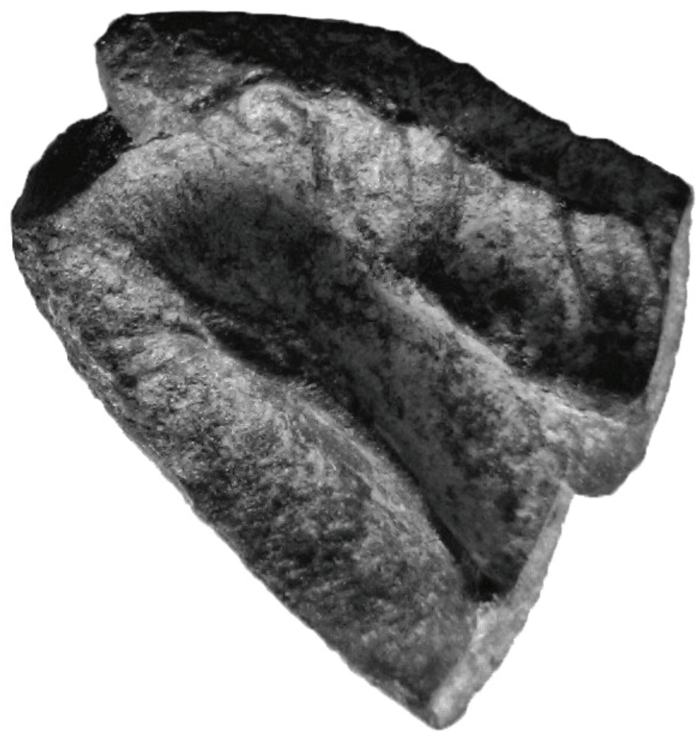
ETHNOBOTANICAL ANALYSIS OF SAMPLES FROM 22OK746, OKTIBBEHA COUNTY, MISSISSIPPI



CHICORA RESEARCH CONTRIBUTION 595

ANALYSIS OF ETHNOBOTANICAL SAMPLES FROM 22OK746, OKTIBBEHA COUNTY, MISSISSIPPI

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MANAGEMENT SUMMARY

This study reports on the examination of a sample of charred plant remains from the site known as the Cork Site, 22OK746, located in Oktibbeha County, east central Mississippi. The materials resulted from data recovery excavations by Dr. Janet Rafferty with the Cobb Institute of Archaeology at Mississippi State University and were contracted for by Dr. Evan Peacock. The investigations were funded by the Mississippi Department of Transportation because of the proposed US 12 By-Pass northeast of Starkville.

Identified in 1997, with Phase II testing conducted in 1998 (Rafferty 1999), and data recovery conducted in 2001, the site was found on a ridge overlooking a creek to the south. Data recovery included 190 1-meter units, most in four blocks distributed from west to east along the ridge. Samples from the units were floated and processed by water screening using a 1/16-inch mesh. In addition, features were identified and the fill was processed by flotation.

Site 22OK746 was determined to represent primarily a Middle Woodland (ca. 200 B.C. – A.D. 550) with the vast majority of the pottery consisting of sand-tempered Middle Woodland types from the Miller Phase (Rafferty and Galaty 2002). Also recovered was a small quantity of galena (Rafferty and Renson 2017).

A very large quantity of ethnobotanical materials were generated and this study examined a sample of the total collection, consisting of a 5% of the excavation units and all of the recovered features and postholes.

Consequently, this investigation examined a total of 106 samples, 45 are units, 30 are features, and 30 are post holes.

The recovered specimens are of special interest since they are reported to derive from an unplowed site; nevertheless, the materials are often worn and almost universally heavily fragmented. As discussed in this study, I believe this may be the result of taphonomic activities during site occupation.

This precluded the identification of most of the wood charcoal present at the site. The few species present include primarily oak, with minor components of pine and an unidentified wood.

Another finding of considerable importance is that many of the features exhibit very large quantities of hickory nutshell – to the near exclusion of other materials. This site appears to have focused on the processing of hickory nuts.

While a small quantity of carbonized seeds were identified (33), they are all representative of weedy plants that likely existed in and around the settlement. These is no indication that any were of economic significance. Moreover, there is no evidence of any cultigens.

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Introduction

Background

The Cork Site (22OK746) was identified in 1997 during the Mississippi Department of Transportation survey for the new by-pass of Starkville. Thought to retain integrity (no plowzone was identified in the shovel testing), the site was further investigated in 1998, with the excavation of 21 units, totaling 25m^2 along the ridge line (Rafferty 1999). As a result of this work, the site was determined eligible for inclusion on the National Register of Historic Places, and data recovery excavations were conducted in 2001. This work involved the excavation of 190 1-meter units, most in four blocks scattered across the ridge and associated with areas of suspected dense remains.

Excavation during the data recovery used natural soil zones, but these were determined to represent soil horizons, further adding to the belief that the site had not been plowed. Archaeological Zone A is equated with the A horizon; archaeological Zone B is the equivalent of the E Horizon; and archaeological Zone C is thought to represent the B horizon soils at the site.

Unit fill was processed by waterscreening through ¼-inch and 1/16-inch mesh, except for a 2-liter (0.5 gallon) sample that was floated using a machine-assisted system. In contrast, the bulk of each feature (after the removal of soil for other purposes) was subjected to flotation.

Rafferty reported that the deposits were primarily sheet midden with general debris, although a few large, and undisturbed, sherd concentrations were identified and yielded partially reconstructable vessels. Otherwise, features were uncommon and generally shallow. No house patterns or burials were encountered.

Research reveals the Cork site was occupied in the period from 200B.C. to A.D. 300, based on two radiocarbon dates (Rafferty 2004). This is consistent with the Middle Woodland Miller phase and the presence of sand-tempered plain, fabric-marked, and cordmarked pottery (Rafferty and Galaty 2002).

Rafferty suggested two distinct habitation areas at the Cork Site, at opposite ends of the ridge (represented by the east and west excavation blocks, which also present slightly different pottery). She hypothesized that each might have been the location of one to several houses, with refuse collecting nearby. She also suggested that the two areas were not entirely contemporaneous, suggesting a pattern of multi-year mobility (e.g., (Rafferty and Hogue 1999).

Exotic artifacts included the presence of Tallahatta quartzite characteristic of southwest Alabama and southeast Mississippi, about 62 miles from the Cork site. Also recovered from the site (and from these ethnobotanical studies) are small quantities of galena, often associated with Middle Woodland Copena mortuary contexts, and sourced from the Central Missouri-Tri-State-North Arkansas region (Rafferty and Renson 2017).

The investigations are today being completed by Dr. Evan Peacock, a colleague of Dr. Rafferty. His report should be consulted for detailed information concerning the site and the various proveniences.

Extant Environment

Situated in the east central part of Mississippi, Oktibbeha County (Figure 1) incorporates primarily two topographic areas – the

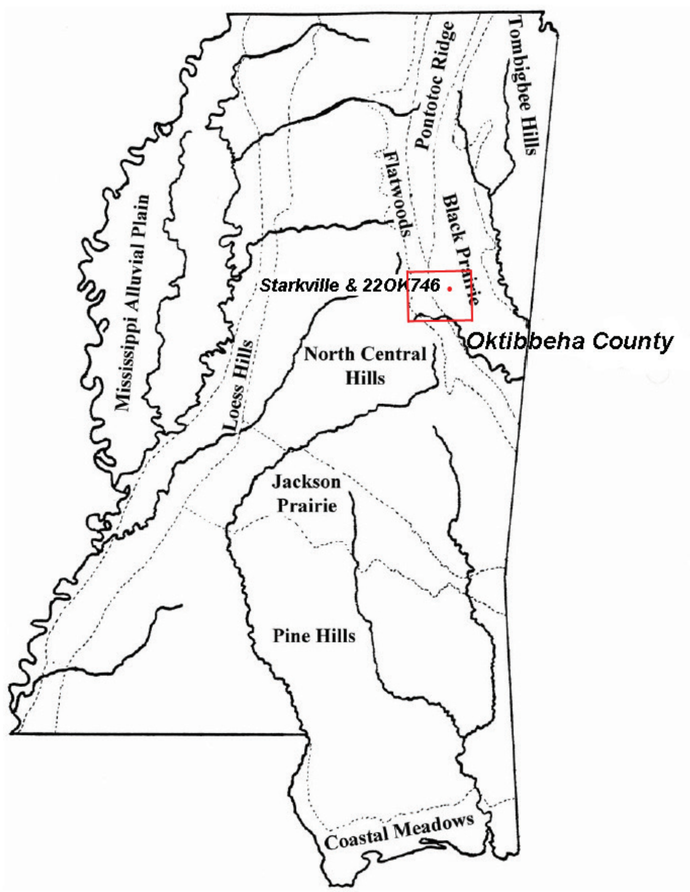

Figure 1. Topographic regions and Oktibbeha County in Mississippi (adapted from Rafferty 2018:Figure 1).

the Flatwoods and the Black Belt Prairie.

The Black Belt Prairie Belt developed from Upper Cretaceous chalks and the portion adjacent to the Tombigbee River is primarily composed of ferruginous red sandy hills of the Eutaw Formation. The Flatwoods, a gently undulating plain, has developed on the calcareous and micaceous Porters Creek clay. Soils have been classified as primarily Susquehanna-Savannah-Ruston series, although there is tremendous local variation (U.S. Department of Agriculture 1939:1072).

The investigated site is found northeast of Starkville on a narrow ridge overlooking a small creek to the south. It is reported to have never been farmed (at least in memory) since the ridge was so narrow and had never been logged (again, in the memory of residents) until acquired by MDOT prior to the data recovery work (Rafferty 1999:9).

The area climate is warm and humid, influenced by the subtropical latitude, the high land mass to the north, and the warm waters of the Gulf of Mexico to the south. Temperatures today range from an average of about 46° F in the winter to an average of about 81°F in the summer. As might be expected for the southern subtropics, the relative humidity for the region is high during both the winter and summer. Rainfall averages about 50 inches, with about 23 inches occurring in the April through September growing season. The average growing season is about 226 days.

Braun (1950) classifies the region as part of the Gulf Slope section of her Oak-Pine Forest, although she observes that there is considerable diversity on a local level (Braun 1950:271-272). For example, the Black Belt Prairies region originally was characterized by upland treeless areas occupied by prairie vegetation on alkaline soils. Oaks were found on the higher reddish soils that "dot the prairie surface like islands" (Braun 1950:277) and the stream bottoms were dominated by dense hardwood forests. Slight variations in topography resulted in different vegetational communities. In contrast, the Flatwoods tended to be dominated by loblolly pines and post oaks. In the site vicinity, however, Braun identifies a broad band of pine associated mostly with upland oaks and hickories (Braun 1950:277).

Vankat (1992:135-135, 145-148) identifies the area as part of the deciduous forest blanketing eastern North America, with the study area part of what he describes as the Oak-Hickory Association. The most widespread of the associations, it is dominated by its namesakes, often with admixed pines.

Wenger (1968) discusses the silvics of a pine-hardwood forest and notes that pine is usually eliminated within 300 years of the beginning of the successional process, although the trend toward hardwood climax is slower on light sandy soils than on clay soils. Further, a pine forest may be artificially maintained. Regardless, it seems likely that there would be considerable diversity in species readily available to prehistoric people.

Küchler (1964:2) developed the concept of potential natural vegetation – defined as the vegetation that would exist today if humans were removed from the scene and if the resulting plant succession were telescoped into a single moment. This is not a perfect concept, since it does not specifically address, for example, the vegetation present when prehistoric occupants were living at the Cork Site. Yet it does provide some hints.

Consequently, the Black Prairie Belt is what Küchler identified as the *Liquidamber-Quercus-Juniperus* area. While the dominants are thought to be the red cedar, sweetgum, and post oak, he notes that other components would include hickories, ash, and elm. Within 5 miles of the Cork site to the west lies Küchler's *Quercus-Carya-Pinus* area, dominated by hickories, pines, and oaks. In this forest, a wide variety of hickories are anticipated, including bitternut, mockernut, pignut, and shagbark (Küchler 1964: Forest Types 89, 111). Curiously, the closest, most-likely location for walnut trees is Küchler's *Quercus-Carya* forests over 50 miles to the northwest.

Whitehead and Sheehan (1985) provide one of the few pollen studies for the region, reporting on pollen cores at the B.L. Bigbee Oxbow near Columbus Mississippi and Buttonbush Swale, near Aliceville, Mississippi. The former is on a terrace of the Tombigbee River, while the latter is on the forested uplands of the Tombigbee River. Their resulting paleoecological inferences for the Late Holocene suggest that during the occupation of the Cork site, pines may have increased, at the expense of oaks and hickories (Whitehead and Sheehan 1985:134). This *may* suggest that the Cork Site was found in an area of remnant hickory. Of greater interest, but far less certain meaning, the authors report the presence of two corn pollen grains identified, bracketed by radiocarbon dates of 2310 and 2680 B.P. (Whitehead and Sheehan 1984:135).[1]

In general, the Cork site is situated in an area of considerable variety – uplands dominated by oaks and cedars with some bluestem prairie along with hickories, pines, and oaks in close proximity and nearby lowland creek ecotones providing more mesic vegetation.

[1] It is nevertheless important to remember that while corn may have been present in a few gardens, it failed to make much of an impression until after A.D. 800-900 (Smith and Cowan 2003:117). We must also take into consideration the recent reevaluation of evidence for early maize at Middle Woodland sites (e.g., Simon 2017).

Methods

There are a range of significant biases that potentially affect the collection and interpretation of ethnobotanical collections (see, for example, Figure 4.1 in Popper 1988 or Pearsall 2015:35-44). It is important to remind the reader that what is discarded, what is preserved, and what is identified all affect our interpretation of ethnobotanical samples.

The materials from the Cork Site represent a number of different features and contexts. For each feature about a half-gallon of soil was floated and much of the unit fill was water screened. As a result, we should have a relatively representative sample.

In spite of this, there is considerable variation in the quantity of carbonized remains present. The 45 units have an average ethnobotanical weight of 1.332 g, with a standard deviation of 2.523 g. and range from as little as 0.018 g to as much as 14.584 g. The features are no less diverse, with the 30 samples ranging in size from only 0.003g to as much as 67.596g (average of 12.391 and SD of 17.049). The 30 postholes, as might be imagined, are overall smaller samples, with an average of only 1.843 g and a SD of 2.335.

While we have significant differences in yields, we have no reason to believe that there is any significant issue with the field methodology and it seems reasonable to associate the differences with either differences in feature function or the preservation context.

All of the samples were provided in a semi-cleaned state. That is, the quantity of both sand and uncarbonized organic material appears to have been significantly reduced in most samples by pre-sorting. As a result, there was relatively little "trash" in most of the samples (although two of the samples were nearly two-thirds non-carbonized materials). The postholes were the cleanest samples, but they were also the smallest.

All of the samples were prepared in one of two ways. The smaller samples were sorted under low magnification (7 to 30x), with each component weighed to the nearest 0.001 g.

Larger samples were prepared in a manner similar to that described by Yarnell (1974:113-114), with the each sample weighed and then fractioned through a series of 10 stacked geologic screens (6.3, 4.0, 2.8, 2.38, 2.0, 1.4, 1.0, 0.71, 0.425, and 0.212 mm).

This screening produces a set of subsamples, each composed of approximately equal sized particles that are more easily examined than the unsorted material. Each subsample was weighed, and then examined under a low magnification (7 to 30x).

All seeds were removed from each subsample and identified to the most limited taxonomic level possible, usually genus. As the weight of the seeds was usually quite small, all seeds from a sample were combined and their aggregate weight reported. In addition, the counts of each seed type were reported.

Identification of other plant remains was carried out for those remains greater than 2.0 mm in size (i.e., the first four screens), and the weight of each category of material was taken.

Unfortunately, remains smaller than 2.0 mm in size cannot be confidently identified. However, in order that the quantities of material reported might more accurately reflect the composition of the sample as a whole, the weights of the remains larger than 2.0 mm were extrapolated to the remains that are between 2.0 mm and 0.212 mm.

These methods are not substantively different from those used by other researchers (see, for example, Pearsall 2015), allowing comparison of this study with others in the region.

Remains were identified based on gross morphological features and seed identification relied on U.S.D.A. (1948, 1971), Martin and Barkley (1961), and Montgomery (1977).

Wood identification was generally not conducted given the small size of the fragments involved (making it difficult or impossible to expose a fresh transverse surface), but where conducted was taken to the genus level using comparative samples, Panshin and de Zeeuw (1970), and Koehler (1917).

Recently, there has been an interest in the identification of noncarbonized seeds. There is no question that in some conditions, such as dry caves or waterlogged environments, seeds (and other noncarbonized remains) may provide important information. Such is not the case at the Cork Site. There, noncarbonized materials are almost certainly the result of bioturbation and, even more particularly, collection by rodents and insects. We see no reason to expend resources to document the obvious.

In the discussions, the weights and percentages derived from these weights will be used for the different plant materials. Another standardized analysis is ubiquity, especially useful since the various remains vary in density and preservability. Ubiquity calculates the percentage of samples in which a given plant occurs (Marston 2014:167; Popper 1988:60-61). Marston suggests that ubiquity "works best" when, first, it is applied to samples from similar contexts, second, the depositional conditions are similar, and third, sampling measures are uniform. While the current study fulfills the second and third requirements, we have combined units, features, and postholes, perhaps violating the first. Nevertheless, without combining the samples, we fear the collection would be too small to be meaningful.

Results

West Block Units

The West Block sample contained three units, with 14 proveniences, including primarily flotation samples of the four identified zones. The average weights are all very small, with only B2 producing an average sample over a gram. Nevertheless, the sample average increase in weight to 1.032 g in Zone B2, declining to 0.683 in B3, suggesting the greatest occupation may be in Zone B2 and perhaps B3. The average percentage of hickory nutshell provides a very similar account, with hickory nutshell being most abundant in Zone B2. Not surprisingly, the most noncarbonized materials were found in Zone A, which Rafferty noted "contained considerable quantities of organic matter, roots, and leaves" (Rafferty 1999:13).

Since the unit flotation samples were standardized at 2 liters, the resulting total weights in Table 1 can be readily converted in the weight of charcoal per volume of soil. The most abundant carbonized sample (1.763 g) was recovered from the 3N 65W, B2 sample, while the smallest quantity (0.076 g) was recovered from the 2N 63W, B1 sample.

In nearly every case, fine screening produced even greater proportions of hickory nutshell since it is hard, dense, and preserves far better than more fragile carbonized wood. Nevertheless, these samples are little better than hand picking and the floats are by far more representative.

There is an absence of walnut shell in the western units and only a small trace of acorn shell from two proveniences.

The western units did, however, produce 17 seeds for a total weight of 0.151 g. Most of these (59%) came from flotation samples (surprisingly, the remaining seven seeds came from fine screening). Most of the flotation seeds (60%) were identified in Zone B2, contributing further evidence that this zone may represent the densest remains at the site.

East Block Units

Six units comprise the sample of units from the East Block, representing a total of 32 proveniences, including floats, ¼-inch screening, and 1/16-inch fine screening. In general, these collections are all larger than those derived from the western blocks, with the flotation samples averaging 0.889 g in size compared to only 0.625 g from the western blocks.

The largest samples were again those from Zone B2, although the B1 and B3 samples were nearly as large, perhaps suggesting deeper or more vertically dispersed occupation in the eastern portion of the site. The B2 flotation weight average was 1.164 g compared to 1.103 g and 1.042 g for Zones B1 and B3, respectively.

The largest sample (2.215 g) was recovered from the 5S 3W, B2 flotation, while the smallest (0.018 g) also came from a B2 zone, from unit 7S 11W.

On average, hickory nutshells comprised over 50% of the B2 flotation samples, compared to about 24% of the B1 and just over a third of the B3 samples.

Walnut shells are found in just two samples, both screened collections. Acorn shell was not recovered from any of the unit samples.

While only 3.6% of the B2 samples (by weight) were noncarbonized materials, the remainder of the zones were considerably more “trashy,” with typically about 11% of the samples consisting of sherd fragments, rootlets, sand grains, and other debris.

The eastern units, while possessing far more hickory nut shells, contained only seven seeds, five of which were recovered from Zone A samples. These seeds were also found in only four of the 32 proveniences, compared to five of the 14 proveniences in the West Block.

Features

The 30 proveniences examined represent 17 distinct features. The average weight of the resulting flotation samples is 12.391 g, well above the average for the unit flotations, representing the larger quantities of soil floated for the feature samples. The largest quantity from a feature is that derived from all of the various components of Feature 1, in the amount of 95.953 g. This feature was identified as a pit (Rafferty 1999:16).

Every feature (and every provenience except 1) exhibited hickory nutshells that range in quantities from less than 1 g to over 96 g (representing an average of 46% of the component total weight).

Walnut shell was found in 10 proveniences of nine distinct features although in each case the quantity was very small (in only case, Feature 10, was more a 1 g identified). Acorn nutshell was recovered from only four features, and in consistently small quantities (never greater than 0.048 g).

Surprisingly, only two seeds were recovered from feature contexts – far less in both quantity and weight than were recovered from units.

Postholes

Thirty posthole proveniences represented 26 distinct posts. Generally, postholes are relatively poor producers of ethnobotanical remains. If the post burned in place, it may be possible to recover abundant carbonized wood representing the original post. Similarly, some posts were charred to minimize decay and it may be possible to attribute charcoal to the original post. More often, however, the materials recovered are what found their way into a decomposing posthole. In such cases, the remains in postholes are little more than vague representations of the sheet midden at the site.

We found that nearly two-thirds of material in these postholes represented wood charcoal, although in no case is it likely that this charred wood represented the original post (the quantities are simply too small). All but two of the samples contained hickory nutshell, in quantities ranging from only 0.008 g to as much as 7.987 g, which was over 93% of the weight of material recovered from that one posthole. It is worth considering in this one case the possibility that the posthole was a smudge pit or other specialized feature.

One of these postholes also produced a single, and very small, fragment of shell. Whether an accidental inclusion or possible tentative evidence of Mississippian tempering is unknown.

Seven seeds were recovered from three postholes.

Food Remains

Given the quantity (212.350 g), we are confident that the hickory nutshell served as a food source. The walnut (3.320 g) is less convincing, although it is possible that the walnut was an opportunitist source. In contrast, the slightly more than 0.1 g of acorn shell is most likely to represent an accidental inclusion into the assemblage (discussed below).

Hickory

The fragments of hickory nutshell, although abundant, were generally small (the largest is illustrated on the cover of this report). At

Table 1.
Analysis of the ethnobotanical samples from units (weights in grams)

															Seeds													
	Wood Charcoal	%	*Carya* nutshell	%	*Juglans* nutshell	%	*Quercus* nutshell	%	non-carbonized	%	Lithics, Pottery	%	shell	%	*Scutellaria* sp.	*Solanum* sp.	*Panicum* sp.	*Strophostyles helvola*	*Passiflora incarnata*	*Euphorbia corollata*	*Vaccinium* sp.	*Brassica* sp.	*Prunus* sp.	*Gallium* sp.	UID	Total Seed Weight	%	Total Weight
West Blocks																												
1N 62W, A, float	0.213	24.6	0.114	13.1					0.540	62.3																		0.867
1N 62W, A, fine screen	0.490	59.8	0.311	38.0												1										0.018	2.2	0.819
1N 62W, B1, float	0.672	80.9	0.088	10.6					0.031	3.7						2										0.040	4.8	0.831
1N 62W, B1, fine screen	0.358	28.8	0.841	67.7					0.044	3.5																		1.243
1N 62W, B2, float	0.374	46.9	0.417	52.3					0.006	0.8																		0.797
1N 62W, B2, fine screen	0.275	29.9	0.624	67.8													3								3	0.022	2.4	0.921
2N 63W, A, float	0.102	77.3	0.030	22.7																								0.132
2N 63W, B1, float	0.070	92.1	0.006	7.9																								0.076
2N 63W, B2, float	0.459	85.8	0.076	14.2			t	t	t	t					1											t	t	0.535
3N 65W, A, float	0.078	88.6	0.007	8.0					0.003	3.4																		0.088
3N 65W, B1, float	0.336	69.9	0.130	27.0			t	t	0.005	1.0															2	0.010	2.1	0.481
3N 65W, B1, fine screen	3.180	82.1	0.693	17.9																								3.873
3N 65W, B2, float	1.104	62.6	0.598	33.9													2	1					1		1	0.061	3.5	1.763
3N 65W, B3, float	0.634	92.8	0.049	7.2																								0.683
East Blocks																												
3S 0E, A, float	0.085	63.0	0.050	37.0																								0.135
3S 0E, B1, float	0.496	57.2	0.314	36.2					0.055	6.3							1		1							0.002	0.2	0.867
3S 0E, B1, ¼-inch			0.146	100.0																								0.146
3S 0E, B2, float	0.369	44.4	0.446	53.6					0.017	2.0																		0.832
3S 0E, B2, ¼-inch	0.000	0.0	0.182	52.8					0.163	47.2																		0.345
3S 0E, B3, float	0.912	69.5	0.262	20.0					0.139	10.6																		1.313
5S 1E, A, float	0.302	42.9	0.304	43.2					0.098	13.9																		0.704
5S 1E, B1, float	0.312	59.5	0.212	40.5					t	t																		0.524
5S 1E, B1, ¼-inch			0.144	100.0																								0.144
5S 1E, B2, float	0.095	5.9	1.513	94.1																								1.608
5S 1E, B2, ¼-inch			1.406	98.7					0.019	1.3																		1.425
5S 2W, A, float	0.321	67.7	0.145	30.6					0.006	0.5															1	0.002	0.4	0.474
5S 2W, B1, float	1.394	71.5	0.335	17.2					0.222	11.4																		1.951
5S 2W, B2, float	0.785	64.2	0.309	25.3					0.128	10.5																		1.222
5S 3W, A, float	0.158	68.1	0.061	26.3					0.008	3.4					1					1		1				0.005	2.2	0.232
5S 3W, A, fine screen	0.081	52.6	0.073	47.4																								0.154
5S 3W, B1, float	0.537	43.4	0.174	14.1					0.139	11.2																		1.236
5S 3W, B2, float	0.524	23.7	0.035	1.6					0.034	1.5																		2.215
7S 8W, A, float	0.141	64.7	0.015	6.9					0.058	26.6															1	0.004	1.8	0.218
7S 8W, B1, float	0.938	57.2	0.439	26.8					0.264	16.1																		1.641
7S 8W, B1, ¼-inch	0.144	5.6	0.793	31.0					1.625	63.4																		2.562
7S 8W, B1, fine screen	5.326	36.5	8.846	60.7					0.412	2.8																		14.584
7S 8W, B2, float	0.261	24.0	0.823	75.7					0.003	0.3																		1.087
7S 8W, B2, ¼-inch			0.467	89.5	0.055	10.5																						0.522
7S 8W, B3, float	0.294	38.1	0.378	49.0					0.099	12.8																		0.771
7S 8W, B3, ¼-inch			0.144	100.0																								0.144
7S 11W, A, float	0.309	91.2							0.030	8.8																		0.339
7S 11W, A, fine screen	0.906	36.0	1.268	50.3					0.345	13.7																		2.519
7S 11W, B1, float	0.361	90.5	0.038	9.5																								0.399
7S 11W, B1, fine screen	1.194	12.4	7.758	80.8	0.197	2.1			0.453	4.7																		9.602
7S 11W, B2, float	0.015	83.3							0.003	16.7																		0.018
7S 11W, B2, fine screen	0.038	5.8	0.617	94.2																								0.655

Table 1, cont.
Analysis of the ethnobotanical samples from features and postholes (weights in grams)

															Seeds													
	Wood Charcoal	%	*Carya* nutshell	%	*Juglans* nutshell	%	*Quercus* nutshell	%	non-carbonized	%	Lithics, Pottery	%	shell	%	*Scutellaria* sp.	*Solanum* sp.	*Panicum* sp.	*Strophostyles helvola*	*Passiflora incarnata*	*Euphorbia corollata*	*Vaccinum* sp.	*Brassica* sp.	*Prunus* sp.	*Gallium* sp.	UID	Total Seed Weight	%	Total Weight
Features																												
Fea 1-02, 24S 28E	0.347	5.9	4.303	73.6					1.198	20.5																		5.848
Fea 1, 1S 41W	0.229	75.1	0.076	24.9																								0.305
Fea 1A, E½	2.430	12.9	10.413	55.4	0.030	0.2			5.387	28.7	0.530	2.8																18.790
Fea 1A, W½	0.294	83.5	0.020	5.7					0.038	10.8																		0.352
Fea 1B	0.313	52.7	0.182	30.6					0.099	16.7																		0.594
Fea 1B, 3S 4E	2.175	88.1	0.254	10.3					0.039	1.6																		2.468
Fea 1A & 1B, scrape	6.444	9.5	36.596	54.1			t	t	24.556	36.3																		67.596
Fea 2	0.125	1.2	8.729	86.6	0.097	1.0			1.133	11.2																		10.084
Fea 2A	7.313	76.0	0.584	6.1					1.730	18.0																		9.627
Fea 2B	9.190	80.6	0.019	0.2					2.187	19.2																		11.396
Fea 3	0.051	0.6	8.492	95.3					0.365	4.1																		8.908
Fea 4	0.670	4.2	13.067	81.4					2.320	14.4																		16.057
Fea 7	0.268	2.6	8.152	79.5	0.100	1.0			1.729	16.9																		10.249
Fea 8, N½	32.020	79.6	3.991	9.9	0.094	0.2	0.048	0.1	4.091	10.2																		40.244
Fea 8, S½	0.412	64.7	0.136	21.4					0.089	14.0																		0.637
Fea 9	t	t																			1					0.003	100.0	0.003
Fea 9, 2S 1E	0.732	39.9	0.392	42.6					0.709	38.7																		1.833
Fea 10	4.980	33.1	7.539	50.1	1.386	9.2			1.136	7.6																		15.041
Fea 11	7.174	51.2	5.040	35.9					1.749	12.5																0.062	0.4	14.025
Fea 11, W½	0.329	20.7	1.257	79.3																								1.586
Fea 12	5.833	93.2	0.165	2.6					0.263	4.2															1	t		6.261
Fea 13	30.738	53.7	13.480	23.6	0.097	0.2	0.090	0.2	12.830	22.4																		57.235
Fea 13, N½	2.021	63.0	0.586	18.3			t	t	0.601	18.7																		3.208
Fea 14	3.980	10.8	29.073	78.8	0.809	2.2			3.021	8.2																		36.883
Fea 17	0.078	3.4	2.250	96.6																								2.328
Fea 19	2.735	85.1	0.460	14.3	0.017	0.5																						3.212
Fea 21	0.452	51.6	0.403	46.0					0.021	0.7																		0.876
Fea 22	1.009	57.9	0.483	27.7	0.097	5.6			0.154	8.8																		1.743
Fea 22, 1N 15E	9.861	42.0	4.813	20.5	0.081	0.3	0.001	0.0	8.732	37.2																		23.488
Fea 23 NW	0.479	55.6	0.203	23.6					0.179	20.8																		0.861
Post Holes																												
1A	0.428	42.6	0.302	30.0					0.261	26.0														3		0.014	1.4	1.005
1B	1.602	59.2	0.999	36.9					0.103	3.8																		2.704
2A	0.065	65.7	0.012	12.1					0.022	22.2																		0.099
2B	1.227	77.2	0.339	21.3					0.023	1.4																		1.589
3	0.907	70.1	0.336	26.0					0.051	3.9			t	t														1.294
5	5.316	55.6	2.903	30.3					1.349	14.1																		9.568
5, Strat B	1.055	59.8	0.708	40.2					0.010	0.6																		1.763
6	0.255	57.4	0.173	39.0					0.016	3.6																		0.444
7	0.305	57.8	0.187	35.4					0.036	6.8																		0.528
8	2.221	62.8	0.993	28.1	0.100	2.8			0.223	6.3																		3.537
10	1.362	73.5	0.466	25.2					0.024	1.3					3											t	t	1.852
12	0.384	84.8	0.069	15.2																								0.453
14	0.716	26.4	1.614	59.6	0.070	2.6			0.309	11.4														1		t	t	2.709
21	0.403	84.8	0.045	9.5					0.027	5.7																		0.475
22	0.401	4.7	7.987	93.4					0.166	1.9																		8.554
25	0.112	70.0	0.046	28.8					0.002	1.3																		0.160
27	0.456	47.5	0.426	44.3					0.079	8.2																		0.961
40	0.892	54.2	0.320	19.4					0.435	26.4																		1.647
41	0.408	81.6	0.021	4.2					0.071	14.2																		0.500
42	0.029	78.4	0.008	21.6																								0.037
46	0.637	61.4	0.358	34.5					0.043	4.1																		1.038
50	1.711	64.6	0.912	34.4					0.025	0.9																		2.648
51	1.250	97.4	0.033	2.6																								1.283
53	5.754	99.3							0.042	0.7																		5.796
54	0.038	60.3							0.025	39.7																		0.063
55	1.755	92.7	0.118	6.2			t	t	0.021	1.1																		1.894
56	2.104	99.1	0.019	0.9																								2.123
57	0.116	77.3	0.026	17.3					0.008	5.3																		0.150
75	0.165	58.3	0.083	29.3					0.035	12.4																		0.283
76	0.113	93.4	0.008	6.6																								0.121

least a few could be tentatively identified as *Carya glabra* or the pignut hickory. Others are classified only as thick-shelled hickory (generally considered to be *C. ovata, C. tomentosa, C. laciniosa, and C. glabra*).

Fowells (1965:110-138) identifies four hickories to be common in the area of Oktibbeha County: bitternut, *C. cordiformis*; mockernut, *C. tomentosa*; pignut, *C. glabra*; and shagbark, *C. ovata*. The taste of the bitternut hickory generally precludes it from being considered a dietary staple, although Moerman (1998:140) identifies the bitternut as being used by the Iroquois as a food (Medsger 1966:104 identifies this nut as "very bitter indeed").

Radford and his colleagues (1968:365-366) identify the bitternut and shagbark in low, rich woods, while the mockernut is found in dry woods and the pignut can be found in dry to moist woods. All produce nuts in October.

Table 2.
Nut data (adapted from Asch et al.1972; Bonner and Maisenhelder 1974; Brinkman 1974; Olson 1974

Nut	% yield (nutmeat/fruit)	yield per tree (bu)	calories/ 100 g	Protein (%)	Fat (%)	Carbohydrates (%)
C. ovata	25-38	1.5-2	683	12.2	72.7	11.3
J. nigra	33	2	624	23.0	60.7	12.3
Q. rubra	42-80		313	5.8	21.6	67.2

Moerman (1998:141) identifies a number of historic groups for which shagbark hickory has been an important food source. Sumner notes that Bartram in 1791 described bushels of hickory nuts being stored by the Creeks and "used in almost all of their cookery" (Sumner 2004:151).

Perhaps the most detailed discussion, however, is that by Fritz and her colleagues (2001) who describe the preparation of the Oklahoma Cherokee ku-nu-che, a traditional hickory nut soup. This study not only addresses the preparation and cooking, but also noted that the resulting nutshells were a preferred fuel among those making the soup, perhaps helping to address the abundance of nutshell preserved in the archaeological record (Fritz et al. 2001:24).

The emphasis on "acorns, hickory nuts, and other forest seeds" easily can be traced to Caldwell's (1958:21) concept of "Primary Forest Efficiency." In the 1980s, Cowan identified nuts as the most common component of ethnobotanical samples from as early as 7,000 B.C. until the rise of agriculture (Cowan 1985:218).

Gardner (1997) has prepared a very detailed assessment of hickory nut exploitation among Woodland groups, considerably expanding on the earlier concepts. Step-by-step Gardner documents the greater caloric content of hickory nuts compared to maize and acorns; exploring their productivity; examining studies on processing costs; and noting that while hickories were simply "just one resource among many," they would have been of considerable importance as a stored commodity in the winter and spring (Gardner 1997:171). Requiring no more preparation for storage than simple parching, hickories would easily have complemented the lean game of the winter periods. Gardner effectively shifts our attention from viewing hickory nut resources as a fall resource, to one that assumed importance later in the year, when there were far fewer options.

Thus, it should come as no surprise that the Middle Woodland occupants at the Cork Site were spending considerable effort in acquiring hickory nut resources.

Walnut

The importance of walnut pales in comparison to that of hickory. But, this is to be expected considering the location of the Cork Site and the probable difficulty in finding walnut resources.

Fowells (1965:203) suggests that the

black walnut (*Juglans nigra*) is the most likely source. It grows best in well drained bottoms and on rich soils (Fowells 1965:203; Radford et al. 1968:362). Moreover, while Fowells comments that it grows in many of the mixed mesophytic forests, it is seldom abundant (Fowells 1965:204). Wagner comments that the black walnut resources are "usually scattered" (Wagner 2003:150). As previously discussed, Küchler did not anticipate many walnuts in his environmental reconstruction around the Cork Site. Therefore, with only occasional trees, it is not surprising that only occasional nuts were identified in the assemblage.

Moerman (1998:280-281) notes native use of the walnut for both food and medicine, with processing not especially different from that of the hickory. Medesger (1966:95) observed the "sweet, edible, four-celled kernel has a pleasant but strong taste and is quite oily." Schopmeyer (1974:456) does explain that walnut meat can be difficult to difficult to remove from the shells, but this need not be a concern if the walnut is processed in any of the methods thought to be used with the hickory (Gardner 1997).

Acorn

Fowells (1965:557-640) identifies no fewer than 11 oaks that might be expected in the Oktibbeha area of Mississippi. The species range from dry, sandy upland soils to well-drained terrace soils, to poorly-drained alluvial lands. Given the variety, the aboriginal occupants should have had a great variety of acorns to include in their foraging strategy.

In spite of the abundance, however, very few – and very small – specimens were recovered. Too few, we believe, to warrant consideration as a food resource. Instead, we suspect accidental inclusions, perhaps as a result of fuel wood selection.

This suggests that the site occupants made a decision to focus on high-protein hickory, rather than high-carbohydrate acorn.

Seeds

Twenty-four seeds, representing 10 species were identified in this study. An additional nine seeds were unidentified. These seeds are listed in Table 1. Before discussing the individual genera and their *potential* uses, I am doubtful that any of the specimens are more than accidental inclusions as weedy species.[1] None are present in quantities sufficient to suggest they served an economic function.

Brassica sp. - mustard

This plant is native to Western Europe, the Mediterranean, and temperate regions of Asia and was introduced into North America. There is no reason that it should be associated with a Middle Woodland archaeological site. The seed was re-examined and the identification appears sound, so it was likely an accidental inclusion in the archaeological record.

Euphorbia corollata – flowering spurge

This is a "weedy" species that fruits from May-June through September-October and is found in old fields and dry sandy areas (Radford et al. 1968:672; United States Department of Agriculture 1971:246). Moerman (1998:230) does identify its use, primarily as a drug, among various native groups.

Galium sp. – bedstraw

Although bedstraw (also known as cleavers) is widely dispersed, there are at least two species, G. circaezans and G. virgatum, that are

1 A "weedy" species is defined as a generally unwanted plant that thrives in habitats disturbed by humans (e.g., Harlan and deWet 1965:19). In the case of many weeds, very large numbers of seeds are produced, the plant may mimic to some degree the surrounding plants, thereby escaping notice, and will also exhibit "enormous phenotypic plasticity, allowing them to readily adapt to survive with humans.

specifically associated with the Black Belt Prairie (https://mississippientomological museum.org. msstate.edu/habitats/black.belt.prairie/Prairie.Pl ants.htm). It is another "weedy" species that fruits from May through October and is found in rich woods and roadsides (Radford et al. 1968:984; United States Department of Agriculture 1971:352). Moerman (1998:242) documents the use among Native American groups for both food and as a drug.

Panicum sp.

One species, *P. virgatum* or as switchgrass, is associated with the Black Prairie Belt. Moderately deep to deep, somewhat dry to poorly drained, sandy to clay loam soils are best and the plant fruits from June through October (Radford et al. 1968:142; United States Department of Agriculture 1971:72). The grass is known as good forage and provides shelter for animals. Moerman (1998:377) also reports its use in Native American foods, especially in breads and cakes.

Passiflora incarnata – maypops

Maypops is a common southern plant, producing beautiful, viney flowers and a fruit that Moerman (1998:379) notes as being used both as a food and a "social drink" among different groups (see also Medsger 1966:59). The plant occurs along roadsides, fencerows, thickets, and old fields. While it prefers fertile, well-drained soil, it will grow in heavier clay soils. The plant fruits from July through October (Radford et al. 1968:734).

Prunus sp. – cherry

The seed may represent either the choke cherry (*P. virginiana*) or the black cherry (*P. serotina*), although the former is not generally reported from Mississippi (*Plants Database*). In addition, *P. angustifolia* is often associated with the Black Belt Prairie; however, the black cherry is a better seed match. Regardless, this plant is usually referred to as a small tree (Schopmeyer 1974:658-673). It fruits from July through October and is generally found in rick woods, often associated with oaks and hickories (Radford et al. 1968:568).

Scutellaria sp. – skullcap

S. parvula is the species most commonly associated with the Black Belt, although the five identified seeds may also represent *S. integrifolia*. The former prefers open, prairie-like environments with calcareous soil. It flowers from the late spring to the early summer. The latter is found in mesic areas of open, disturbed soil and flower from May through July.

Solanum sp. - nightshade

The plant is found as a "weedy" species in old fields and waste places, usually in sandy soil, and fruits from May through October (Radford et al. 1968:930; United States Department of Agriculture 1971:322). Both Medsger (1966:200) and Moerman (1998:535-536) note that parts of the plant are edible, although the latter suggests it was general considered "starvation food" among the Native Americans.

Strophostyles sp. – wild bean

All three species of this wild legume, *S. helvola*, *S. leiosperma,* and *S. umbellate*, are native to Mississippi. They occur in sandy fields, woods, and clearings, seemingly preferring damp soils, but found in a wide variety of conditions, including fine-textured upland soils. It is usually thought of as a "pioneer" plant, colonizing open sites. The plant fruits from August through October (Radford et al. 1968:640), with the seed pods shattering, dispersing the seeds, when the seeds are ripe. Moerman (1998:546) reports the plant was used for food as well as various medicinal uses. It is attractive to a variety of wildlife, including bobwhites, quail and turkeys. It is also widely reported in archaeological assemblages (e.g., Blake and Cutler 2001:118, 119, 121; Muller 2009).

Vaccinium sp. – blueberry

Vaccinium is a common and widespread genus of shrubs or dwarf shrubs producing fleshy fruits. With over 400 species (although far fewer are native to Mississippi), they are found in a variety of habitats, although most prefer acid soils, often under oaks and pines (Radford et al. 1968:814). Moerman (1998:582-583) identify a variety being used as food by Native Americans. They are also sporadically identified from both prehistoric and historic archaeological sites in the Eastern United States.

Table 3.
Identified woods

Provenience	*Quercus*	*Pinus*	UID
Feature 2B	x		
Feature 8, N½	x	x	
Feature 12	x	x	x
PH 25	x	x	
PH 41	x		
PH 53	x		
PH 56	x		

Wood Charcoal

As mentioned, the materials from the Cork Site were very small and few fragments were of a size suitable for allowing radial and tangential sections (Smart and Hoffman 1988:178-179). As a result, we found only seven samples containing sufficiently large fragments; three from feature contexts and four from postholes. The results of this analysis are provided in Table 3.

Only two woods could be identified, oak and pine. The oak is present in all seven samples, pine is present in three. This is consistent with the site's location in Braun's Oak-Pine Forest and its proximity to Küchler's *Quercus-Carya-Pinus* area (see p. 3 of this study).

Focusing on cultural mechanisms bringing wood to the Cork Site, the most likely are either for fuelwood or as structural timbers. In the context of fuelwood, oaks yield 86% of the heat value of coal, with only the hickory producing a higher yield (of 96%). Yellow pine yields 85% efficiency, nearly as high (Reynolds and Pierson 1942:7). Given the importance of the hickory mast to the site occupants, it does not seem unreasonable that alternative woods, such as oak and pine would have been chosen for fuel, over the more valuable hickory. In addition, both oak and pine would have been more prevalent, making their access less costly.

A number of pines, such as the slash and loblolly, are good self-pruners, as are many oaks (Millington and Chaney 1973:176-181). So it is reasonable that considerable fire wood, at least in the short-term, could be obtained without the need to remove living trees. Curiously, many hickories are also good self-pruners, yet no hickory wood was identified in the samples, in spite of the time that the site occupants must have been around these trees collecting nuts. Whether this reflects a division of activity or a spiritual respect for the tree providing food cannot be determined with the current evidence (most fundamental here is the very small sample available).

The prevalence of oak in possible structural contexts is not surprising. Scheffer and Cowling (1966:151) identify oak (such as post and white) as being resistant or very resistant to decay. In contrast, pine is only moderately resistant. Additional research by Highly (1995:418) found that above ground use of oak in southern Mississippi had an anticipated lifespan of about 6 to 20 years, while pine would survive from 5 to 10 years.

Other Material

While not normally a material identified in ethnobotanical studies, it is worth mentioning that several samples contained small quantities of galena. This topic has already been explored by Rafferty and Renson (2017) and one explanation for the material's rarity involves collection methodology. The identified weights and their location are provided in Table 4.

These materials, along with other sand and debris were collected in the flotation samples and none would have been recovered with any water screening other than 1/16-inch mesh. Hopefully, these additional materials will allow further comments on the presence of this material at the Cork Site. Their recovery also points out that

Table 4.
Galena recovered from ethnobotanical samples

Provenience	weight (g)
1N 62W, A, float	0.065
3S 0E, B1, float	0.023
5S 2W, B2, float	0.057
5S 3W, B1, float	0.083
Feature 3	0.039
Feature 4	0.104
Feature 7	0.007

flotation is not solely useful for the recovery of plant materials, but can sometimes provide additional lines of evidence.

Conclusions

Summary

The ethnobotanical collection from the Middle Woodland Cork Site in Oktibbeha County, Mississippi, was recovered from nine units representing a sample from the West and East blocks (16.9%), 17 features (32.1%), and 27 post holes (50.9%). In sum, there were 109 discrete samples, 90 of which were flotation samples with heavy and light fractions combined and the remainder were water screening through either ¼-inch or 1/16-inch mesh. The collection had a total weight of 490.7 g, with the flotation samples alone weighing 451.3 g (nearly 92% of the total).

The samples included abundant wood charcoal (189.5 g), although the fragments are small and relatively few were suitable for species identification. As a result only oak, pine, and an unidentified wood were found. Hickory nutshell, however, is even more abundant, accounting for 212.3 g of the sample. Walnut, while present, accounts for only 3.2 g, suggestive of opportunistic collection. Acorn shell is very uncommon (0.1 g) and it seems most likely the result of accidental inclusions, perhaps in association with fuel wood.

Thirty-three seeds or fragments were recovered in the samples, for a total weight of 0.243 g. These include 10 identifiable genera, as well as a few unidentified seeds. None appear with the consistency to suggest that they were gathered for some specific purpose and many are "weedy" species that would be expected in a disturbed habitat. Nevertheless, some of the "disturbance indicators" of secondary succession, such as bedstraw (*Galium* sp.), spurge (*Euphorbia* sp.), maypop (*Passiflora incarnata*), and wild bean (*Strophostyles* sp.) are plants that Crites finds "intimately involved in the specialized human-plan mutalism/symbiosis" of eastern North America (Crites 1987:729).

It is curious that the seed:charcoal ratios for the block excavations are actually higher (2:1 for the west block and 1:2.3 for the east block) than for the floated features (1:66.3). This may lead credence to the idea that the B zones in the excavations represent sheet midden as proposed by Rafferty.

The quantity of hickory nuts in the feature fill varied considerably, but we see eight features (or portions of features) where the proportion of nutshells is 70% or greater and these appear to stand out as representative of special cultural activities (Features 1-02, 2, 3, 4, 7, 11W½, 14, and 17).

The nutshell:charcoal ratio for the combined features is 1.2:1.

The nutshell:charcoal ratios for the block excavations further reveal the importance of hickory nuts at the Cork Site. In the west block, the nutshell:charcoal ratio is 1:2; in the east block the ratio is 1.7:1. So in these blocks, the proportion of nutshell ranges from about 50% to as 169%. This may again be explained by recognizing the bulk of the unit zones representing sheet midden, with abundant evidence of daily activities.

Another way to express the significance of the hickory nutshell at the Cork Site is through ubiquity. Nutshell has 100% ubiquity in the western blocks, 94% ubiquity in the eastern blocks, 97% ubiquity in the features, and 93% ubiquity in the post holes.

It should not be surprising that the Cork Site failed to exhibit any evidence of cultivated crops such as corn. The case for Middle Woodland corn cultivation in the deep south is exceedingly weak. Gremillion observes that while corn was present in the Hopewell gardens further north, "it had little dietary impact" (Gremillion 2003:35) and it was only after A.D. 800 that corn becomes a significant crop. What is far more surprising is that sites such as 22OK746 that show abundant use of hickory nut are not better recognized and examined. As Gardner (1997:177-178) has observed, "while tabulating nutshell percentages is not as flashy an endeavor as finding early cultigens, nutshell is an important data set in its own right" and it deserves more than it often receives in our analytical efforts.

Comparisons

Rafferty acknowledged that "only a few Middle Woodland habitation sites have been excavated in north-central Mississippi and hand excavation has not been extensive at any except when associated with mounds. Often, the sites' plow zones have been stripped off with heavy equipment, the dirt from which was not screened (Rafferty and Renson 2017:248). Although these comments were directed toward the recovery of galena, they are equally appropriate when we consider ethnobotanical remains.

The only study I have found is that at site 22OK908. There five features with 18 proveniences were subjected to flotation and subsequent analysis. The study concluded that remains were not common, with only 18.3 g recovered. Unfortunately, no tabulation of remains was provided, but the report does indicate that in addition to wood remains (dominated by hickory, at 38% and oak, at 13%), there was nutshell (confined to one feature that produced only 0.12 g), monocot stem material (suggestive of grasses or canes), papery rind fragments, three unidentifiable seeds, and what was identified as possible corn (McKnight 1999).

Very little should be made of the corn, since the site evidenced plowing with rodent disturbances and abundant uncarbonized seeds. Moreover the attribution is uncertain. What is of far greater interest is the general dearth of botanical remains and, within the assemblage, a dearth of hickory nutshell.

A more recent study in neighboring Choctaw County (Bush 2015) recovered 85.1 g of carbonized materials from 12 samples. Most abundant was wood charcoal, corn (one kernel and some possible starchy material), hickory nutshell, acorn nutshell, cane, and seeds. This site had a Mississippian component that might account for the corn. The hickory nutshell here had a total weight of only 1.14 g. and the acorn was very scarce (0.04 g). Twelve seeds were recovered, representing the daisy family, American hornbeam, grassy species, and three indeterminate seeds.

Middle Woodland remains from the coastal Godsey site (22HR590) have been examined by Scarry (2000). Hickory nuts are the only plant food from this site that is present in more than one sample, being found in seven of the 10 samples. Here, however, acorn and hickory appear to be complementary (hickory being found in 77% of the samples and acorn in the remaining 23%) (Scarry 2000:171). Scarry observed scant evidence for the use of wild grains and no evidence for cultivated grains.

Fritz, in her review of the Lower Mississippi River Valley comments that for the Middle Wood there is a pattern of "heavy acorn use," with higher densities of acorn than hickory (Fritz 2008:333). The investigations at the Cork site suggest an entirely opposite scenario, emphasizing how really little we know about the Middle Woodland in this area.

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