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INTRODUCTION

Nine lots of botanical samples collected during 1988 and 1992 excavations at the Shelby Mound site (41CP71) were submitted for identification prior to their eventual curation at Stephen F. Austin State University. Some botanical samples from these excavations have been previously reported (Perttula and Nelson 2004). Excavations at Shelby Mound were conducted in a 10 x 10 ft. unit divided into four 5 x 5 ft. squares. Botanical samples were recovered using 1/4-inch screen. Shelby Mound, also known as the Tracy site and the Greasy Creek site, is a large Late Caddo village, community cemetery, and mound center. Most of the community cemetery at the site was destroyed by looters more than 30 years ago.

ECOLOGICAL SETTING

The Shelby Mound site is situated in southern Camp County, Texas. Mean annual precipitation in Camp County during the period 1951-1980 was 43.3 inches (1100 mm). Precipitation is distributed fairly evenly over the year, with a slight peak in the late spring. The frost-free season in Camp County today averages 238 days and runs from March 21 through November 14 (NFIC 1987:85-86).

Shelby Mound is located on the floodplain above Greasy Creek, which drains east into Big Cypress Creek, which in turn reaches the Red River via Caddo Lake. The site area lies at the northwestern edge of the Pineywoods ecological region, where the Pineywoods begins to grade into the Post Oak Savannah.

Upland forests at the northwestern edge of the Texas Pineywoods in pre-settlement times typically would have been shortleaf pine communities, where shortleaf pine (*Pinus echinata*) shared dominance with oaks (*Quercus* spp., both red and white groups) and hickories (several species, but frequently *Carya texana*) (Diggs et al. 2006:88-89). Coves and small streams supported mixed hardwood-loblolly pine communities. The lowlands associated with Big Cypress Creek would have supported flood-tolerant hardwoods such as sweetgum *(Liquidambar styraciflua)*, beech *(Fagus grandifolia)*, holly *(Ilex spp.)*, maple *(Acer spp.)*, and American hornbeam (*Carpinus caroliniana)* (Diggs et al. 2006:89-90, 100-101).

VEGETATION RECONSTRUCTIONS

Commercial harvesting has resulted in significant changes in Pineywoods vegetation since the mid-19th century, with plantations of loblolly pine replacing shortleaf and longleaf stands. Nonetheless, modern equivalents exist for most prehistoric plant communities in East Texas (Diggs et al. 2006:87). Pollen studies indicate that use of the modern vegetation zones is appropriate for understanding the plants and attendant animal resources available to people during the first and second millennia. Weakly Bog, situated in the Post Oak Savannah vegetation region southwest of Camp County, provides some of the best data for vegetation reconstruction in the eastern half of Texas during the last 3,000 years (Bousman 1998). Pollen profiles from this bog indicate oak and later oak-hickory woodlands, suggesting that modern plant communities generally provide good analogs for Texas plant communities during the last 3,000 years. A recent study by Albert

(2007) in southwest Upshur County provides supporting data. Some fluctuations in rainfall and temperature have taken place, however (Bousman 1998:204). Spikes in grass pollen at approximately 500 B.P. and 1500 B.P. suggest drier conditions during those times (Bousman 1998). Most notably, such changes would have altered the location of the Pineywoods-Post Oak Savannah edge (Bousman 1998:204).

METHODS

Materials from Shelby Mound arrived in the Macrobotanical Analysis laboratory in plastic bags and film containers, with no organic packing or labeling material such as cotton balls or paper. In the laboratory, all samples were subject to full radiocarbon protocols to retain suitability for radiocarbon dating. Samples were sorted on freshly cleaned glassware and handled only with latex gloves and metal forceps. The three samples that included small particles were placed on a No. 10 (2 mm) mesh to separate charcoal of identifiable size from sediment and charcoal flecks. Uncarbonized roots that did not fall through the mesh were removed, weighed, bagged, and labeled as "contamination." Residue that fell through the mesh was examined under a stereoscopic light microscope to ensure that it contained only wood charcoal consistent with that in the larger size fraction. Screens, sorting dishes, and scale pans were cleaned between samples. Contact with paper and other plant products was avoided. Only one sample was open at a time in the laboratory. Writing instruments used for data recording of samples were plastic mechanical pencils.

For each sample, 20 wood charcoal fragments were selected for identification at random from those larger than 2 mm. When fewer than 20 fragments were present in a sample, identification was attempted for all. Fragments were snapped to reveal a clean transverse section and examined under a stereoscopic light microscope at 28-180 X magnification. When necessary, tangential or radial sections were examined for ray seriation, presence of spiral thickenings, types and sizes of inter-vessel pitting, and other minute characteristics that can only be seen at the higher magnifications of this range.

Botanical materials were identified to the lowest possible taxonomic level by comparison to materials in the Macrobotanical Analysis comparative collection and through the use of standard reference works (Core et al. 1979; Davis 1993; Hoadley 1990; InsideWood 2004; Martin and Barkley 2000; Musil 1963; Panshin and de Zeeuw 1980; Wheeler 2011). Due to the current (October 2013) federal government shut-down, botanical nomenclature follows that of the Native Plants Information Network (NPIN 2013) instead of the PLANTS Database (USDA, NRCS 2013).

RESULTS

Tables 1 and 2 show material from Shelby Mound carbon samples by count and weight, respectively. A small amount of non-plant material is included in these two tables. It should be noted that "daub" glosses any burned clay, with or without inclusions, from clay soil to house floors to construction material. Measurements of the 52 measurable corn cupules are given in Table 3.

DISCUSSION

Archaeological versus modern plants

Some uncarbonized plant parts were included in lots from Square D. The material consists of bark, pecan shell *(Carya illinoinensis)*, and a grape seed fragment (*Vitis* spp.). Despite the relatively young age of the site (15th to 17th century A.D.), this material most likely did not survive from Late Caddo times in the humid climate of East Texas. In all except the driest areas of North America, uncarbonized plant material on open-air sites can be assumed to be of modern origin unless compelling evidence suggests otherwise

Table 1. Botanical samples from Shelby Mound (41CP71): counts.

Square	A	A	A	B	D	D	D	D	D
Unit	N 200 W 190	N 200 W 190	N 200 W 190		N 200 W 190	N 200 W 190	N 200 W 190	N 200 W 190	N 200 W 190
Portion	Segment A	Segment B	Segment C	Level 9/10	Level 9	Level 10	Level 11		Level 11
Depth (ft.)	98.24-97.94	98.29-97.75	97.50-97.25	98.04-97.75	98.37-98.00	98.00-97.50	97.50-97.00		98.15-96.40
Feature								Post mold, west wall	Pit, west wall
Carbonized plants									
Corn *(Zea mays)*									
Cupules/glumes		9	13	42		39			
Kernels/germs				1		1			1
Persimmon seed *(Diospyros virginiana)*				3					
Cane stem *(Arundinaria gigantea)*					2				1
Nutshell									
Hickory *(Carya* sp.)	56	22	6		40	92	29		13
Hickory/walnut family (Juglandaceae)	3		1			6			
Acorn nutmeat *(Quercus* sp.)									2
Wood									
Eastern redcedar *(Juniperus virginiana)*						3	9		9
Red group oak *(Quercus* subg. *Lobatae)*		3	1		3	2	4	7	1
White group oak *(Quercus* subg. *Quercus)*		11			6	3			
Oak, unspecifiable (Quercus sp.)	2					3		8	6
Pine *(Pinus* sp.)		2	2		2	4	1		4
Hickory *(Carya* sp.)		2			6	1	1		
Maple *(Acer* sp.)						1	1	5	
Chinkapin *(Castanea pumila)*		1				1	1		
Sweetgum *(Liquidambar styraciflua)*		1					2		
Plum/Cherry *(Prunus* sp.)					2	1			
American hornbeam *(Carpinus caroliniana)*			2						
Indeterminable hardwood		1	1						
Hophornbeam *(Ostrya virginiana)*						2			

Table 1. Botanical samples from Shelby Mound (41CP71): counts, cont.

Square	A	A	A	B	D	D	D	D	D
Unit	N 200 W 190	N 200 W 190	N 200 W 190		N 200 W 190	N 200 W 190	N 200 W 190	N 200 W 190	N 200 W 190
Portion	Segment A	Segment B	Segment C	Level 9/10	Level 9	Level 10	Level 11		Level 11
Depth (ft.)	98.24-97.94	98.29-97.75	97.50-97.25	98.04-97.75	98.37-98.00	98.00-97.50	97.50-97.00		98.15-96.40
Feature								Post mold, west wall	Pit, west wall
Holly/Yaupon *(Ilex* sp.)								1	
American elm *(Ulmus americana)*						1			
Not examined for species			7			76	164	47	63
Bark						5	6	2	
Root								1	
Indeterminable			1						
Uncarbonized plants									
Bark						2		4	
Pecan nutshell *(Carya illinoinensis)*						1	4		
Grape seed *(Vitis* sp.)									
Non-botanical material									
Daub (burned clay, with or without tempe	6		1	1		3	9	3	1
Bone (animal)						2	3		
Tooth (fish)									
Indeterminable	2								
Rocks, concretions									

Table 2. Botanical samples from Shelby Mound (41CP71): weight in grams.

Square	A	A	A	B	D	D	D	D	D
Unit	N 200 W 190	N 200 W 190	N 200 W 190		N 200 W 190	N 200 W 190	N 200 W 190	N 200 W 190	N 200 W 190
Portion	Segment A	Segment B	Segment C	Level 9/10	Level 9	Level 10	Level 11		Level 11
Depth (ft.)	98.24-97.94	98.29-97.75	97.50-97.25	98.04-97.75	98.37-98.00	98.00-97.50	97.50-97.00		98.15-96.40
Feature								Post mold, west wall	Pit, west wall
Carbonized plants									
Corn (Zea mays)									
Cupules/glumes		0.07	0.21	0.41		0.31			
Kernels/germs				0.05		0.04			0.02
Persimmon seed *(Diospyros virginiana)*				0.15					
Cane stem *(Arundinaria gigantea)*					0.07				0.02
Nutshell									
Hickory *(Carya* sp.)	4.6	1.98	0.79		3.22	6.88	2.43		0.8
Hickory/walnut family (Juglandaceae)	0.05		0.07			0.04			
Acorn nutmeat *(Quercus* sp.)									0.06
Wood									
Eastern redcedar *(Juniperus virginiana)*						0.14	0.37		0.36
Red group oak *(Quercus* subg. *Lobatae)*		0.16	2.23		0.3	0.19	0.59	0.25	0.04
White group oak *(Quercus* subg. *Quercus)*		0.68			1.15	0.31			
Oak, unspecifiable (Quercus sp.)	0.15					0.29		0.24	0.59
Pine *(Pinus* sp.)		0.03	0.81		0.1	0.17	0.02		0.21
Hickory *(Carya* sp.)		0.22			0.41	0.03	0.08		
Maple *(Acer* sp.)						0.06	0.11	0.07	
Chinkapin *(Castanea pumila)*		0.02				0.04	0.15		
Sweetgum *(Liquidambar styraciflua)*		0.06					0.08		
Plum/Cherry *(Prunus* sp.)					0.3	0.06			
American hornbeam *(Carpinus caroliniana)*			0.29						
Indeterminable hardwood		0.05	0.05						
Hophornbeam *(Ostrya virginiana)*						0.08			

Table 2. Botanical samples from Shelby Mound (41CP71): weight in grams, cont.

Square	A	A	A	B	D	D	D	D	D
Unit	N 200 W 190	N 200 W 190	N 200 W 190		N 200 W 190	N 200 W 190	N 200 W 190	N 200 W 190	N 200 W 190
Portion	Segment A	Segment B	Segment C	Level 9/10	Level 9	Level 10	Level 11		Level 11
Depth (ft.)	98.24-97.94	98.29-97.75	97.50-97.25	98.04-97.75	98.37-98.00	98.00-97.50	97.50-97.00		98.15-96.40
Feature								Post mold, west wall	Pit, west wall
Possumhaw/Yaupon *(Ilex* sp.)							0.08		
American elm *(Ulmus americana)*					0.15				
Not examined for species		0.83			6.52	8.64	3.62	2.24	1.04
Bark					0.52	0.39	0.11		
Root							0.92		
Indeterminable		0.06							0.02
Contamination > 2mm						0.26		7.64	
Residue < 2mm				0.07		0.29		5.09	
Uncarbonized plants									
Bark					0.13		0.11		
Pecan nutshell (Carya illinoinensis)					0.23	0.6			
Grape seed (Vitis sp.)									0.01
Non-botanical material									
Daub (burned clay, with or without tempe	1.38	0.17	0.37		0.81	1.41	0.8	2.42	
Bone (animal)					0.37	0.47			
Tooth (Fish)									0.03
Indeterminable	0.44								
Rocks, concretions									0.49

Table 3. Dimensions (in mm) of measurable corn cupules (*Zea mays*) from Shelby Mound (41CP71).

Square	Context	Width	Mean height (aka thickness)
A	Segment B	6.0	3.8
		5.4	3.8
A	Segment C	7.2	3.3
		6.6	4.8
		7.9	3.6
		6.8	2.3
		7.3	3.2
B	Level 9/10	5.2	2.6
		5.1	2.6
		4.8	2.7
		4.9	2.7
		4.7	2.7
		4.5	2.9
		4.7	2.9
		4.8	2.9
		5.2	3.4
		5.3	3.4
		4.4	3.4
		4.8	2.1
		5.0	2.1
		5.2	2.3
		5.0	2.3
		5.7	2.6
		5.2	2.6
		4.8	2.5
		5.2	2.5
		5.7	2.0
		4.2	2.1
		5.2	2.7
		4.7	2.4
		4.5	2.5
		5.1	2.3
		4.8	2.7
		5.0	1.8
D	Level 10	4.8	3.3
		5.1	3.3
		4.9	3.3
		5.1	2.9
		5.1	2.9
		1.3	2.9
		4.8	3.2
		5.0	3.2
		4.7	3.2
		4.9	2.8
		4.5	2.8
		4.4	2.8

Table 3. Dimensions (in mm) of measurable corn cupules (*Zea mays*) from Shelby Mound (41CP71), cont.

Square	Context	Width	Mean height (aka thickness)
		3.5	2.6
		3.7	2.6
		4.0	2.9
		4.0	2.9
		3.8	2.9
Mean		**5.0**	**2.8**

☐ indicates cupules conjoined into a single rank (height column) or conjoined ranks of cupules (width colum).

(Lopinot and Brussell 1982; Miksicek 1987:231). The lack of carbonized pecan shell and grape pits support the inference that uncarbonized plants have different origins than the carbonized plants.

Corn (*Zea mays*)

Three nearly-whole corn kernels were recovered from Squares B and D. All three squares yielded corn cupules. Many cupules were conjoined in single-rowed ranks, and two ranks from Square D were joined into a short double row. The angle between the conjoined cupules is approximately 80 degrees, suggesting an eight or 10-rowed ear. Many cupules had glumes attached, usually the lower but sometimes the upper. Fifty-two cupules were complete enough for measurement of width and height (Table 3). When cupules were conjoined into ranks, height measurements were taken on the entire rank and divided by the number of cupules in the rank for better accuracy. As indicated in Table 4, the cupule measurements from Shelby Mound are consistent with those from other Caddo sites.

Wild plants

Three fragments of persimmon seeds *(Diospyros virginiana)* were recovered from Square B. Fragments of river cane *(Arundinaria gigantea)* were found in Level 9, Square D. Nutshell was found in all but two of the samples. Most of it was clearly thick-shelled hickory (*Carya* spp.; n=258), but 10 specimens could be identified only as hickory/walnut family (Juglandaceae).

Wood charcoal

A total of 508 fragments of wood charcoal weighing 34.66 g were recovered in the samples. One hundred and thirty fragments were examined for species identification, of which 128 could be identified to the genus or species. Forty-six percent of the wood charcoal was oak (*Quercus* spp.; n=60), with white group and red group oaks represented equally. After oak, eastern red cedar (*Juniperus virginiana*, also called juniper) was the next most common wood. It was present in three samples from Square D. Red cedar is present but not terribly common in East Texas. Ritual or symbolic structures made from red cedar wood are known from the American Bottom area (Simon 2002), and Bobby Gonzalez describes uses of cedar in contemporary Caddo mortuary traditions (Gonzalez 2005:57-59). At Shelby Mound, two red cedar poles were preserved with one of the (looted) burials (Perttula 2009). The red cedar fragments in these Shelby Mound samples likely also reflects use in ceremonial contexts.

Table 4. Mean corn cupule (*Zea mays*) measurements (in mm) from selected Caddo sites (measurements in mm).

Site	Cupule width	Cupule thickness (height)	Number of cupules measured	Reference
Oak Hill Village (41RK214) Fea. 86*	4.8	3.1	~10220	Elson et al. 2004
41PN175	4.9	2.3	39	Bush 2013
W. A. Ford (41TT852)	5.0	2.9	10	Bush 2011
Shelby Mound (41CP71)	5.0	2.8	52	this article
Pine Tree Mound (41HS15)	5.3	2.3	106	Bush 2012
Stallings Ranch (41LR297)	5.4	3.1	35	Bush 2008
Henry M. (41NA60)	6.1	1.9	20	Perttula et al. 2010
Ramos Creek (34MC1030), all others	6.5	3.1	87	Dowd n.d.
Winding Stair (3MN496)	6.5	n/a	256	Williams 2000
Sha'chahdínnih (41MR211)**	7.2	2.8	229	Goldborer 2002

Note: all cupules carbonized; includes whole cobs, cupules attached in ranks, and loose cupules
*Mean of measurements given in Table 91. Number of cupules estimated from 108 measurable cobs, row numbers distributed as given in Table 91, assuming 10 measurable cupules per rank.
**Mean of measurements given in Appendix Tables 3A-D.

PREVIOUS SAMPLES FROM SHELBY MOUND

Examination of other botanical samples from the same excavations yielded many of the same plants recovered here. One additional species of wood was identified (*Salix* spp.; willow), and a domestic bean *(Phaseolus vulgaris)* was also found (Perttula and Nelson 2004).

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