2012

Microartifacts Assist in Interpreting Human Activity at the Reller Prairie Site

Linda Dammann
University of Nebraska-Lincoln

From: Nebraska Anthropologist, Volume 27: 2012

Microartifacts Assist in Interpreting Human Activity at the Reller Prairie Site

Linda Dammann

Abstract: *Scholars have begun to question whether microartifacts can tell archaeologists anything about what was occurring at a particular activity area. The University of Nebraska – Lincoln, Department of Anthropology, 2010 Archaeology Field School obtained soil core samples at the Reller Prairie #14 site in southeastern Nebraska with the objective to utilize microartifact analysis in determining human activity at this site. Processes used in the analysis and identification of microartifacts in these core samples are reviewed, and the subsequent results and recommendations are briefly discussed. It was concluded from the analysis of the soil samples that microartifacts at this site allude to human activity, but were indeterminate as to the use of the site, and will serve as a baseline for future investigations at the Reller Prairie.*

Introduction

Scholars have begun to question whether microartifacts can tell the archaeologist anything about human behavior at a particular activity area. The University of Nebraska – Lincoln (UNL), Department of Anthropology, 2010 archaeology field school (Field School) obtained soil core samples at the Reller Prairie #14 site in southeastern Nebraska. One of the questions from the field school was whether using microartifact analysis could assist in determining human activity that may have occurred during the archaic period at the Reller Prairie site. Processes used in the analysis of the core samples obtained by the field school are reviewed. Subsequent findings, recommendations and conclusions are discussed.

Site Location

Reller Prairie is located in the Salt Creek Basin of Lancaster County, Nebraska (Figure 1). Salt Creek is a tributary of the Platte River and also the part of the Salt Creek-Big Nemaha River drainage basin to the Missouri River (Clausen 2011). Reller Prairie is part of the central Great Plains and in the Fenneman's Glaciated Central Lowlands region (Baker et al.2000). Modern vegetation of southeastern Nebraska is associated with tall-grass prairies on the uplands, floodplains, and eastern deciduous forest (Baker et al. 2000). The area surrounding Reller Prairie is used for agricultural production. Collection site of the soil cores is located at Reller Prairie #14 along the Olive Branch of the Salt Creek. Core samples were obtained on June 14-15, 2010 by field school students.

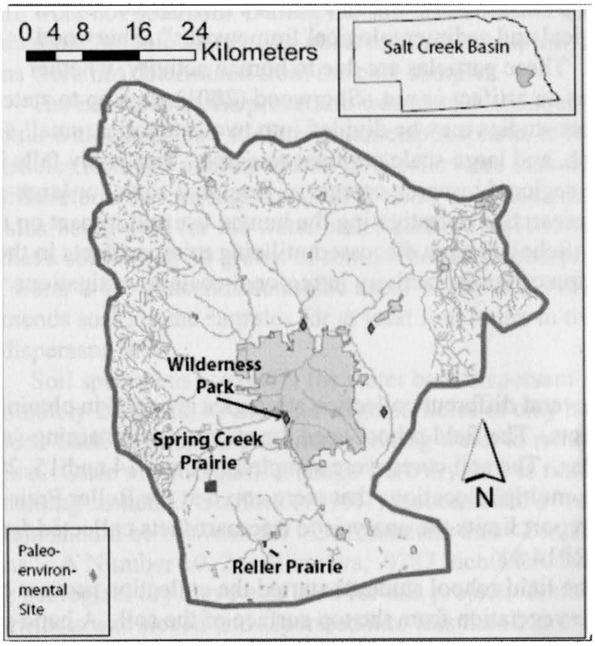

Figure 1. Map of Reller Prairie Location

Definition of Microartifacts

Microartifacts are small artifacts that generally require magnification for identification. Microartifacts are defined as artifacts less than 2.0 millimeters in size (Sherwood 2001). Sherwood (2001:328) referenced the studies of Hassan, Fladmark, and Rosen stating microartifacts are a valuable tool, "in helping archaeologists identify and interpret activity areas, sort out site formation processes, and examine reduction stages in stone tool technology". Microartifacts can provide additional information of a site to what has been obtained from macro or larger artifacts.

Theoretical Frameworks

Microartifacts are placed into two theoretical frameworks by Sherwood (2001): natural processes and cultural processes. Particles, artifacts and nonartifacts, are deposited by these two processes. "Natural particles," according to Sherwood (2001:329), "constitute anything in the deposit that is not an artifact". These are particles from a sedimentary process. She defines cultural particles as "anything in the deposit from cultural processes and are interpreted both in archaeological and sedimentological frameworks" (Sherwood 2001:329). These particles are due to human activity, whether identified as an artifact or not. Sherwood (2001) goes on to state that microartifact studies may be divided into two categories: small-scale site research, and large-scale regional research. This study falls into the large-scale regional research category. Regional-scale (or large-scale regional) research is investigating the human use and impact on the landscape. Scholars have discussed utilizing microartifacts in the determination of human activity in regional-scale investigations.

Methods

Several different collection strategies are used in obtaining microartifacts. The field school used the strategy of obtaining vertical core samples. The soil cores were sampled on June 14 and 15, 2010. There were multiple locations that were cored at the Reller Prairie #14 site. This report limits the analysis to microartifacts collected from auger #1 (RP14 #1).

The field school students started the collection process by first clearing the vegetation from the top surface of the soil. A hand auger was then employed to obtain samples at increments of ten centimeters. The top 50 centimeters were discarded because they were considered to be of modern soils in a plow zone. Cores were obtained from 50 to 210 centimeters and 215 to 295 centimeters. The core samples were sealed in plastic bags.

Laboratory Process

Microartifact identification begins with isolating and recovering the microartifacts. This involves separating the soil particles from the microartifact particles. The procedure used to separate the prairie soils and microartifact particles was developed by

Stafford (1995).

Core soil samples were weighed within their collection bags. Core samples ranged from 1,127 grams to 1,435 grams in weight. Soil color and type were also obtained through observation and the use of a Munsell color system for soils. Color ranged from Munsell 10YR 4/1 to 10YR 5/8. Soil type ranged from silty clay to clayey silt to silty clay again. Moisture of the soils collected were observed and also varied from dry to moist to very moist. Soils that were very moist held a shape when compacted. Soils that were dry were either very fine grained and stayed separated or were in dry clods. Percentages of soil moisture were not obtained. During the soil classification and color determination, organic matter was observed in the samples. Soil horizons were not determined from the core samples.

The next step in the procedure was to soak the specimens in a water bath with dispersant, sodium hexametaphosphate, to remove the clay particles from the microartifacts. The soils were then transferred to .2 millimeter nylon mesh paint strainer mesh bags and suspended over a sink being used for the water bath. Stafford's (1995) procedure states that a solution of 50 grams of sodium hexametaphosphate per liter of water is the concentration to be used. Stafford (1995) recommends soaking the samples for at least four hours in the water/dispersant bath.

Soil specimens soaked in the water bath/dispersant approximately 20 hours, by then the large particles of clay had dispersed. Each bag was rinsed under running water to remove the fine sediments. Once the microartifact bags were dry, it was time to sieve the remaining contents. Stafford (1995:1) recommends a "minimum separation should be between the >2 millimeters and <2 millimeters fractions". A Number 10, 2 millimeters, .0787 inch USA Standard Testing geological dry sieve was used for this project. Each bag of microartifacts was sieved and separated into less than 2 millimeters and greater than 2 millimeters particles.

After the microartifacts had been screened the next step in the procedure was to determine the debris type. Type of microartifacts include debitage, sherds, wood charcoal, nutshell, bone, fire cracked rock, etc. Possible contamination was observed within some of the specimens. Categories of debris types were discussed with lead archaeologist, LuAnn Wandsnider (personal communication 2011), and initial categories were determined to be botanicals, insects, calcium carbonate castes, sand, and possible artifacts. The United States Geological Survey (2004:1) defines sand as "loose particles of rock or mineral (sediment) that range in size from 0.0625 - 2 millimeters in diameter". Botanicals included roots, root hairs and leaves.

Results

The majority of the specimens comprised of root hairs, microscopic roots, sand, soil root castes and old horizon soils (see Table 1). Geologist, Allen Dammann (personal communication 2011), was consulted regarding soils that did not disperse with the sodium hexametaphosphate. The soils were round and fairly uniform in shape. Dammann classified the soils as old horizon soils most likely from alluvial deposits.

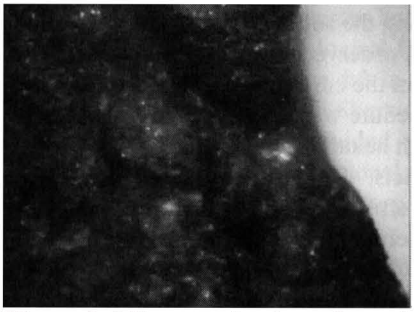

Figure 2. Microscopic view of wood charcoal.

One microartifact from the 160 to 170 centimeter level contained what was identified by Dammann as possibly being hornblende, which would have been deposited as glacial outwash. In the 180 to 190 centimeter level a possible lithic flake was found, along with Sioux quartzite, sandstone, wood charcoal (Figure 2), weathered limestone (chalk), mica, a possible snail shell (Figure 3), old horizon soils, and carbonized chenopod seeds (United States Department of Agriculture Natural Resources Conservation 2011). The next level of 190 to 200 centimeters also contained carbonized chenopod seeds (Figure 4), sandstone, quartzite sand, Sioux quartzite, weathered limestone (chalk), a possible snail shell, and old horizon soils. Shell fragments were also found in the 60 to 70 centimeter level.

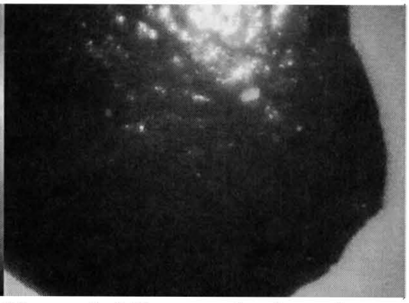

Figure 3. Microscopic view of a shell fragment.

Figure 4: Microscopic view of a carbonized (chenopod) seed pod.

Wood charcoal was found starting at a depth of 130 centimeters to a depth of 200 centimeters. The charcoal particles ranged from pinhead (less than .1 millimeter) size to .2 millimeters in size. Sand particles were also found in every specimen. Sand ranged from clear quartzite to possible agate particles. Some sand particles were rounded and had frosted surface as if they had been transported or tumbled by water extensively. Other quartzite sand particles had glassy surfaces with sharp fracture angles with the possibility of being microdebitage (Sherwood 2001).

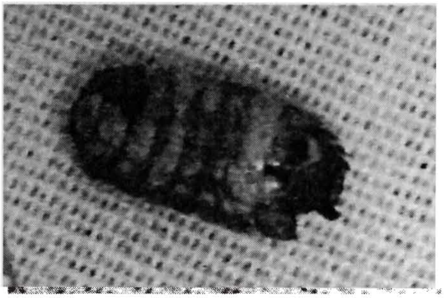

Figure 5. *Armadilidum vulgare.*

Botanicals and insects were also found amongst the specimens. Root and root hairs were found in every specimen. Microscopic chenopod seeds looked carbonized, and were found in every sample from 130 centimeters to 200 centimeters. What looked to be a small Quercus velutina Lam. seed (black oak acorn) was found at the 160 to 170 centimeter level. An Armadillidum vulgare (University of Georgia 2010) (Figure 5) was found at 225 to 235 centimeter level. It was speculated that a pill bug contaminated the specimen due to the fact that a green leaf was still attached to its shell. Possible hymenoptera, ants, parts (Figure 6) were found in deeper levels starting at 190 centimeters to 235 centimeters. Contamination of green leaf particles and possible insect body parts were found throughout the specimens, specifically at 170 through 235 centimeters.

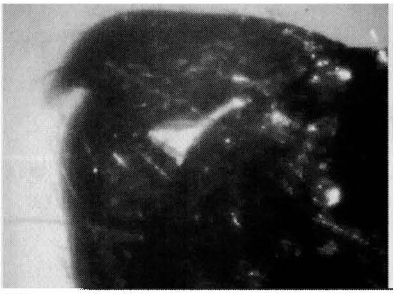

Figure 6. Microscopic view of possible hymenoptera, ant, mandible.

Recommendations

Sherwood (2001) recommends a comparative collection be used for microartifacts identification in order to reduce observer error. "A comparative collection is one that consists of macroartifacts that are reduced in size to match the microsize distributions to be analyzed" (Sherwood 2001:331). Using a comparative collection of microartifacts in this study would have aided in determining the significance of whether the charcoal and carbonized chenopods were from prairie fires or from human made campfires, also whether the sand particles were weathered stone from the nearby creek channel or if they were microdebitage created by human activity.

Dammann recommends the following procedure to decrease contamination in auger core samples. At the chosen site, clear off the vegetation and contaminants at least one foot surrounding the proposed auger hole. On top of this cleared space place a five to ten mil plastic sheet large enough to cover the cleared space plus a foot that will extend into and cover the vegetation. At the point where the auger hole is to be placed, slice an "X" into the plastic large enough for the auger to fit easily through. Commence coring at this point. When the core sample is removed from the auger hole, discard ten centimeters at the top and bottom of the cored sample to help eliminate the contamination from soils pushed into and scraped out of the hole by the auger.

Conclusions

Scholars debate, archaeologists wonder... can microartifacts expand the archaeological record in relation to human behavior? The University of Nebraska – Lincoln, Department of Anthropology, 2010 Field School participants wondered such concepts. Field school participants obtained core samples for future analysis at Reller Prairie in Lancaster County, Nebraska to determine if human activity occurred during the archaic period. Multiple core samples were obtained during the field school, but microartifact analysis in 2011 was limited to the core sample designated as RP14 #1.

There is a factor of observer error and specimen contamination in this report that must be considered when coming to conclusions. Given more time for analysis a distinct pattern of human activity might be found through quantifying the microartifacts. A comparative collection of like microartifacts would have assisted in determining if what was identified was of natural causes or from human activity. Analysis and microartifacts from RP14 #1 will serve as a good comparative collection if or when the other core samples are analyzed.

Soil horizons were not determined for these samples, which would have helped in identifying a timeline of soil deposition. Salt Creek had also changed its channel over the years and the identification of soil horizons would have helped in determining if the sand particles were from natural processes of a change in the channel and site formation or microdebitage from stone tool technology or from both.

Limiting contamination of the soil samples would have assisted in determining if the insects and botanicals were from the time period when the soil was deposited. If the insect parts and oak acorn were part of the deposited soil layer, a series of conjectures could be made such as insect behavior or plant growth within the site.

Considering the qualifiers above, it may be concluded that there is the possibility human activity took place during the time that levels from 130 to 200 centimeters were the soil surface. In these levels microartifacts of wood charcoal and quartzite particles, possible microdebitage, are found along with carbonized chenopod seeds suggesting human activity. What type of activity occurred, whether it was sedentary or not, cannot be determined from this small sampling of the site. More analysis and investigation of the site and its history would be required and it is worth further investigation. But to answer the question, can microartifacts expand the archaeological record in relation to human behavior, yes they can.

References Cited

Baker, Richard G., Glen G. Fredlund, Rolfe D. Mandel, and E. A. Bettis, III

2000 Holocene environments of the central Great Plains: multi-proxy evidence from alluvial sequences, southeastern Nebraska. *Quaternary International.* 67:75-88.

Clausen, Eric

2011 Little Nemaha River-Big Nemaha River drainage divide landform origins in southeastern Nebraska, USA: A geomorphic history based on topographic map evidence. *Research Institute, Regional Geomorphology.* Version 61. Knol. Electronic document, http://knol.google.com/k/eric-clausen/little-nemaha-river-big-nemaha-river/24pd5mzz859tp/215, accessed May 15, 2011.

Sherwood, Sarah C.

2001 Microartifacts. *Earth Sciences and Archaeology.* Edited by Paul Goldberg, Vance T. Holliday, and C. Reid Ferring, pp. 327-351. Kluwer Academic/Plenum Publishers, New York.

Stafford, C. Russell

1995 ISU Anthropology Laboratory bulk sediment sample processing procedure. *Iowa State University, Department of Anthropology.*

United States Department of Agriculture Natural Resources Conservation Services

2011 Electronic document, http://plants.usda.gov/java/profile?symbol=QUVE, accessed May 15, 2011.

United States Geological Survey

2004 Definition of sand. Electronic document, http://geomaps.wr.usgs.gov/parks/misc/glossarys.html, accessed May 15, 2011.

University of Georgia

2010 Insect Images. Pill bug. Electronic document, http://www.insectimages.org/browse/detail.cfm?imgnum=1252081, accessed May 15, 2011.

Table 1. Reller Prairie 14, Auger #1.

Auger #	Depth	FS	Weight (g)	Bag Wt (g)	Revised Wt (g)	Color	Soil Type	Debris Types	Notes
RP14 #1	50 - 60 cm	24	1221	32	1189	10YR 4/1	silty clay	roots and root hairs, seed pods, old horizon soils, quartzite particles, sand, root clastes	6-14-10: MGM, micro; dry
RP14 #1	60 - 70 cm	26	1225	32	1193	10YR 4/2	silty clay	roots and root hairs, old horizon soils, quartzite particles, sand	6-14-10; JSW: micro; ~1% moisture
RP14 #1	70 - 80 cm	28	1431	32	1399	10YR 3/3	silty clay	roots and root hairs, old horizon soils, quartzite particles, sand, shell fragments	6-14-10; JSW: micro; moist
RP14 #1	80 - 90 cm	30	1374	32	1342	10YR 3/4	silty clay	roots and root hairs, old horizon soils, quartzite particles, sand, weathered limestone - chalk	6-14-10; JSW; micro; moist
RP14 #1	90 - 100 cm	32	1445	32	1413	10YR 3/3	silty clay	roots and root hairs, old horizon soils, quartzite particles, sand	6-14-10; JSW: micro; moist
RP14 #1	100 - 110 cm	34	1320	24	1296	10YR 3/2	clayey silt	roots and root hairs, old horizon soils, quartzite particles, sand	6-14-10: KSE; micro; dry
RP14 #1	110 - 120 cm	36	1320	24	1296	10YR 3/4	clayey silt	roots and root hairs, seed pods, old horizon soils, quartzite particles, sand, possible shell fragment, weathered limestone - chalk	6-14-10; KSE; micro; very moist
RP14 #1	120 - 130 cm	38	1385	24	1361	10YR 3/4	clayey silt	roots and root hairs, seed pods, old horizon soils, quartzite particles, sand, weathered limestone - chalk	6-14-10; KSE; micro; very moist
RP14 #1	130 - 140 cm	40	1360	24	1336	10YR 4/6	silty clay	roots and root hairs, charred seed pods, old horizon soils, quartzite particles, sand, weathered limestone-chalk, wood charcoal	6-14-10, KSE; micro, slightly moist
RP14 #1	140 - 150 cm	42	1342	24	1318	10YR 4/6	silty clay	roots and root hairs, old horizon soils, quartzite particles, sand, wood charcoal	6-14-10; KSE; micro; dry
RP14 #1	150 - 160 cm	44	1326	24	1302	10YR 4/6	silty clay	roots and root hairs, seed pods, old horizon soils, quartzite particles, sand, wood charcoal, contamination	6-14-10; KSE; micro; dry
RP14 #1	160 - 170 cm	46	1347	24	1323	10YR 4/6	silty clay	roots and root hairs, seed pods, old horizon soils, hornblende, quartzite particles, sand, weathered limestone-chalk, seed cap-acorn	6-14-10; KSE; micro; dry
RP14 #1	170 - 180 cm	48	1267	24	1243	10YR 4/6	silty clay	roots and root hairs, carbonized seed pods, old horizon soils, quartzite particles, sand, wood charcoal, sandstone	6-14-10; KSE; micro; dry
RP14 #1	180 - 190 cm	50	1286	24	1262	10YR 4/6	silty clay	roots and root hairs, carbonized seed pods, old horizon soils, quartzite particles, sand, sandstone, wood charcoal, Sioux quartzite, possible shell fragment, mica, contamination - grass/leaf, possible lithic flake	6-14-10; KSE; micro; dry
RP14 #1	190 - 200 cm	52	1402	24	1378	10YR 5/6	silty clay	roots and root hairs, carbonized seed pods, old horizon soils, quartzite particles, sand, possible snail shell, Sioux quartzite, weathered limestone - chalk, contamination	6-14-10; KSE; micro; dry, large clods
RP14 #1	200 - 210 cm	54	1459	24	1435	10YR 5/6	silty clay	roots and root hairs, seed pods, old horizon soils, quartzite particles, sand, wood charcoal, contamination, possible lithic flakes	6-14-10, KSE; micro; dry
RP14 #1	215 - 225 cm	60	1151	24	1127	10YR 5/6	silty clay	roots, root hairs and bark, carbonized and brown seed pods, quartzite particles, sand, bugs,	6-14-10; KSE; micro; dry
RP14 #1	225 - 235 cm	62	1222	24	1198	10YR 5/6	silty clay	roots and root hairs, quartzite particles, sand, mica, weathered limestone, pill bug, bugs - ants	6-15-10; LSA; micro; dry
RP14 #1	235 - 245 cm	64	1179	24	1155	10YR 5/8	silty clay	roots and root hairs, old horizon soils, quartzite particles, sand, weathered limestone - chalk	6-15-10; LSA; micro, dry
RP14 #1	245 - 255 cm	66	1223	24	1199	10YR 5/8	silty clay	roots and root hairs, old horizon soils, quartzite particles, sand	6-15-10; LSA; micro; dry
RP14 #1	255 - 265 cm	68	1327	24	1303	10YR 5/8	silty clay	roots and root hairs, root clastes, weathered limestone - chalk, old horizon soils	6-15-10; LSA; micro; dry
RP14 #1	265 - 275 cm	70	1449	24	1425	10YR 5/8	silty clay	roots and root hairs, root clastes	6-15-10; LSA; micro; dry
RP14 #1	275 - 285 cm	72	1399	24	1375	10YR 5/8	silty clay	roots and root hairs, root clastes	6-15-10; LSA; micro; dry
RP14 #1	275 - 285 cm	74	2	-	2	-	-	not analyzed	6-15-10; LSA; macro; dry
RP14 #1	285 - 295 cm	76	1313	24	1289	10YR 5/8	silty clay	roots and root hairs, root clastes	6-15-10; LSA; micro; dry
RP14 #1	285 - 295 cm	78	9	-	9	-	-	not analyzed	6-15-10; LSA; macro; dry