.40	10.41	27.54	13.42	9.92	41.55

ITA = Intentional Thermal Alteration

A detailed analysis of the post-depositional modification the excavation assemblage underwent, encompassing comparisons of flake to biface ratios, showed that bifaces were significantly underrepresented in the plowzone levels, something arguably due to collector behavior. An analysis of the ceramics recovered in the excavations also showed that sherds from lower levels were on the average larger than those in the plowzone, suggesting considerable plow reduction and possible surface collection of this artifact category had occurred (Anderson 1976).

THE CHOWNING COLLECTION ANALYSES

For over 35 years, from the late 1930s until the mid 1970s, Frank E. Chowning and his son, Robert Chowning, of Little Rock, Arkansas, visited the Toltec Mound Group (3LN42) and made surface collections from across the site area. Frank Chowning, a charter member of the Arkansas Archeological Society, dutifully labeled the artifacts he found, giving his collection considerable research value. In the spring of 1976 Martha Rolingson and I visited Frank Chowning at his home in Little Rock where we examined his collection and discussed how it had been assembled. We took several thousand lithic and ceramic artifacts from the site on to the Arkansas Archeological Survey laboratories in Fayetteville, where I examined the lithics over a period of several months in 1976, under Martha's direction. After analysis and photography, the collections were returned to Frank Chowning early in 1977. After Frank Chowning's death in 1981, the collection was donated to the Arkansas Archeological Survey for use at Toltec Mounds State Park. As these materials were accessioned, it became apparent that the artifacts examined in 1976 comprised slightly less than half of the total collection the Chowning's had made from the site, primarily reflecting what were thought to be the "best" artifacts. Given that it took me almost a decade to write up what he had loaned us, this is perhaps fortunate.

During the 1976 analysis, measurements of individual artifacts were made and associated with photographs of these artifacts wherever possible, since it was not possible

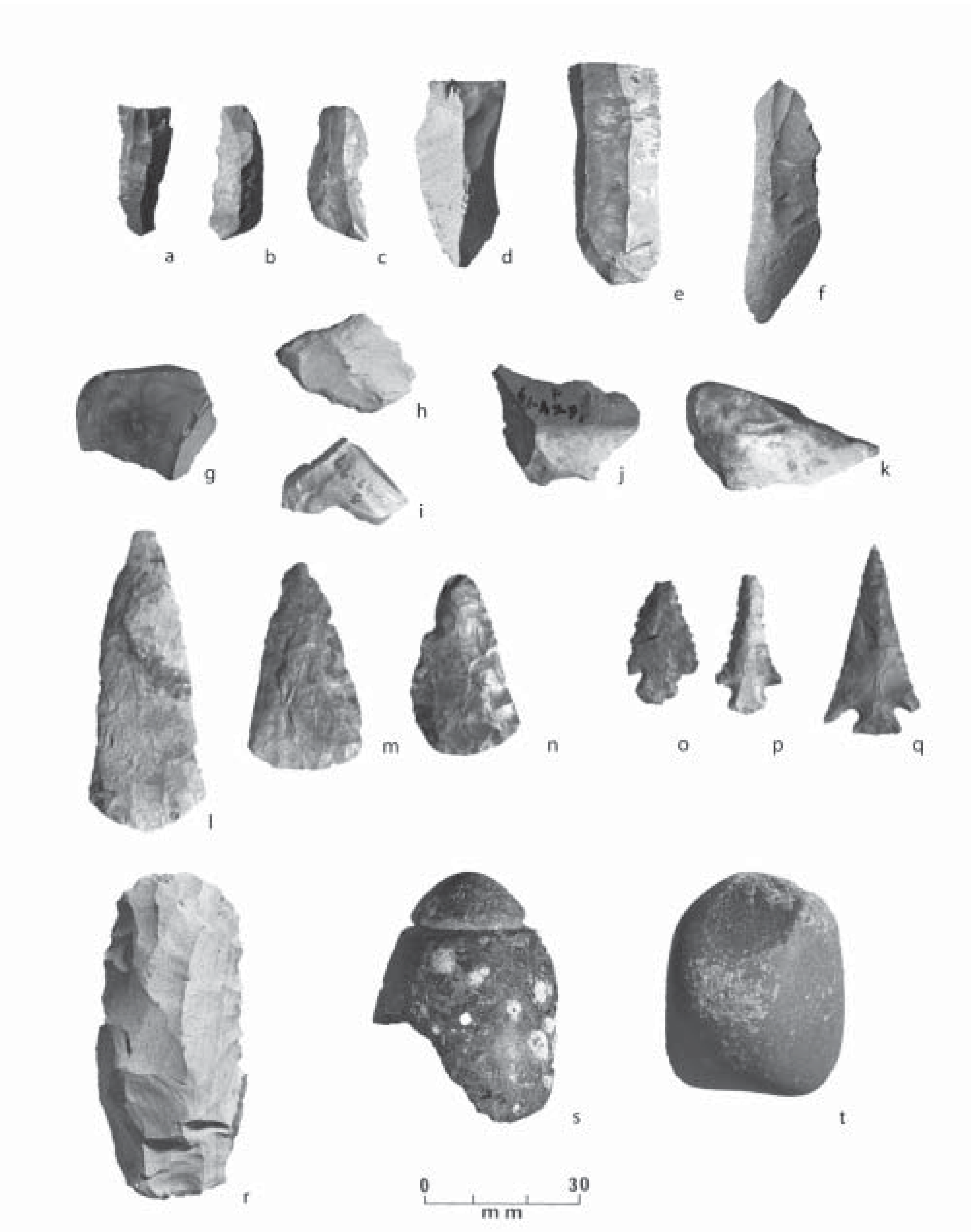


Figure 2. Lithic artifacts from the 1966 excavation units on and near Mound C, Toltec Mounds (3LN42), Arkansas. a-f) blades and blade-like flakes; g-k) retouched flakes; i-j) spokeshaves; l-n) perform-like bifaces; o-p) arrow points; o) Ashley type point; q) Rockwell type point; r) adze-like biface; s) plummet fragment; t) hammerstone. a-r) chert; s) lamprophyre, t) quartzite (AAS negative numbers 764242, 764246, 767247, 764274, 764275).

to catalog individual artifacts at the time. A large primary database of measurement data was produced, and remains available for interested researchers (measurements of individual tools by artifact category are provided in Anderson 1986). The importance of these collections cannot be underestimated. In the years that intensive research has been underway at Toltec, only a few examples of many of the artifact categories so well represented in the Chowning Collection have come to light. By carefully collecting and recording materials from the site, and seeing that they were left to posterity, the Chowning's bequest stands as a lasting testimony of the role responsible avocational archeologists can play in the advancement of knowledge and the preservation of our country's heritage (see also Pike *et al.* 2006). Unfortunately, save in states like Arkansas where the Arkansas Archeological Society has had a profound impact on the local avocational community, this example occurs all too infrequently.

Chert

A total of 2984 lithic artifacts were examined from the Chowning collection, 1738 of which were chert (Table 3, Figures 3, 4). Much of the chert assemblage by count (n=1036, 59.6 %) consisted of chert cores and debitage, which were sorted by reduction stage. Of 37 cores, only seven were on intentionally thermally altered chert, a somewhat higher incidence than noted in the 1966 excavation sample. Unlike that sample, where a regular pattern of increasing incidence of intentional thermal alteration by reduction stage was noted, however, the percent of alteration varied irregularly with successive reduction stage, accounting for 21.6%, 10.6%, and 23.2% of the primary, secondary, and interior flakes of chert in the Chowning collection by count, respectively (Table 2). This suggests that either intentional thermal alteration was practiced differently in the Mound C area than over the entire site, where the surface collection came from, in late stage manufacturing activity, or that the Chownings were consciously or otherwise selecting for certain kinds of chert debitage. Collector behavior is almost certainly operating to some extent, since the average weight of both the altered and unaltered cores and debitage in the Chowning collection is appreciably larger than in the 1966 excavation sample (Table 2). The 1966 excavation assemblage, obtained from fill screened through ¼ inch mesh, might be expected to yield more small artifacts than a collection hand picked from the site surface.

Whether the incidence of unaltered to altered chert by reduction stage in either the Mound C area or the Chowning collection is typical of the site as a whole is thus unclear, and in need of further evaluation with other collections from the site. Hoffman's published analyses of lithics from Mound D (1982b; 1998:54, 71, 77) notes the presence of thermal alteration, and suggests the process may have been occurring in the vicinity of Mound D. Nassaney's (1992:298, 343-348) analyses with materials from a number of sites from the general region indicated the incidence of intentional thermal alteration was most prevalent on sites dating to the Late Woodland - Baytown/Coles Creek period, with a much lower incidence on earlier and later components. His research also indicated that intentional thermal alteration varied appreciably from site to site, and that it appeared directed particularly to "producing formal tools (e.g., dart and arrow points)" which he took to further imply "evidence of a spatial division of labor—one tactic for monopolizing surplus" (Nassaney 1992:344, 348).

Specific tool forms present in the Chowning collection included blades and blade-like flakes, unifaces, gravers, perforators, drills, crude bifaces, formal bifaces, adze/chisels, arrow preforms, arrow points, and dart points. As in the 1966 excavation sample, chert blades and blade-like flakes were present in the Chowning Collection, three true blades and three blade-like flakes. Ranging from 28 to 43 mm in length, all but one had extensive wear and/or intentional retouch on one or more lateral margins. On two of the true blades the central arris, with working angles of from 100 to 120^{o}, exhibited crushing and nicking from possible use as an acute-angled tool; similar wear was observed on some quartz crystal facets. Whether a true blade industry exists on the site is uncertain, although the low numbers suggest that, if one was present, it was likely a minor part of the assemblage.

A total of 123 chert flakes exhibited unifacial wear and/or intentional retouch. Just over one-fourth of these unifaces were on intentionally thermally altered chert (n=35, 28.5%), an incidence almost identical to that observed in the 1966 excavation sample (n=16 of 53, 30.2%). Thermal alteration was thus apparently sometimes selected when additional workmanship was necessary and/or when acute, presumably sharp, cutting edges were desired. Most of the chert use in unifacial tools, however, appears to have been fairly expedient, employing debitage picked up, modified as necessary for the task at hand, used, and then discarded.

Extensive woodworking at the site was indicated by the presence of a number of tool forms. Twenty-two chert unifaces exhibiting semicircular concavities with steep (ca. 60 to 90^{o}) working edges were present that are assumed to have functioned as spokeshaves. Only two of the 22 were on intentionally thermally altered chert, suggesting this characteristic was avoided where tool edges needed to be

Table 3. Lithic artifacts from the Frank Chowning Collection, Toltec Mounds (3LN42): Summary data by raw material and functional category.

	No.	Wt. (g)	No.	Wt. (g)		No.	Wt. (g)	No.	Wt. (g)
Quartz Crystal					**Novaculite**	**ITA**		**No ITA**	
Crystal Tips	31	250.2			Cores	-	-	3	241.5
Crystal Fragments	40	1110.3			Secondary	3	35.2	3	32.2
Primary	42	17.5			Interior	8	132.3	20	141.0
Secondary	335	1007.0							
Interior	111	263.5			Unifaces	5		7	
Shatter	11	35.5			Perforators	6		1	
					Bifaces	6		4	
Obtuse Angle	6				Arrow Preforms	14		-	
Blades, blake-like	12				Arrow Points	98		-	
Unifaces	35				Dart Points	19		14	
Crude Bifaces	6				*Total Novaculite Artifacts = 185*				
Pebbles	3								
Arrow Preforms	1				**Sandstone, Quartzite, Greenstone, misc**.				
Arrow Points	15				Pitted Cobbles	15			
Total Quartz Crystal	*648*				Abraders	12			
					Abraders Faceted Cobbles	10			
Chert	**ITA**		**No ITA**		Celts	26			
Cores	7	375.5	30	1909.4	*Total Artifacts*	*63*			
Primary	25	167.5	91	870.5					
Secondary	82	402.0	689	5868.3	**Hammerstones and Pressure Flakers**				
Interior	25	46.0	83	321.5	Pressure Flakers	35			
Shatter	-	-	4	26.0	Hammerstones	253			
					Unmodified disks	3			
Blades, blade-like flakes	-		6		*Total Artifacts*	*291*			
Unifaces	35		88						
Spokeshaves	2		20		**Unusual Artifacts**				
Gravers	-		13		Atl-Atl Weights	8			
Perforators/drills	10		9		Plummets	25			
Bifaces	4		41		Pipe Fragments	6			
Adzes/Chisels	3		42		Lamprophyre	19			
Arrow Preforms	55		15		Hematite	1			
Arrow Points	154		117		*Total Unusual*	*59*			
Dart Points	19		69						
Total Chert Artifacts = 1738									
					Grand Total = 2984 artifacts				

ITA = Intentional Thermal Alteration

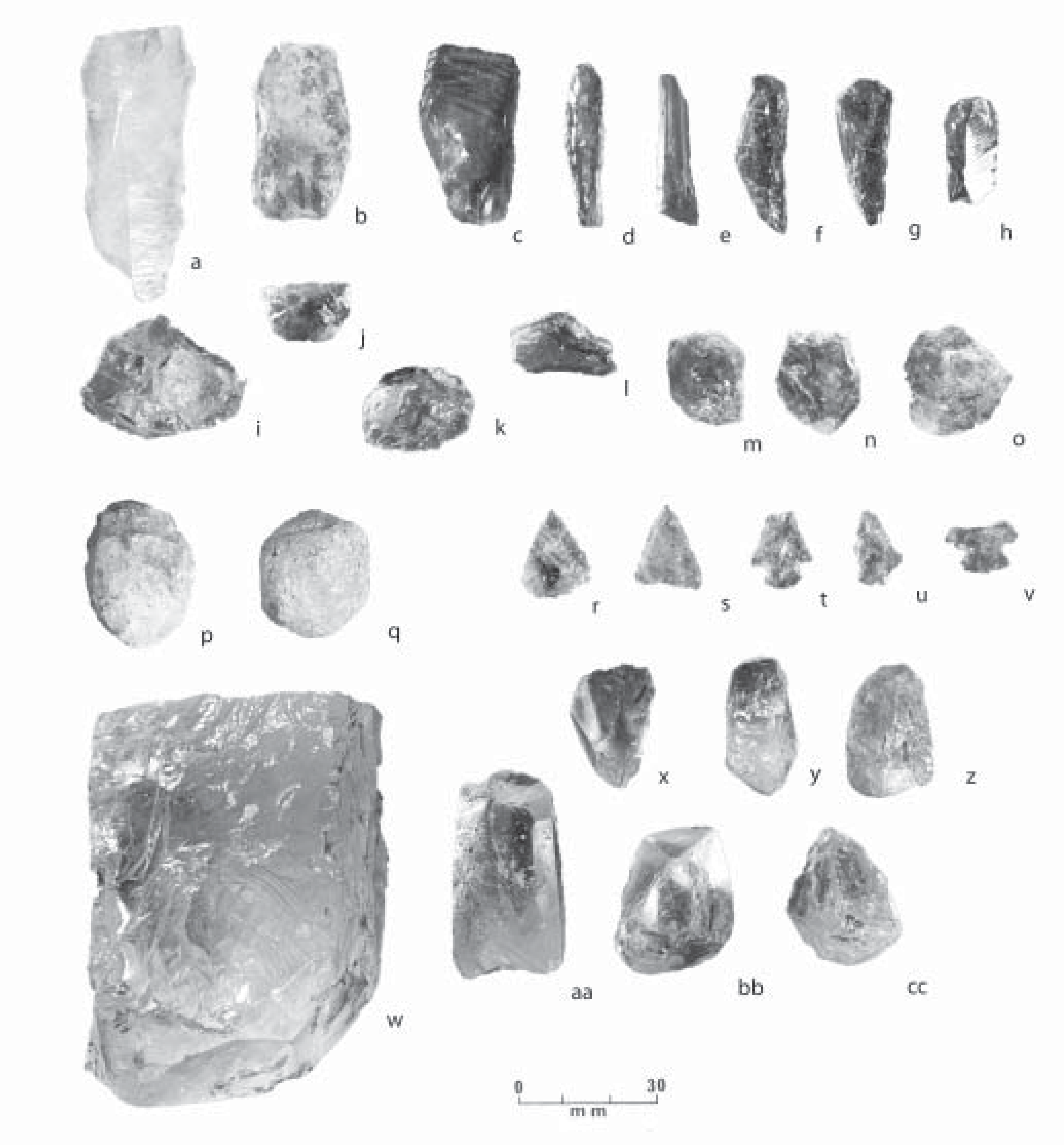


Figure 3. Lithic artifacts from the Frank Chowning Collection, Toltec Mounds (3LN42), Arkansas. a-h) blades and blade-like flakes; i-o) retouched flakes; p-q) battered spheroids; r-v) arrow points; w) large worked fragment; x-cc) battered fragments with obtuse angle wear. All artifacts are crystal quartz (AAS negative numbers 764195, 764248-764252, 764254).

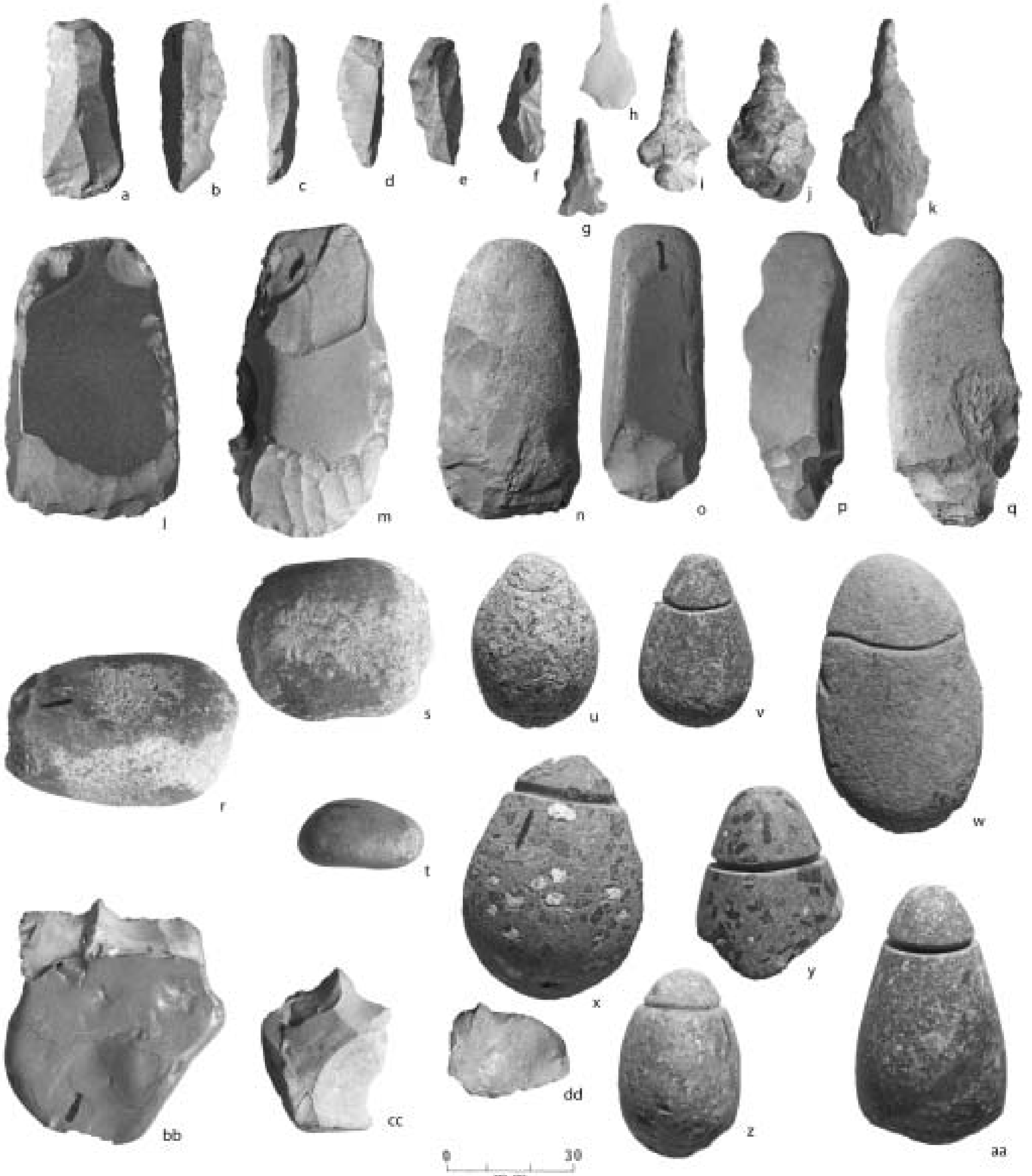


Figure 4. Lithic artifacts from the Frank Chowning Collection, Toltec Mounds (3LN42), Arkansas. a-f) blades and blade-like flakes; g-k) perforators; l-q) adze and adze-like bifaces; o-q) possible chisels; r-t) hammerstones; u-aa) plummets and plummet fragments; bb-dd) gravers. a-g, i-q, bb-dd) chert; h) novaculite; r-t) quartzite; u) syenite; v, w, z, aa) sandstone; x, y) lamprophyre (AAS negative numbers 764192, 764193, 764194, 764214, 764225, 764233, 764236, 764256-764257, 764290, 764295-764297).

particularly durable and long lasting. Thirteen flakes with graver spurs were present, none heat treated; an appreciable majority (n=9; 69.2%) of the graver spurs were situated opposite natural or prepared backing. Nineteen chert bifacially worked perforators were in the collection, a majority (n=12; 63.2%) reworked arrow points. Use of these tools in drilling or piercing tasks is probable, although the kinds of materials worked (i.e., wood, shell, bone, antler, hide, etc.) remains unknown.

Forty-five chert adze and adze-like bifaces or chisels were present, 27 intact and another 18 fragmentary or reworked. In every case the working edge had been flaked; no evidence for grinding of the bit area was observed. Most of these tools were chipped from pebbles or small cobbles and exhibited cortex over varying portions of the body. Poll areas were often unworked, using the natural pebble cortex as a backing. Poll areas and lateral margins, where flaked, subsequently were battered extensively, presumably to provide a smooth hafting surface. Edge angles varied appreciably over the intact specimens, ranging from 40 to 80^{o}. Two distinct tool forms, adzes and chisels, appear to be represented in the assemblage. The former are characterized by wide, convex bits with steep working edge angles (average = 69.2^{o}). The latter, assumed to be chisel-like tools, had narrower bits (average width = 30.6 mm as opposed to 38.4 mm over the adzes) with straight to convex working edges. Working edge angles on the chisels were considerably lower, averaging 52.3^{o}. No striations were observed on any of the intact specimens of adzes and chisels, although use polish was noted on five adzes and two chisels. Only three fragmentary specimens were thermally altered. The absence of much evidence for thermal alteration may be due to the presumed use of these tools in heavy-duty cutting and chopping tasks; durability, rather than sharp, brittle edges would have been desired in such activities. A fairly extensive woodworking industry at the site is suggested by the number of adzes and chisels, as well as spokeshaves, gravers, and steep-angled unifaces.

A total of 271 hafted chert arrow points and point fragments, and 70 triangular-to-ovate bifaces thought to be arrow preforms were present in the Chowning Collection. Remarkably, just over half the arrows (n=154; 56.8%) and three-fourths of the arrow preforms (n=55, 78.6%) are on intentionally thermally altered chert, figures that correspond fairly closely to those noted on the arrow points in the Mound C excavation sample. These are the highest values for intentional thermal alteration observed on any chert artifact category at the site, suggesting that the process was important in the manufacture of arrow points.

Dart points were also fairly common in the Chowning collection, although of 88 recovered, only 19 exhibited intentional thermal alteration, an incidence far below that observed on the chert arrow points from the site. Selection for thermal alteration was not practiced as extensively in the manufacture of these tool forms, which, considering some of the forms may date to earlier periods of site use than when mound construction was occurring from ca. AD 700-1000 (e.g., Hoffman 1998:62-65), suggests selection for alteration changed over time in the immediate area. Given the minimal evidence for pre-mound building occupations at the site, some or many of the dart points may be contemporaneous with the arrow points. Evaluating the age and associations of the darts points, and indeed all of the artifacts found on the surface, is critical at Toltec Mounds. The fairly large numbers of dart points in the collection, if indeed indicative of earlier use of the site area, means it will be difficult to determine how many of the other lithic artifact categories found at the site are associated with the period of mound building, at least until these artifacts can be found in securely dated context.

Novaculite

Ninety-eight novaculite arrow points and 14 presumed arrow preforms were present in the Chowning Collection, together with a smaller number of pieces of novaculite debitage and other unifacial and bifacial tools (Table 3). A moderate number (n=33) of dart points of Archaic and Woodland age were found, a pattern like that observed in the chert assemblage, and documenting earlier use of the site area. Extensive use of intentional thermal alteration appears to characterize use of novaculite at Toltec, at least in the manufacture of arrow points and preforms; the dart points, in contrast, included a number of apparently unaltered specimens. This may reflect an attempt to improve the knapping quality of novaculite, or may be from a desire to produce the white, glossy color and texture that characterizes much intentionally thermally altered novaculite. Evidence for extensive manufacture of novaculite tools at Toltec is not indicated from the materials present in the Chowning collection, given the low quantity of debitage recovered. Given the moderate incidence of late stage novaculite debitage found in the 1966 excavation sample (Table 1), however, some collector selection bias against novaculite debitage appears to have been operating when Mr. Chowning was collecting the site. The presence of novaculite arrow preforms and the moderate incidence of finished novaculite arrow points suggest that some manufacturing occurred, perhaps in conjunction with the production of the chert and quartz arrow points.

Quartz Crystal

In his collecting activity, Frank Chowning (personal communication 1976) attempted to pick up every piece of quartz crystal that he found. The artifact category appears to have been a favorite among the site collectors, as Chowning noted that he had seen "thousands of pieces carried away" by other visitors. Quartz crystal artifacts in the collection (n=648) included crystal tips, fragments, and debitage, and a number of tool forms, including arrow points, blades and blade-like flakes, unifaces, obtuse-angled tools, battered spheroids, and crude bifaces and biface fragments.

Thirty-one crystal tips, including intact crystals and crystals broken below the tip, with no evidence for subsequent reduction, were found. Slight crushing was observed on the tips of over half the specimens (n=20; 64.5%); whether this reflects use, in incising or perforating activities, or accidental damage remains unknown. Seven of the 31 specimens exhibited light crushing along one or more edges from possible use of the intersecting crystal planes as obtuse angled tools; four of these seven also had crushed tips.

Crystal fragments or "cores" were present in the collection and consisted of broken or reduced nontip portions of crystals. The category encompasses all crystal nonflake or shatter fragments exhibiting one or more flake scars from prior reduction. Thirty-nine fragments from comparatively small crystals were present together with one unusually large, partially reduced fragment weighing 681.0 g that must have come from a substantial parent crystal.

A total of 499 pieces of nonretouched quartz debitage, weighing a total of 1323.5 g, was present in the collection. All of the primary and secondary decortication flakes came from the reduction of quartz crystals. The quantity of quartz debitage recovered supports the conclusion reached in the Mound C analysis that extensive crystal reduction and manufacturing activity was occurring at Toltec. Assuming that the 1966 screened excavation sample is the more representative, it is evident that the Chowning's missed or did not collect small fragments (under ca. 1.0 g) and that they consciously or unconsciously avoided collecting irregular shatter fragments or cortical fragments from quartz pebbles. What this suggests is that surface collections of debitage, even by the most conscientious of collectors (professional or avocational), are likely to be considerably less representative for technological analyses than screened excavation samples. Such analyses must always keep in mind, of course, the contexts from which the samples were derived (i.e., mound fill, mound occupation, non-mound areas).

Twelve quartz blade-like flakes exhibiting acute-angled unifacial wear along one or more margins were present in the collections, a finding similar to that noted within the chert artifacts from the site. Four are true blades, flakes with "two or more scars of previously removed blades with force lines and compression rings indicating that force was applied in the same direction as blade detachment" (Bordes an Crabtree 1969:1). The remaining eight are blade-like flakes, flakes with a length-to-width ratio greater than 2:1, yet with no evidence for production from a true blade core. All are small, ranging in length from 20 to 38 mm, and all exhibit pronounced wear in the form of nibbling and light crushing along one or more margins. Working angles are low, ranging from 30 to 50º in most cases, suggesting use in cutting functions (Wilmsen 1970). The tool working edges were commonly placed opposite natural backing (crystal faces), or backing (flattened surfaces) produced by battering or flake detachment.

Thirty-five other crystal flakes exhibited unifacial wear and/or intentional retouch. Most were somewhat irregular in shape, differentiating them from the blade and blade-like category, and appear to reflect the opportunistic use of pieces of crystal debitage. An appreciable majority (n=24; 68.6%) had natural (i.e., crystal faces) or intentionally produced (i.e., crushed, battered, or flaked) backing opposite the working edges.

Fifteen clear quartz arrow points and one apparent arrow preform were present in the analysis sample. All of the arrows exhibited straight to expanding stems with faint to pronounced corner notches. Bases, where intact, were typically convex (n=7) or flat (n=4); only one faintly concave specimen was noted. Six of the arrows were serrated and four had been made on unifacial flakes, with only minimal evidence for bifacial workmanship.

Two worked spheroids and one apparently unmodified pebble of clear quartz came from the site surface. The two spheroids were extensively battered, suggesting possible use as hammerstones. Alternatively, all three objects may be personal or ceremonial objects of some kind, such as charm stones.

The Chowning and Mound C analyses demonstrated that considerable reduction and use of quartz crystal was occurring at Toltec. Crystals and crystal tips were either saved intact or were used as a source of knappable stone for the manufacture of a number of tool forms. Intact or minimally reduced crystal segments saw use as possible incising or perforating tools and as obtuse-angled tools. Perhaps the most dramatic category produced by crystal reduction was clear quartz arrow points. The manufacturing focus on clear arrow points and the retention of intact crystals suggests that the raw material category may have been a source of prestige and/or ceremonial goods. The production of utilitarian tools, so characteristic of the chert industry on the site, is only minimally evident. The size, shape, and knapping characteristics of available quartz may have also, to some extent, constrained the kinds of tools that could be made from this material, which may explain why many of the flaked tools (i.e., arrow points, blades, and flakes) are small (Nassaney 306-320).

Polished Igneous and Sedimentary Artifacts

Twenty-five plummets and plummet fragments were present in the Chowning collection. The artifacts were typically egg or ovoid in shape and invariably had a narrow (ca. 2 to 4 mm) groove running around the body between one-fifth and one-third of the total length below the tip. The groove was presumably to support a cord, although exactly what these objects were used for is uncertain. Possible functions include bolas stones, fish or net weights, plumb bobs, or items of personal adornment. The lamprophyre, magnetite, and at least some of the sandstone plummets were quite well made, with highly smoothed surfaces. The chert and syenite plummets, in contrast, were for the most part quite crude in comparison.

Eight atlatl weights, seven intact and one fragmentary, were present in the collection. Lamprophyre, syenite, and sandstone were used to make the intact weights, whose shape was of the type traditionally called a boatstone. Six pipe fragments, all carved in reddish-pink siltstone, were also present. Fifteen pitted cobble tools were present, 12 made of sandstone and the remaining three on a quartzite-like material. Wear pattern studies suggest use of these tools as anvil stones in a range of tasks, encompassing plant, stone, and other raw material processing tasks, including in bipolar reduction. Twelve sandstone slabs with pronounced abrader grooves were also in the collection, as were ten cobbles with pronounced abrader facets on their edges, eight of sandstone and two of quartzite.

A total of 253 intact hammerstones were present. Three possible size modes were indicated, by weight: (a) hammerstones under roughly 110 g, (b) hammerstones from 110 to 260 g, and (c) hammerstones ranging from ca. 280 to 500 g. These “small”, “medium”, and “large” categories, if an accurate reflection of aboriginal hammerstone selection, probably reflect a range of tasks, each requiring tools of a specific size range. Thirty-five narrow, rectangular pebbles, ten with light to extensive battering near the tip, were also present and may represent possible pressure flaking tools. All but seven of these artifacts were of chert, the remainder were sandstone. Extensive stone tool manufacture at the site is indicated by the presence of these tool forms.

Twenty-three ground sandstone, trachyte porphyry, and lamprophyre celts and celt fragments were also present, and further support the inference that extensive woodworking was occurring in the site area. Most of these artifacts were carefully made and smoothed over their surface, with grinding common along the margins and over other portions of the body, although a few were left in a roughened condition. The bits on the intact specimens were wide and convex and were almost identical in width (average = 37.6 mm) and working angle (average = 71.0 degrees) to the chert adzes (average width = 38.4 mm; average working edge angle = 69.2 degrees). Use in similar, presumably heavy duty cutting and chopping tasks such as woodworking, is inferred.

CONCLUSIONS

Analyses of the 1966 excavation and Chowning collection indicate that extensive on-site reduction of chert and quartz crystal occurred at Toltec, as documented by the presence of appreciable quantities of reduction debris and intermediate and final stage manufacturing products. Reduction of quartz crystal and novaculite, particularly the former, appears to have been particularly directed to the production of arrow points by the Plum Bayou Culture occupants of the site. Expedient use of crystal debitage for unifacial tools, including small blades, is indicated. Crystal tips and fragments additionally saw use as possible engraving tools and/or charm stones and as obtuse-angled tools. Use of crystal arrows as status markers is suggested by the presence of one in a burial.

Flaked chert artifacts were extremely common, and extensive reduction and manufacturing activity and the use of a range of tool forms is indicated. Considerable arrow point manufacture, employing intentional thermal alteration, occurred. An extensive woodworking industry is indicated by the presence of adzes of chert, sandstone, and other materials, and by the presence of spokeshaves, gravers, and a number of steep-angled unifaces. Evidence for extensive stoneworking is also indicated by the large amount of debitage and hammerstones recovered.

What might these lithic artifacts tell us about how the remarkable Toltec site came about, how the people there lived, and why the society eventually declined? Michael Nassaney (1991, 1992, 1994, 1996a, 1996b, 1999), in a series of elegant analyses and papers associated with his work on Plum Bayou Culture, not the least of which is his 1992 doctoral dissertation, has convincingly documented "a clear increase, followed by a decrease, in the proportions of quartz crystal from the Marksville through Mississippian periods" and that "quartz crystal reached the height of its popularity during the Baytown-Coles Creek period" coeval with the Plum Bayou culture (Nassaney 1996:194) in central and eastern Arkansas.

In an analysis of the incidence of intentionally thermally altered and non-thermally altered cherts, Nassaney (1996:213) also documented a pattern like that observed on quartz crystal in the use of intentional thermal alteration, a "clear increase, followed by a decrease, in the ratio of heated:non-heated cherts through time" on both flake and core tools, before and after the time of Plum Bayou culture (see also Nassaney 1992:348).

Nassaney (1996:216) has argued that "the high incidence of heat-treated cherts during the Baytown Coles Creek period suggests that local groups chose to improve the flaking characteristics of lower quality, and perhaps less costly, raw materials." Intentional thermal alteration, in his view, was "an attempt to conserve a resource made relatively scarce by the decline in mobility during this period. Moreover, the high incidence of intentional thermal alteration at Baytown-Coles Creek sites may represent a strategy of resistance whereby local groups could undermine exchange networks and associated costs by transforming the suitability of readily available but marginal raw materials" (Nassaney 1996:217; see also Nassaney 1992:350).

Chert, Nassaney, Rolingson, Hoffman and others have noted, is readily available in gravel deposits across the Arkansas landscape, and does not appear to have been subject to any kind of control as far as access or use was concerned. But thermal alteration of chert, it has been securely demonstrated, displays an unusual incidence at Toltec and on surrounding Plum Bayou phase sites, particularly on arrow points. Novaculite sources had a more limited distribution, and was also a preferred raw material, and also exhibited a high incidence of intentional thermal alteration, particularly on arrow points, which when altered have somewhat glossy, white to slightly pinkish colors.

One has to ask, why was intentional thermal alteration so common during Baytown-Coles Creek times if it served such apparent utilitarian ends? Nassaney (1996:217) suggests alteration technology was not needed in Mississippian times to produce the kinds of expedient flake tools then in use. I suggest that the functional considerations of intentional thermal alteration, while very real, are nonetheless a bit overdrawn in this case. People used local chert gravels since Paleoindian times in central and eastern Arkansas, without the need for extensive or even much reliance on intentional thermal alteration. Chert gravels are still easily found on the landscape to this day, rendering the argument that they were becoming increasingly scarce questionable as well (although modern land clearing and erosion may be partially responsible for the ease with which chert gravels may now be found).[1] Finally, there is not any great difference between the flake tools and arrow points used in the terminal Late Woodland period and those employed in the subsequent Mississippian era; many of the same point forms occur in both times and cultures.

I suggest that color, and specifically bright red, was part of what was selected for by Plum Bayou people thermally altering their chert, rather than the process being solely an attempt to improve the efficiency of stone tool production (contra Anderson 1979; my own ideas on this matter have changed over the past 30 years!). Intentional thermal alteration of chert turns the local tan gravels a bright red, and it is on arrow points, and only arrow points, that a high incidence of intentional thermal alteration, and red color, is observed at Toltec. Most chert tools, in fact, are on unaltered materials, especially those likely used in heavy duty woodworking or scraping tasks. In a related manner, I also suggest that use of crystal and novaculite (the latter frequently thermally altered) in the manufacture of arrow points was related as much to the appearance and colors of these materials (i.e., white, clear) as for manufacturing advantage.

Through work at sites like Shiloh and at Cahokia and elsewhere, we are beginning to realize that Mississippian peoples building mounds sometimes made prominent use of colored soils, particularly reds and sometimes white or gray (Anderson and Cornelison 2001; Pauketat 2007; Pursell 2004; Sherwood 2007; Welch 2006:257-258), so it is not much of a stretch to suggest a deliberate selection was occurring in the manufacture of arrow points at Toltec for these colors, particularly since we know from historic accounts that red and white were highly charged with meaning to many southeastern Indians (Hudson 1976: 126-127, 132). The color red was associated with "conflict, war, fear, disunity, and danger" while white was "the color of that which is old, established, pure, peaceable, holy, united, and so forth" (Hudson 1976: 235). These colors were also associated with kinship groupings such as clans and even whole towns, reflecting social divisions within the societies. What this color symbolism meant at Toltec is unknown, but it is quite clear that use of color, and red and white in particular, played a major role in the production of arrow points at the site. Red was directly associated with the activity these artifacts were doubtless sometimes put to, which was warfare. That the use of clear crystal, and thermally altered white or glossy novaculite was also deliberately selected for in the manufacture of arrow points is also apparent, but whether it was linked with the historic association of this color, with peace, purity, holiness, and so on, is unknown.

But why is intentional thermal alteration greatest only during the Baytown Coles Creek period at Toltec and in the surrounding region? Surely the colors resulting from intentional thermal alteration might have been attractive and symbolically charged to earlier as well as later populations as well? Warfare increases across Eastern North America during the Late Woodland period, in part due to the introduction of the bow and arrow, and so might have been an area of interest and concern to Plum Bayou Culture peoples (Blitz 1988; Milner 1999; Nassaney and Pyle 1999). But warfare continued seemingly unabated in the Mississippian period in Arkansas, while use of thermally altered chert in arrow manufacture becomes much less common. A further examination of quartz manufacture and use in Plum Bayou Culture may suggest an answer to this question.

Michael Nassaney (1992, 1996: Figures 4, 5, 6) has convincingly shown that "there is no relationship… between distance from Toltec and quantity of quartz crystal by count, weight, or mean weight" (Nassaney 1996:201). Likewise, he has observed that "quartz crystal was acquired either directly from its source or through down-the-line reciprocal exchange *in most cases* during the Baytown-Coles Creek period" (Nassaney 1996:198-199; his emphasis). When outliers were eliminated, in fact, a direct relationship between quartz by weight and distance to source was evident (Nassaney 1996: Figure 7). At a few Plum Bayou Culture sites, like Toltec and the Coy Mounds, however, far more quartz was found than expected given this near linear relationship, a pattern that Nassaney (1996:202) argued "underscore[s] the importance of quartz for social reproduction at large multiple mound centers in Plum Bayou culture." He further argued that crystals, given their importance in ethnographic accounts, "would have been ideal commodities for socially ranked individuals to monopolize for status reinforcement" (Nassaney 1996:202).

Nassaney (1996:204) concluded that his analyses showed that "If individual agents were attempting to monopolize access to quartz crystal in central Arkansas, their control was tentative at best." Obviously, the key term here is what is meant by "monopolize." I would suggest that control over a material need not be invariably related to how easily it can be acquired by individuals, but also by the use rights attached to it by powerful or influential members of a society. Quartz (=white?), and bright red thermally altered chert points, while indeed fairly easily obtained or produced, may have been restricted in use to certain individuals or groups, perhaps to warriors, or higher status individuals, or for certain activities, like warfare. The Late Woodland sees the introduction of the bow and arrow, and increased evidence for warfare in many parts of the region, making arrows a likely focus of competitive energy, ritual, and ceremony. They quite literally carried life and death.

From Rolingson's (1982, 1998) work, furthermore, we know that quartz occurrence was restricted to certain areas within the Toltec site, to the eastern half away from the plaza (Nassaney 1996:218); this distribution was inferred to reflect the occurrence of workshop areas. The fact that the material appears to have been restricted in occurrence even at Toltec suggests that only a limited, probably socially restricted or approved segment of society could use crystal quartz, something clearly indicated by the greater occurrence of the material at larger Plum Bayou Culture sites like Coy and Toltec, where presumed social elites may have lived or operated, such as ritual specialists, warriors, or perhaps even hereditary leaders and their kin. The same pattern may ultimately be found to hold true for red chert arrow point use in Plum Bayou Culture, that they saw use by special people or in special activities. Proving this will remain difficult until the occurrence of these materials in houses, burials, and site areas can be examined for evidence about when and how these materials were used.

Again, though, why was there extensive use of quartz and intentional thermal alteration in Plum Bayou Culture, and not before and after? I suggest it was because the symbolism involved in the use of these materials was used to integrate people as well as set some apart from others, but that it worked well only for a time. Chert was readily available and easily heated, while quartz crystal was not that difficult to obtain in the mountains to the west and southwest. As Mississippian cultures arose to the north and east of the Plum Bayou Culture, these artifact categories may no longer have worked as well in the new competitive arena that was emerging, that apparently made use of different ideological and iconographic underpinnings, at least in relation to stone tool manufacture and use. While color symbolism continued to be important, it was manifest in other ways, perhaps in the mounds themselves, and only rarely on the chipped stone tools of these later peoples.

Resistance to elite authority and prerogatives by local populations may have played a role in Toltec's demise, as Nassaney (1996) has argued. An increasing use of intentional thermal alteration and crystal quartz over time was occurring within Plum Bayou Culture, followed by its abandonment in subsequent Mississippian times locally (Nassaney 1996, 1999:473). This may reflect first the adoption and control of these technologies and symbols by a small segment of the population, their progressively wider adoption throughout society, followed ultimately by their abandonment, as what was once sacred and the prerogative of the privileged became commonplace. That is, as use of this symbolism grew more widespread, it may have contributed to, and been symptomatic of, a breakdown in the status marking and exchange system in Plum Bayou Culture (see particularly Nassaney 1992:361-366). By choosing symbols that were too easily acquired and produced, Plum Bayou Culture may have been sowing the seeds of both its initial success and its subsequent decline. Toltec's impressive society quite literally 'crystallized' and shown brightly on the southern landscape, red and white in color, and perhaps in power and religious symbolism. The system worked well for a century or two, long enough for one of Eastern North America's most remarkable Late Woodland architectural complexes to be built, but then something happened, and the mound complex, and the society that erected it, disappeared forever about AD 1050-1100.

Note

1. Nassaney (personal communication 2007) has suggested that novaculite use was more prevalent in Archaic times in central Arkansas, and that as mobility decreased, chert use increased through the Woodland/Mississippian sequence. Thus, it was novaculite and not the chert that was becoming increasingly scarce. Since novaculite was a preferred material, use of intentional thermal alteration in later times would increase the efficiency with which available supplies and sources could be used.

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