



# INDEX OF TEXAS ARCHAEOLOGY

*Open Access Gray Literature from the Lone Star State*

---

Volume 2016

Article 17

---

2016

## Plant Remains from the Washington Square Mound site (41NA49), Nacogdoches, Texas

Leslie L. Bush

*Heritage Research Center, Stephen F. Austin State University*

Follow this and additional works at: <https://scholarworks.sfasu.edu/ita>



Part of the [American Material Culture Commons](#), [Archaeological Anthropology Commons](#), [Environmental Studies Commons](#), [Other American Studies Commons](#), [Other Arts and Humanities Commons](#), [Other History of Art, Architecture, and Archaeology Commons](#), and the [United States History Commons](#)

Tell us how this article helped you.

---

This Article is brought to you for free and open access by the Center for Regional Heritage Research at SFA ScholarWorks. It has been accepted for inclusion in Index of Texas Archaeology: Open Access Gray Literature from the Lone Star State by an authorized editor of SFA ScholarWorks. For more information, please contact [cdsscholarworks@sfasu.edu](mailto:cdsscholarworks@sfasu.edu).

---

## Plant Remains from the Washington Square Mound site (41NA49), Nacogdoches, Texas

Creative Commons License



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/)

---

# Plant Remains from the Washington Square Mound site (41NA49), Nacogdoches, Texas

*Leslie L. Bush*

---

## Introduction

Botanical remains were identified from 27 lots from the Washington Square Mound site (41NA49). The primary occupation at the site is Middle Caddo period in age. The first pooled set of calibrated radiocarbon dates from the site fell into the period A.D. 1268-1302 (Corbin and Hart 1998:74), while a recent set of five calibrated dates from samples of plant remains discussed in this article range from A.D.  $1279 \pm 17$  (Feature 115); (2) A.D.  $1358 \pm 57$  (Feature 9); and three dates on charred corn from Features 36, 81, and 86 range from as early as A.D. 1394 to as late as A.D. 1437 (see Perttula 2016:Table 1). These dates as a group fall in the Middle Caddo period; there is limited evidence at the site for other, smaller occupations, including Late Caddo and Late Woodland/Early Caddo. At least three mounds were visible in the nineteenth century. Much of the site was never plowed, a situation that has resulted in intact shallow deposits and unusually large pottery sherds, although a high school has been built over parts of the non-mound site area.

Labels of botanical lots that included excavation dates indicate a range from 1979 to 1983, associating the botanical remains with Stephen F. Austin State University Field School excavations that took place during this time. At least nine features are represented in the botanical lots. Four are described as charcoal-filled pits (Features 8, 9, 51, and 86), one as a pit (Feature 115), and one as a post mold (Feature 18) (Corbin and Hart 1998:61, 63, 64). Feature 36 was a corn cob concentration (Corbin and Hart 1998:65). Botanical lots for Features 62, 81, and 199 are also present.

The Washington Square Mound site is situated in the city of Nacogdoches, Texas, on an interfluvium between Banita Creek and La Nana Creek, which drain into La Nana Bayou and the Angelina River. The area lies squarely in the Pineywoods ecological zone, the westernmost extension of the great Southeastern Evergreen Forest that reaches across the southeastern United States to the Atlantic coast (Braun 2001:281). The dominant vegetation type in an upland area such as Washington Square during pre-settlement times would have been a shortleaf pine community, where shortleaf pines (*Pinus echinata*) share dominance with dry-site oaks such as southern red oak (*Quercus falcata*), post oak (*Q. stellata*), and blackjack oak (*Q. marilandica*), hickories (*Carya* spp.), and elms (*Ulmus* spp.) (Bezanson 2000:26-27; Diggs et al. 2006:88-89). Springs and marshy areas nearby would have offered aquatic and wetland plants such as river cane (*Arundinaria gigantea*) (Bezanson 2000:31-32, 42; Diggs et al. 2006:834-836, 845). A spring-fed pond is reported to have existed north of the site, and a marshy area to the southwest (Corbin and Hart 1998:50).

Pollen studies indicate that use of the modern and recent vegetation is appropriate for understanding the plants and attendant animal resources available to occupants of the sites during prehistoric times (Albert 2007; Bousman 1998). Some fluctuations in rainfall and temperature have taken place, however. In addition, more frequent fires would have made the understory in the uplands less prominent than today (Diggs et al. 2006:81). Early explorers in East Texas and other parts of the Eastern Woodlands noted the open, park-like nature of many woodlands (Diggs et al. 2006:80-81).

## Methods

Labels of the botanical lots indicate that some were designated as carbon samples and others recovered through fine screening using 1/16-inch (1.6 mm) mesh. In four cases, large amounts of clay sediment obscured the botanical remains. These lots were placed in no-see-um mesh with triangular openings of 0.5 x 0.4 x 0.3 mm and soaked overnight in a solution of 12 cups of tap water to one cup of baking soda ( $\text{NaHCO}_3$ ). The samples were rinsed of clay and dried in their mesh bags before sorting.

Botanical lots were sorted and identified according to standard procedures (Pearsall 2015). Equipment was cleaned between samples, and latex gloves were worn when handling material to help preserve suitability for radiocarbon dating. Wood charcoal from Lot 1149 was handled without gloves, so this material may not be suitable for dating.

Botanical lots containing only one or two items were placed on a sorting tray and examined and identified under a Micros stereozoom microscope at 7-45 X magnification. Larger botanical lots were first size-sorted through a stack of graduated geologic mesh. Materials that did not pass through the No. 10 mesh (2 mm square openings) were completely sorted under the microscope, and all botanical remains other than rootlets were counted, weighed, recorded, and labeled. Rocks, soil clumps and rootlets that did not pass through the No. 10 mesh were weighed and recorded as "Non-botanical > 2 mm." All materials that passed through the No. 10 mesh ("Residue < 2 mm") were scanned under the microscope. Whole corn cupules and material not previously identified in the larger size fraction were removed from residue, counted, weighed, and labeled.

Whole corn cupules were measured according to methods set out by Robert Bird (1994). In cases where cupules were conjoined in a rank, cupule height (sometimes referred to as thickness) was determined by measuring the entire rank and dividing by the number of cupules present. Cupule depth was too shallow to be accurately measured.

Identification was attempted for 20 carbonized wood specimens selected at random from those larger than 2 mm from each sample. When fewer than 20 fragments were present, smaller fragments were selected in decreasing order of size until either all fragments were identified, 20 fragments were identified, or identification became impractical. Wood fragments were snapped to reveal a transverse section and examined under a stereoscopic 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 (e.g., Core et al. 1979; Davis 1993; Hoadley 1990; InsideWood 2004-onwards; Martin and Barkley 1961; Panshin and de Zeeuw 1980; Wheeler 2011). Plant nomenclature follows the PLANTS database (USDA, NRCS 2015).

## Results

A summary of plant parts and taxa identified in the botanical lots is shown in Table 1. Detailed information including number of specimens and weight is given by lot number in Table 2, and corn cupule measurements are provided in Table 3.

**Table 1. Plants identified from the Washington Square Mound site (41NA49).**

Corn	Cupules and glumes Kernels
Seeds	Maygrass Pine Indeterminable
Nutshell	Acorn Hickory Hickory/walnut family
Stems	River cane Small grass
Wood	Beech Elm, hard group Hickory Honeylocust Live group oak Persimmon Pine Red group oak Red mulberry Sweetgum White group oak
Bark	Indeterminable Pine Indeterminable
Cone scales	Pine
Indeterminable	Starchy fragments, probably corn kernel Indeterminable

Plant remains recovered are typical of Middle Caddo period sites. Corn and nutshell, especially hickory, are common. River cane and pine cone parts are also present. Wood charcoal reflects trees that would have been available in the local forests. One lot (Lot 1149, recovery method unknown) yielded two maygrass seeds, which are sufficiently small that they are rarely found in investigations where flotation is not used as a recovery method. Two plant taxa not found in these samples have been previously identified from the Washington Square Mound site: ash wood charcoal and carbonized bean cotyledons (Gennett 1983). Ash trees would likely have been present along the creeks near the site. The beans are reported from Feature 44, which Corbin and Hart describe as “2 Deer Bones,” and may belong to the latest Caddo component (Corbin and Hart 1998:65).

Corn cupules at the Washington Square Mound site are smaller than corn measurements reported for other Caddo sites (Table 4). There is some variability in the assemblage, however. More than half of the cupules measured (184 of 312) came from Lot 1149 (Feature 199), where cupules were smaller than the site mean (width = 3.6 mm, height = 1.73 mm). Cupules measured for this study are smaller than previously-measured cupules from the same feature, which averaged 5-6 mm in width (Gennett 1983). Cupules from two contexts, Lot 221 (Feature 36) and Lot 594 (context unknown), had cupule widths averaging more than 5 mm.

Table 2. Floral samples from the Washington Square Mound site (41NA49). All plants carbonized unless otherwise indicated.

Lot #, Context, Recovery Method	Plant part	Botanical name	Common name	Number of Individual Specimens	Weight (g)	Comments
<b>43</b>	Botanical	Indeterminable	Indeterminable	1	0.01	
Context unknown	Rachis	<i>Zea mays</i>	Corn	2	0.11	cob frags with 4 whole cupules
Carbon sample	Stem	<i>Arundinaria gigantea</i>	Cane	1	0.03	
	Wood	<i>Carya</i> sp.	Hickory	3	0.13	
	Wood	<i>Fagus grandifolia</i>	Beech	2	0.01	
	Wood	Hardwood	Hardwood	4	0.04	
	Wood	<i>Quercus</i> sect. <i>Lobatae</i>	Red group oak	2	0.02	
	Wood	<i>Quercus</i> sect. <i>Quercus</i>	White group oak	6	0.11	
	Wood	<i>Ulmus</i> sp.	Elm	1	0.04	
	Residue < 2 mm				2.08	
	Non-botanical > 2 mm			2.68		
<b>109</b> N227 W102 Level 3, 20-30 cm. Recovery method not noted.	Wood*	Hardwood	Hardwood	12	0.19	
<b>198</b>	Botanical	Indeterminable	Indeterminable	107	0.36	
Feature 18	Nutshell	<i>Carya</i> sp.	Hickory	37	1.33	
N 156 W 96	Nutshell	Juglandaceae	Hickory/walnut family	16	0.12	
Carbon sample	Nutshell	<i>Quercus</i> sp.	Acorn	204	0.49	
In 2 bags	Rachis	<i>Zea mays</i>	Corn	35	0.15	cupules, 5 whole
One bag soaked overnight in NaHCO <sub>3</sub> solution.	Seed	Indeterminable	Starchy fragments	5	0.01	prob corn kernel frags
	Seed	<i>Zea mays</i>	Corn	13	0.03	kernel frags
	Wood	<i>Carya</i> sp.	Hickory	13	0.09	
	Wood	Diffuse-porous hardwood	Diffuse-porous hardwood	2	0.02	
	Wood	Hardwood	Hardwood	3	0.03	
	Wood	Not examined for species	Not examined for species	173	0.36	
	Wood	<i>Pinus</i> sp.	Pine	2	0.05	
	Wood	<i>Quercus</i> sect. <i>Lobatae</i>	Red group oak	3	0.01	
	Wood	<i>Quercus</i> sect. <i>Quercus</i>	White group oak	6	0.03	
	Wood	<i>Quercus</i> sp.	Oak	2	0.01	
	Non-botanical > 2 mm				4.24	
	Residue < 2 mm				5.15	

Table 2. Floral samples from the Washington Square Mound site (41NA49). All plants carbonized unless otherwise indicated, cont.

Lot #, Context, Recovery Method	Plant part	Botanical name	Common name	Number of Individual Specimens	Weight (g)	Comments
<b>198</b>						
Feature 18	Botanical	Indeterminable	Starchy fragments	3	0.02	prob corn kernel frags
N 156 W 96	Botanical	Indeterminable	Indeterminable	36	0.17	
Recovery method not noted.	Nutshell	<i>Carya</i> sp.	Hickory	5	0.04	
	Nutshell	Juglandaceae	Hickory/walnut family	5	0.04	
	Nutshell	<i>Quercus</i> sp.	Acorn	4	0.01	
	Rachis	<i>Zea mays</i>	Corn	4	0.02	cupule frags
	Seed	<i>Zea mays</i>	Corn	4	0.02	kernel frags
	Wood	<i>Carya</i> sp.	Hickory	6	0.04	
	Wood	Hardwood	Hardwood	3	0.03	
	Wood	<i>Liquidambar styraciflua</i>	Sweetgum	1	0.05	
	Wood	Not examined for species	Not examined for species	248	1.04	
	Wood	<i>Pinus</i> sp.	Pine	1	0.01	
	Wood	<i>Quercus</i> sect. <i>Lobatae</i>	Red group oak	3	0.02	
	Wood	<i>Quercus</i> sect. <i>Quercus</i>	White group oak	6	0.04	
	Residue < 2 mm				0.35	
<b>221</b>						
Feature 36	Rachis	<i>Zea mays</i>	Corn	4	0.05	removed for 14C
N 227 W 104	Rachis	<i>Zea mays</i>	Corn	49	0.48	whole cupules, 2 conjoined
Recovery method not noted.	Rachis	<i>Zea mays</i>	Corn	206	1.02	cupule frags and glumes
Soaked overnight in NaHCO3 solution	Stem	<i>Arundinaria gigantea</i>	Cane	2	0.01	
	Residue < 2 mm				1.22	
	Non-botanical > 2 mm				0.13	
<b>229</b>						
Feature 9	Nutshell	<i>Carya</i> sp.	Hickory	8	0.38	removed for 14C
Carbon sample	Nutshell	<i>Quercus</i> sp.	Acorn	2	0.01	
Soaked overnight in NaHCO3 solution	Rachis	<i>Zea mays</i>	Corn	4	0.02	whole cupules, not soaked
after hickory nutshell and some corn and pine wood removed.	Rachis	<i>Zea mays</i>	Corn	1	0.02	whole cupule, not soaked
	Rachis	<i>Zea mays</i>	Corn	14	0.08	whole cupules
	Rachis	<i>Zea mays</i>	Corn	190	0.48	cupule frags and glumes
	Seed	Indeterminable	Indeterminable	1	0.01	
	Seed	<i>Zea mays</i>	Corn	1	0.01	kernel frag

Table 2. Floral samples from the Washington Square Mound site (41NA49). All plants carbonized unless otherwise indicated, cont.

Lot #, Context, Recovery Method	Plant part	Botanical name	Common name	Number of Individual Specimens	Weight (g)	Comments
<b>229</b> , cont.	Wood	<i>Pinus</i> sp.	Pine	28	0.41	
	Residue < 2 mm				3.41	
	Non-botanical > 2 mm				1.69	
<b>378</b>	Cone scales	<i>Pinus</i> sp.	Pine	1	0.01	
Feature 8	Botanical	Indeterminable	Indeterminable	8	0.04	
Fine screen	Nutshell	<i>Quercus</i> sp.	Acorn	1	0.01	
	Seed	<i>Zea mays</i>	Corn	1	0.01	kernel frag
	Stem	<i>Arundinaria gigantea</i>	Cane	8	0.03	
	Wood	Hardwood	Hardwood	8	0.09	
	Wood	<i>Liquidambar styraciflua</i>	Sweetgum	1	0.01	
	Wood	<i>Quercus</i> sect. <i>Lobatae</i>	Red group oak	3	0.02	
	Wood	<i>Quercus</i> sect. <i>Quercus</i>	White group oak	2	0.01	
	Wood	<i>Quercus</i> sp.	Oak	5	0.03	
	Residue < 2 mm				4.73	
	Non-botanical > 2 mm				12.52	
	Ceramic, plain body sherd			1	7.65	
<b>529</b> N227 W114, 30-40 cm. Recovery method unknown.	Wood	<i>Liquidambar styraciflua</i>	Sweetgum	1	0.29	
<b>562</b> N215 W160 . Level 4, 30-40 cm. Recovery method unknown.	Rock			1	0.25	
<b>563</b> N216 W161 Level 5, 40-50 cm. Recovery method unknown.	Wood	<i>Quercus</i> sect. <i>Quercus</i>	White group oak	1	0.30	
<b>594</b>	Cone scales	<i>Pinus</i> sp.	Pine	270	1.62	
Context unknown	Botanical	Indeterminable	Indeterminable	10	0.04	
Carbon sample	Nutshell	<i>Carya</i> sp.	Hickory	2	0.01	
	Rachis	<i>Zea mays</i>	Corn	19	0.22	whole cupules



Table 2. Floral samples from the Washington Square Mound site (41NA49). All plants carbonized unless otherwise indicated, cont.

Lot #, Context, Recovery Method	Plant part	Botanical name	Common name	Number of Individual Specimens	Weight (g)	Comments
<b>594, cont.</b>	Rachis	<i>Zea mays</i>	Corn	53	0.26	cupule frags and glumes
	Wood	<i>Carya</i> sp.	Hickory	19	0.14	
	Wood	<i>Quercus</i> sp.	Oak	1	0.01	
	Residue				2.96	
	Non-botanical > 2 mm				0.05	
<b>595</b> Feature 81 Fine screen	Botanical	Indeterminable	Indeterminable	16	0.09	
	Nutshell	<i>Carya</i> sp.	Hickory	52	1.47	
	Nutshell	Juglandaceae	Hickory/walnut family	15	0.17	
	Nutshell	<i>Quercus</i> sp.	Acorn	3	0.01	
	Rachis	<i>Zea mays</i>	Corn	4	0.02	removed for 14C
	Rachis	<i>Zea mays</i>	Corn	10	0.03	whole cupules
	Rachis	<i>Zea mays</i>	Corn	15	0.05	cupule frags
	Wood	<i>Carya</i> sp.	Hickory	13	0.23	
	Wood	Hardwood	Hardwood	2	0.03	
	Non-botanical > 2 mm				1.27	
	Residue < 2 mm				1.33	
<b>596</b> N214 W161 in 2 bags Recovery method not noted.	Cone scales	<i>Pinus</i> sp.	Pine	104	0.60	
	Rachis	<i>Zea mays</i>	Corn	2	0.01	glumes
	Wood	<i>Carya</i> sp.	Hickory	8	0.02	
	Residue < 2 mm				1.23	
<b>601</b> Feature 72. Fine screen	Rocks			11	9.11	
<b>602</b> Context unknown Fine screen in 2 bags combined in lab	Cone scales	<i>Pinus</i> sp.	Pine	175	0.67	
	Botanical	Indeterminable	Starchy fragments	1	0.01	prob corn kernel frag
	Botanical	Indeterminable	Indeterminable	69	0.19	
	Nutshell	<i>Carya</i> sp.	Hickory	7	0.09	
	Nutshell	Juglandaceae	Hickory/walnut family	3	0.02	
	Seed	<i>Pinus</i> sp.	Pine	7	0.02	
	Wood	Hardwood	Hardwood	2	0.01	
	Wood	Not examined for species	Not examined for species	25	0.11	
	Wood	<i>Ulmus</i> sp.	Elm	18	0.11	
	Residue < 2 mm				2.32	
	Non-botanical > 2 mm				2.61	

Table 2. Floral samples from the Washington Square Mound site (41NA49). All plants carbonized unless otherwise indicated, cont.

Lot #, Context, Recovery Method	Plant part	Botanical name	Common name	Number of Individual Specimens	Weight (g)	Comments
<b>603</b>						
Feature 86	Cone scales	<i>Pinus</i> sp.	Pine	4	0.01	
Context unknown	Botanical	Indeterminable	Starchy fragments	5	0.03	prob corn kernel frags
Fine screen	Botanical	Indeterminable	Indeterminable	17	0.06	
	Nutshell	<i>Carya</i> sp.	Hickory	16	0.38	
	Nutshell	Juglandaceae	Hickory/walnut family	6	0.04	
	Rachis	<i>Zea mays</i>	Corn	4	0.03	whole cupules, removed for 14C
	Rachis	<i>Zea mays</i>	Corn	62	0.28	cupule frags
	Rachis	<i>Zea mays</i>	Corn	10	0.07	whole cupules
	Seed	<i>Zea mays</i>	Corn	10	0.62	kernel frags
	Wood	<i>Carya</i> sp.	Hickory	2	0.02	
	Wood	<i>Liquidambar styraciflua</i>	Sweetgum	1	0.01	
	Wood	<i>Pinus</i> sp.	Pine	2	0.01	
	Wood	<i>Quercus</i> sect. <i>Lobatae</i>	Red group oak	2	0.08	
	Wood	<i>Quercus</i> sect. <i>Quercus</i>	White group oak	3	0.02	
	Wood	<i>Quercus</i> sp.	Oak	6	0.10	
	Residue < 2 mm				1.90	
	Non-botanical > 2 mm				1.36	
<b>604</b>						
W214 E160	Cone scales	<i>Pinus</i> sp.	Pine	11	0.03	
Carbon sample	Botanical	Indeterminable	Indeterminable	22	5.00	
	Nutshell	<i>Quercus</i> sp.	Acorn	1	0.01	
	Wood	<i>Carya</i> sp.	Hickory	1	0.01	
	Wood	<i>Quercus</i> sp.	Oak	6	0.02	
	Residue < 2 mm				3.12	
	Non-botanical > 2 mm				0.10	
<b>605</b>						
Fine screen	Botanical	Indeterminable	Indeterminable	2	0.01	
	Nutshell	Juglandaceae	Hickory/walnut family	2	0.01	
	Rachis	<i>Zea mays</i>	Corn	2	0.01	
	Wood	<i>Pinus</i> sp.	Pine	1	0.01	
	Wood	<i>Quercus</i> sect. <i>Lobatae</i>	Red group oak	2	0.01	
	Wood	<i>Quercus</i> sect. <i>Quercus</i>	White group oak	4	0.01	
	Residue < 2 mm				0.13	

Table 2. Floral samples from the Washington Square Mound site (41NA49). All plants carbonized unless otherwise indicated, cont.

Lot #, Context, Recovery Method	Plant part	Botanical name	Common name	Number of Individual Specimens	Weight (g)	Comments
<b>611</b>	Bark	<i>Pinus</i> sp.	Pine	3	0.01	
Feature 51	Nutshell	<i>Carya</i> sp.	Hickory	1	0.01	
Fine screen	Nutshell	Juglandaceae	Hickory/walnut family	1	0.01	
Soaked overnight in NaHCO <sub>3</sub> solution	Wood	<i>Carya</i> sp.	Hickory	1	0.01	
	Wood	Hardwood	Hardwood	2	0.01	
	Residue < 2 mm				1.87	
	Non-botanical > 2 mm				2.12	
<b>738</b>	Botanical	Indeterminable	Indeterminable	1	0.57	
N249 W52	Wood	<i>Morus rubra</i>	Red mulberry	1	0.20	
Level 2, 10-20 cm	Rock			1	0.21	
Recovery method not noted.						
<b>1040</b>	Nutshell	<i>Carya</i> sp.	Hickory	1	0.25	removed for 14C
Feature 115, N222 W103, recovery method not noted, in 2 bags	Wood	<i>Diospyros virginiana</i>	Persimmon	1	0.12	
<b>1041</b>	Bark			1	0.65	
N226 W106	Wood	<i>Quercus</i> sect. <i>Lobatae</i>	Red group oak	1	0.04	
Level 2 10-20 cm, recovery method not noted						
<b>1078</b>	Wood*	<i>Pinus</i> sp.	Pine	5	0.35	
N256 W55	Rock			1	0.59	
Level 4, 30-40 cm, recovery method not noted						
<b>1132</b>	Wood*	<i>Pinus</i> sp.	Pine	2	0.62	
N226 W108	Wood	<i>Quercus virginiana</i>	Coastal live oak	7	0.44	
Level 3, 20-30 cm						
Recovery method not noted.	Bone			1	2.19	

Table 2. Floral samples from the Washington Square Mound site (41NA49). All plants carbonized unless otherwise indicated, cont.

Lot #, Context, Recovery Method	Plant part	Botanical name	Common name	Number of Individual Specimens	Weight (g)	Comments
<b>1149</b>	Rachis	<i>Zea mays</i>	Corn	164	0.77	whole cupules
Feature 199 (Gennett 1983)	Rachis	<i>Zea mays</i>	Corn	382	1.07	cupule frags and glumes
Recovery method not noted.	Seed	Indeterminable	Indeterminable	2	0.01	
	Seed	<i>Phalaris caroliniana</i>	Maygrass	2	0.01	
	Seed	<i>Zea mays</i>	Corn	2	0.01	kernel frags < 2 mm
	Stem	Poaceae	Grass family	1	0.01	
	Wood	<i>Carya</i> sp.	Hickory	1	0.01	Gloves not worn when
	Wood	Hardwood	Hardwood	3	0.01	handling wood charcoal from
	Wood	<i>Quercus</i> sect. <i>Lobatae</i>	Red group oak	2	0.01	this sample. May not be
	Wood	<i>Quercus</i> sect. <i>Quercus</i>	White group oak	15	0.03	suitable for radiocarbon
	Residue < 2 mm				22.03	dating.
	Non-botanical > 2 mm				0.28	
<b>1153</b> N222 W102	Wood	<i>Pinus</i> sp.	Pine	8	0.48	
Level 2, 10-20 cm.						
Recovery method not noted.						
<b>1161</b> N222 W10	Botanical	Indeterminable	Indeterminable	1	0.68	
Level 2, 10-20 cm.						
Recovery method not noted.						
<b>Unknown Lot #</b>	Wood	<i>Gleditsia triacanthos</i>	Honeylocust	11	0.25	
Feature 62, carbon sample						

**Table 3. Dimensions of corn cupules from the Washington Square Mound site (41NA49). All cupules unattached unless otherwise indicated. Measurements in millimeters.**

Lot	# cupules measured	Mean width	Mean height (thickness)
43	4	3.58	2.78
198	5	4.46	1.70
221	53	5.15	2.26
229	19	4.49	1.78
594	19	5.72	2.24
595	14	3.33	1.63
603	14	4.58	1.94
1149	184	3.60	1.73
Site total	312	4.09	1.87

**Table 4. Corn cupules (*Zea mays*) measurements from selected Caddo sites.**

Site	Cupule mean width (mm)	Cupule mean thickness (height) (mm)	Number of cupules measured	Reference
Washington Square Mound (41NA19)	4.1	1.9	312	this article
Dragover (3MN298) loose cupules (Fea. 11, 38, 97)	4.3	1.8	36	Trubitt et al. 2016
Dragover (3MN298) Fea. 97 cob fragment	4.3	2.7	53	Trubitt et al. 2016
Oak Hill Village (41RK214) Fea. 86*	4.8	3.1	~10,220	Elson et al. 2004
Musgano (41RK19)	4.8	2.2	1380	Bush 2014a
41PN175 Fea. 87	4.8	2.3	39	Bush 2015
W. A. Ford (41TT852)	5.0	2.9	10	Bush 2014b
Shelby Mound (41CP71)	5.0	2.8	52	Bush 2014c
Pine Tree Mound (41HS15)	5.3	2.3	106	Bush 2012
Stallings Ranch (41LR297)	5.4	3.1	35	Bush 2008
41CP183	5.4	2.1	24	Sherman et al. 2015
Eli Moores (41BW2) Cob #1	5.8	3.5	21	Perttula (ed.) 2014
Henry M. (41NA60) Lot 292	6.1	1.9	20	Perttula et al. 2010
Ramos Creek (34MC1030), all others	6.4	3.1	87	Dowd and Regnier 2014
Winding Stair (3MN496)	6.5	n/a	256	Williams 2000
Eli Moores (41BW2) loose cupules	7.1	3.4	60	Perttula (ed.) 2014
Indian Creek 2 (41SM404) Fea. 1	7.1	3.4	8	Nash 2012
Sha'chahd'innih (41MR211)**	7.2	2.8	229	Goldborer 2002
Hanna Village (16RR4)	7.4	3.5	9 cobs	Shea 1980
Ramos Creek (34MC1030) Lot 448.3	8.4	3.3	5	Dowd and Regnier 2014

\*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, 3B, 3C and 3D

### References Cited

- Albert, B. M.  
2007 Climate, Fire, and Land-Use History in the Oak-Pine-Hickory Forests of Northeast Texas during the Past 3500 Years. *Castanea* 72: 82-91.
- Bezanson, D.  
2000 Natural Vegetation Types of Texas and Their Representation in Conservation Areas. Master's thesis, Department of Geography, University of Texas at Austin.
- Bird, R. M.  
1994 Manual for the Measurement of Maize Cobs. In *Corn and Culture in the Prehistoric New World*, edited by S. Johannessen and C. A. Hastorf, pp. 5-22. Westview Press, Boulder, Colorado.
- Bousman, C. B.  
1998 Paleoenvironmental Change in Central Texas: The Palynological Evidence. *Plains Anthropologist* 43: 201-219.
- Braun, E. L.  
2001 *Deciduous Forests of Eastern North America*. Blackburn Press, Caldwell, New Jersey.
- Bush, L. L.  
2008 Macrobotanical Remains from the 2005 and 2006 Texas Archeological Society Field Schools at the Gene and Ruth Ann Stallings Site (41LR297). Report submitted to the Texas Archeological Society by Macrobotanical Analysis, Manchaca, Texas.  
2012 Macrobotanical Remains. In *Archeology of the Nadaco Caddo: The View from the Pine Tree Mound Site (41HS15), Harrison County, Texas*, by R. C. Fields and E. F. Gadus, pp. 728-772. Reports of Investigations No. 164. Prewitt and Associates, Inc., Austin.  
2014a Analysis of the Paleobotanical Remains from the Musgano Site. In *The Caddo Archaeology of the Musgano Site (41RK19) in the Sabine River Basin of East Texas*, by T. K. Perttula, with contributions by L. L. Bush, L. Schniebs, and R. Z. Selden, Jr., pp. 35-41. Special Publication No. 28. Friends of Northeast Texas Archaeology, Pittsburg and Austin.  
2014b Macrobotanical Plant Remains. In *Testing and Data Recovery Excavations at Native American Sites along the U.S. Highway 271 Mount Pleasant Relief Route, Titus County, Texas*, by R. C. Fields, V. L. Hatfield, D. Burden, E. F. Gadus, M. C. Wilder, and K.W. Kibler, pp. 613-643. Reports of Investigations No. 168. Prewitt and Associates, Inc. Austin.  
2014c Plant Remains from Shelby Mound (41CP71), Camp County, Texas. *Journal of Northeast Texas Archaeology* 46:45-55.  
2015 Plant Remains from Site 41PN175, Panola County, Texas. In *Data Recovery Investigations: Murvaul Creek Site (41PN175), Panola County, Texas*, by A. McKee, C. D. Frederick, T. K. Perttula, R. Z. Selden, L. Bush, L. Kemp, B. Gregory, C. Yost, L. S. Cummings, J. R. Ferguson, M. D. Glascock, S. Tomka, L. Cecil, C. Masiello, X. Gao, C. Goodmaster, V. Beasley, and D. E. Peter, pp. 269-286. Report No. 165. Texas Department of Transportation, Environmental Affairs Division, Archeological Studies Program, Austin.
- Corbin, J. E. and J. P. Hart  
1998 The Washington Square Mound Site: A Middle Caddo Mound Complex in South Central East Texas. *Bulletin of the Texas Archeological Society* 69:47-78.
- Core, H. A., W. A. Cote, and A. C. Day  
1979 *Wood Structure and Identification*. 2nd edition. Syracuse University Press, Syracuse, New York.
- Davis, L. W.  
1993 *Weed Seeds of the Great Plains: A Handbook for Identification*. University Press of Kansas, Lawrence.

- Dausman, R. J.  
1989 Multimodal Flotation. *Wisconsin Archaeologist* 70(3):362-366.
- Diggs Jr., G. M., B. L. Lipscomb, M. D. Reed, and R. J. O'Kennon  
2006 *Illustrated Flora of East Texas, Volume One: Introduction, Pteridophytes, Gymnosperms, and Monocotyledons*, Sida, Botanical Miscellany, No. 26. Botanical Research Institute of Texas, Fort Worth.
- Dowd, E. and A. Regnier  
2014 *Archaeological Investigations at the Ramos Creek Site (34MC1030), McCurtain County, Oklahoma*. Report on file at the Oklahoma Archeological Survey, Norman.
- Elson, K. M., C. Smith, and T. K. Perttula  
2004 Additional Maize Studies. In *The Oak Hill Village Site (41RK214), Rusk County, Texas*, by R. Rogers and T. K. Perttula, pp. 323-335. Document No. 030083. PBS&J, Austin.
- Gennett, J. A.  
1983 Botanical Remains from Two Archeological Sites in Texas. Manuscript on file, Macrobotanical Analysis, Manchaca, Texas.
- Goldborer, S. E.  
2002 Macrobotanical Evidence of Subsistence at Timber Hill. In *Finding Sha'chahdinnih (Timber Hill): The Last Village of the Kadohadacho in the Caddo Homeland*, by M. L. Parsons, J. E. Bruseth, J. Bagur, S. E. Goldborer, and C. McCrocklin, pp. 81-86. Archeological Reports Series No. 3. Texas Historical Commission, Austin.
- Hoadley, R. B.  
1990 *Identifying Wood: Accurate Results with Simple Tools*. The Taunton Press, Newtown, Connecticut.
- InsideWood  
2004-onwards Published on the Internet. <http://insidewood.lib.ncsu.edu/search>. Accessed March 19, 2014.
- Martin, A. C. and W. D. Barkley  
1961 *Seed Identification Manual*. University of California Press, Berkeley.
- Nash, M. A., T. K. Perttula, and L. W. Ellis  
2012 *National Register of Historic Places Eligibility Testing of Site 41SM404 Within TxDOT's Tyler District, Smith County, Texas*. Document No. 110055. Atkins North America, Inc., Austin.
- Panshin, A. J. and C. de Zeeuw  
1980 *Textbook of Wood Technology: Structure, Identification, Properties, and Uses of the Commercial Woods of the United States and Canada*. Fourth edition. McGraw-Hill Book Company, New York.
- Pearsall, D. M.  
2015 *Paleoethnobotany: A Handbook of Procedures*. 3rd edition. Academic Press, San Diego, California.
- Perttula, T. K.  
2016 New Radiocarbon Dates from Ancestral Caddo Sites in Cherokee, Fannin, Hopkins, Nacogdoches, and Wood Counties, Texas. *Journal of Northeast Texas Archaeology* 67:1-5.
- Perttula, T. K. (editor)  
2014 *The Eli Moores Site, a 17th to Early 18th Century Caddo Site on the Red River, Bowie County, Texas*. Special Publication No. 31. Friends of Northeast Texas Archaeology, Austin and Pittsburg, Texas.
- Perttula, T. K., L. L. Bush, L. Schniebs, T. Middlebrook, and P. S. Marceaux  
2010 *An Early Historic Caddo Farmstead at the Henry M. Site (41NA60) in Nacogdoches County, Texas*. Stephen F. Austin State University Press, Nacogdoches, Texas.

Shea, A.

1980 Analysis of Plant Remains from the Hanna Site. *Louisiana Archeology* 5:273-285.

Sherman, D. L., L. Bush, L. W. Ellis, T. Griffith, C. Wallace, and M. Nash

2015 *National Register Testing at 41CP183, a Small Middle Caddo Settlement, Camp County, Texas*. Blanton & Associates, Inc., Austin, Texas.

Trubitt, M. B., L. L. Bush, L. S. Kelly, and K. Leslie

2016 Ouachita Mountains Foodways: Preliminary Results from 2013-2014 Excavations at 3MN298. *Caddo Archeology Journal* 26:50-79.

USDA, NRCS (United States Department of Agriculture, Natural Resources Conservation Service)

2015 The PLANTS Database. United States Department of Agriculture, Natural Resources Conservation Service, National Plant Data Team, Greensboro, NC 27401-4901. <http://plants.usda.gov>. Accessed December 20, 2015.

Wheeler, E. A.

2011 InsideWood: A Web Resource for Hardwood Anatomy. *IAWA Journal* 32(2):199-211.

Williams, M. L.

2000 Ethnobotanical Analysis (Winding Stair and Bug Spot). In *Forest Farmsteads: A Millennium of Human Occupation at Winding Stair in the Ouachita Mountains*, edited by A. M. Early, pp. 111-122. Research Series 57. Arkansas Archeological Survey, Fayetteville.