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REPORT

Middle Ohio Valley Maize Histories: New Dates from the Crossroads of the Midcontinent

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Abstract

The transition to maize agriculture frames important cultural shifts in the Eastern Woodlands. However, the tempo and mode of this transition are unclear, particularly when analytical techniques are not standard across the region. In this article, we present evidence of directly dated maize macrobotanical fragments from the Turpin site in southwest Ohio that date between cal AD 552–649 and 684–994. These dates add to current dialogues on the spread of maize in the American Midcontinent and help further situate the Middle Ohio Valley as a cultural crossroads through which people and ideas flowed. We echo suggestions that, to refine our understanding of the introduction of maize into the region, we must develop pan-regional analytical standards and create multiple working hypotheses at a variety of scales.

Resumen

La transición a la agricultura del maíz perfila importantes cambios culturales en los *Eastern Woodlands*. Sin embargo, no son claros el ritmo y la forma de esta transición, particularmente, debido a que las técnicas analíticas a lo largo de la región no están estandarizadas. En este artículo, se presenta evidencia de la datación directa y calibrada de fragmentos macrobotánicos de maíz del periodo 552-649 dC y 684-994 dC del sitio de Turpin en el suroeste de Ohio. Estas fechas se suman a los debates actuales sobre la dispersión del maíz en el continente medio americano, contribuyendo a situar aún más el valle medio del Rio Ohio como la sede de una confluencia cultural a través de la cual fluyeron diversas personas e ideas. Apoyamos las sugerencias de que para refinar a mayor detalle nuestra comprensión sobre la introducción del maíz en la región, debemos desarrollar procedimientos analíticos estandarizados para toda la región y crear múltiples hipótesis de trabajo en varias escalas.

Keywords: maize; Fort Ancient; Woodland period; Middle Ohio Valley

Palabres clave: maíz; Fort Ancient; período Woodland; valle medio del Rio Ohio

The introduction of maize into the Eastern Woodlands frames many considerations of cultural developments that occurred between AD 400 and 1600. Questions of when, where, and how maize appeared have fostered a long history of investigations (e.g., Staller et al. 2006). As we have collectively clarified maize histories in this region, long-standing narratives regarding the emergence of complexity and regional interconnectedness have changed (e.g., Bender et al. 1981; Simon 2014, 2017; Simon, Hedman, and Emerson 2021). Increases in the variety and resolution of empirical testing have also revealed significant spatial and temporal nuance to these histories that can at times seem less than intuitive. A recent dialogue has emerged regarding the timing of maize in the American Bottom and Great Lakes regions and the nature of data used to assess this chronology (Emerson et al. 2020; Hart et al. 2021; Simon, Hollenbach, and Redmond 2021). This article reviews previously published data for maize use from pre-AD 1000 contexts in the Middle Ohio Valley (MOV) and adds to the discussion recent maize AMS dates from the Turpin site (33HA19) in southwest Ohio. Macrobotanical data from our region suggest that maize was used in the MOV as early or earlier than anywhere else in the Midcontinent and that the MOV may have acted as a crossroads between the American Bottom, the Great Lakes, and other regions in the midcontinent.

Maize Histories

The spread of maize from its initial area of domestication in the Balsas River Valley in south-central Mexico approximately 8,700 years ago (Piperno et al. 2009) has long interested researchers, given the social and ecological transformations that tended to accompany this crop. North of Mexico, maize entered the economies of indigenous foragers in the US Southwest by approximately 2500–2000 BC and was part of the package of cultural traits that moved with Basketmaker II phase farming groups early in the first millennium AD (Hanselka and Vierra 2017). The pathway(s) that maize took into the Plains is currently unclear, but macrobotanical evidence in the eastern Plains points to its appearance between cal AD 688 and 977 (Adair 2012). Recent microbotanical evidence suggests that maize was part of Indigenous systems in the eastern Plains as early as cal 361–197 BC (Adair et al. 2022). This apparent lag signals a similar discrepancy between macrobotanical and microbotanical remains in the Eastern Woodlands.

Recent work by Mary Simon and colleagues (e.g., Emerson et al. 2020; Simon, Hollenbach, and Redmond 2021) and John Hart and coworkers (e.g., Hart 2022; Hart and Lovis 2013; Hart et al. 2003, 2007) has provided considerable insight into maize histories in the American Bottom and Great Lakes regions, respectively. Simon (2014, 2017; Simon, Hedman, and Emerson 2021) has demonstrated that maize is rare in the American Bottom before AD 900/1000, reshaping a common narrative in which gradually increasing amounts of maize were an integral part of Woodland period cultural evolution in this region. Even maize cited at Middle Woodland sites has been shown to be intrusive or originally misidentified as maize (Simon 2017; Simon, Hedman, and Emerson 2021). The sole Woodland maize date from western Illinois broadly that stands up to scrutiny was recovered from the Edgar Hoener site and dates between cal AD 657 and 775 (see Simon 2014). This new perspective on early maize use fits well with what we are finding in the MOV.

Expanding our understanding of early maize use, Hart and colleagues (2003, 2007) identified maize phytoliths in residues from pots recovered from central New York dating to as early as 300 BC. Macrobotanical evidence is less common, but sites like Grand Banks in southern Ontario have produced directly dated maize cupules as early as cal AD 330–649 (Crawford et al. 1997:114).[1] These early dates on the opposite side of the continent from the south-central Mexican heartland of maize domestication have led some scholars to question their validity or at least find these dates confusing (Emerson et al. 2020). However, considered broadly, these data offer an intriguing case for an early introduction of maize into the Great Lakes region.

The different types of evidence (i.e., macro- versus microbotanicals) create a situation in which we may talk past each other; yet, taken at face value these studies demonstrate some of the complexities in understanding the varying pathways that maize took as it entered subsistence systems of Indigenous foragers in the Eastern Woodlands before its establishment as a focal aspect of agricultural systems around AD 1000. The MOV reflects one possible avenue of movement between these regions and provides an otherwise missing perspective. The Ohio River Valley has long been seen as a thoroughfare for the movement of people and ideas (e.g., Griffin 1952). At least in the early years of the Late Precontact period (around AD 1000–1300), people were moving between the Great Lakes, MOV, and the American Bottom regions (Cook 2017; Cook and Price 2015), and there is also some intriguing evidence for movement during the centuries preceding this period (Cook and Price 2015).

Now that remains from the Edwin Harness Mound in Ohio have been shown to be plants other than maize (Simon, Hollenbach, and Redmond 2021), there are no directly dated maize macrobotanical remains from solid contexts before AD 1000 in the MOV. More common are secondary lines of evidence, including maize contextually associated with charcoal dates and carbon isotope evidence from human bone. For example, features from the Woods site in West Virginia containing maize date between cal AD 569 and 775 (Shott 1990; Wymer 1992, 1994). Similarly, maize is reported from Woodland contexts at the Sand Ridge site in southwest Ohio (Riggs 1998), but stratigraphic mixing at the site likely means that these kernels were intrusive. Direct analysis is necessary to confirm these dates and ensure that they are not examples of contamination or of non-maize plants like those identified elsewhere. Additionally, isotopic evidence from northeast Ohio indicates the presence of maize in the diets of individuals around cal AD 775–1022 (Redmond 2012:124). More work is clearly needed to confirm site-specific and regional patterns regarding the possibility of pre–AD 900/1000 maize use in the region. The Turpin site in southwest Ohio provides a compelling place to begin that work (Figure 1).

Maize from Turpin: Spanning Late Woodland and Early Fort Ancient Time Periods

As part of our ongoing work to better understand the emergence of maize agriculture in the MOV, we conducted field and collections-based research at the Turpin site over the last decade (Comstock 2017; Comstock and Cook 2021; Cook 2017). This multicomponent site contains both preagricultural (Late Woodland; around AD 400–1000) and Late Precontact Fort Ancient culture (around AD 1000–1300) occupations and is the type-site for the post-Hopewell Newtown phase (around AD 400–700) in the region (Griffin 1952; see also Comstock 2017; Cook 2017). Excavations by the then Cincinnati Museum of Natural History (CMNH) revealed intensive Newtown Phase occupations, termed the "Old Village" component, that also purportedly contained maize (Oehler 1973). To determine whether these maize remains were intrusive like much of the maize recovered from Woodland period contexts in the American Bottom (Simon 2014), six maize cob fragments were selected from CMNH collections for dating at the NSF Arizona AMS Laboratory: three from "Old Village" contexts and three from Fort Ancient contexts (see Cook 2017).

The results of this analysis are consistent with the contexts from which the samples were taken (Table 1; Figure 2). Cob fragments sampled from the three Newtown phase "Old Village" contexts all resulted in pre–AD 1000 distributions. One date from the "2nd Old Village," a context that we interpret to reflect a separate occupation based on CMNH parlance, produced a 12-row maize

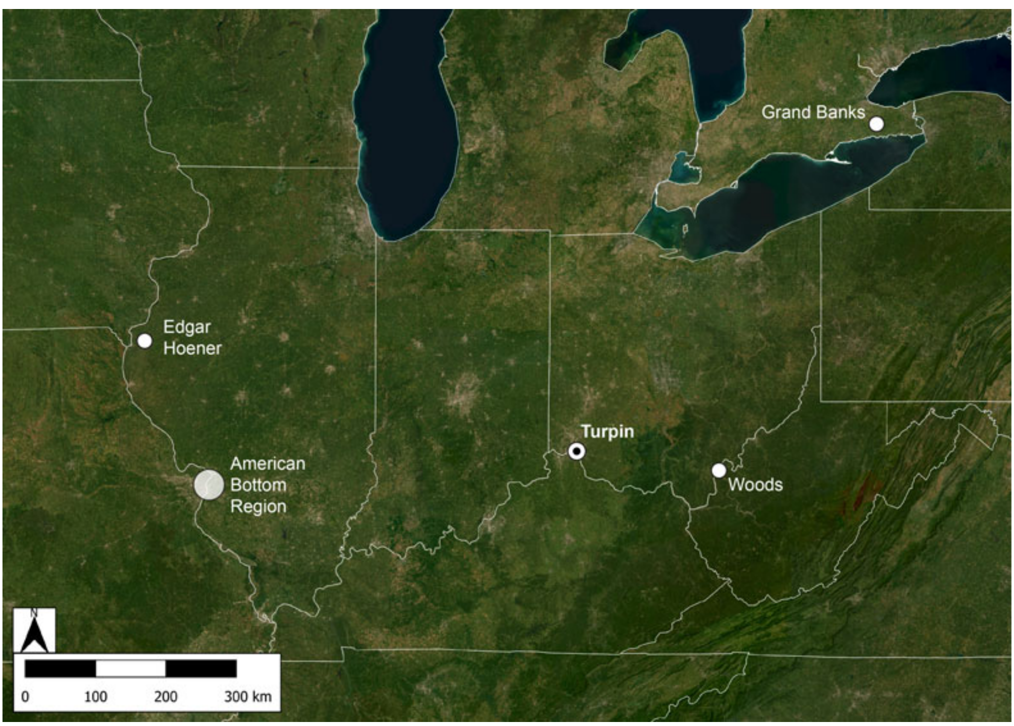

Figure 1. Map of sites and areas mentioned in this study.

Table 1. Maize Dates and Contexts from CMC Excavations at Turpin.

Date	Radiocarbon Years BP	Median (AD)	Calibrated Date and 2-sigma Probability Range (AD)	Material*	$\delta^{13}C$ Value	Context
AA98032	1468 ± 35	603	552–649 (95.4%)	Maize cob (12 row)	−10.8	"2nd Old Village" F.S. 9881 676/ 14498 A62864
AA98034	1200 ± 42	831	684–744 (12.4%) 771–900 (74.1%) 917–973 (9.0%)	Maize cob (8 row)	−10.2	"Old Village" 1st layer F.S. 875 676/ 7395 A62865
AA98033	1130 ± 35	927	774–788 (3.9%) 828–862 (7.0%) 868–994 (84.6%)	Maize cob (10 row)	−9.9	"Old Village" 1st layer F.S. 875 676/ 7395 A62865
AA98030	907 ± 35	1131	1040–1216 (95.4%)	Maize cob (8 row)	−9.3	Mound Area, subdivision 4 block 0000R3 F.S. 1977 676/ 7398 A62866
AA98031	875 ± 37	1166	1045–1086 (16.7%) 1092–1105 (2.1%) 1120–1261 (76.6%)	Maize cob frags (prob. 12 row)	−10.4	Mound Area, subdivision 4 "top" 676/ 6552 A62863
AA98029	842 ± 35	1200	1054–1063 (1.5%) 1156–1272 (94.0%)	Maize cob (10 row)	−8.8	Mound Area, subdivision 4 block 0000R3 F.S. 1977 676/ 7398 A62866

Notes: Calibrations performed using OxCal 4.4.4 with the r.5 atmospheric data from Reimer and colleagues (2020).
* Row numbers estimated by Kristen Gremillion.

cob fragment that dates between cal AD 552 and 649, making it one of the earliest directly dated maize cobs in the Eastern Woodlands. Two additional cobs date to the centuries before AD 1000, although their accuracy suffers from the nature of the calibration curve during this period. One eight-row cob fragment dates between cal AD 684 and 973 and a 10-row cob fragment dates between cal AD 774 and 974. Note that these pre–AD 1000 distributions do not overlap calibrated ranges associated with Fort Ancient contexts and were recovered from contexts with distinctly different material

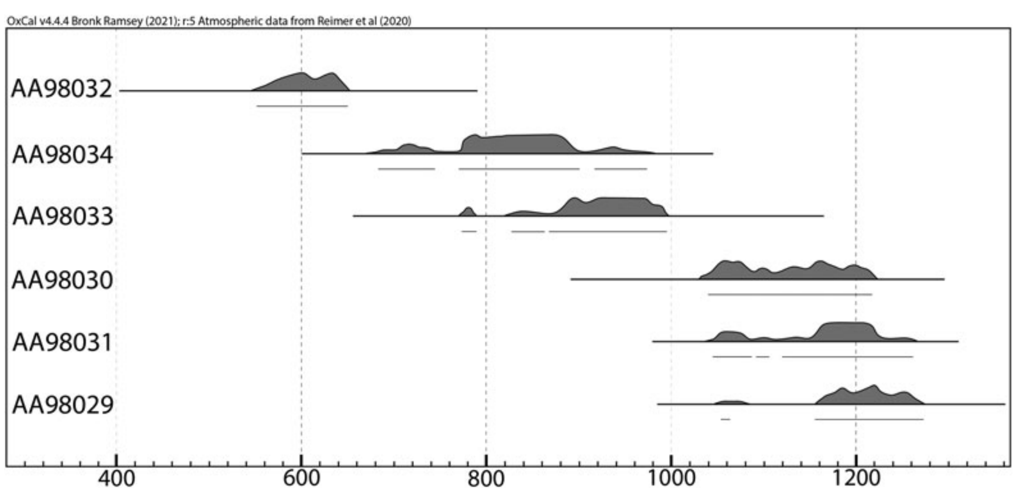

Figure 2. Calibrated distributions of maize dated from the Turpin site.

culture. We thus interpret these early maize dates as earlier than established villages of maize agriculturalists in our region. Maize cob fragments sampled from suspected Fort Ancient contexts date between cal AD 1040 and 1275 (Table 1) and are consistent with other dated contexts from the site and the early Fort Ancient period more broadly (see Comstock 2017; Comstock and Cook 2021; Cook 2017).

The pre–AD 1000 maize dates presented here point to maize use at the Turpin site earlier than has been so far discovered in the MOV, and at least one is earlier than most maize macroremains found in the Midcontinent. Considered at a regional scale, these dates place the MOV in consideration for one of multiple early areas of maize use in the midcontinent. We should note that unlike some regions in which there is a lag between early maize evidence and bone isotope evidence for maize consumption, Turpin has produced evidence for early maize remains and early maize consumption. For example, Greenlee (2002:191) notes that bone collagen from half the sampled individuals interred in the stone mound, a mortuary facility at Turpin dated between cal AD 600 and 900, produced elevated $\delta^{13}C$ values (between −9‰ and −13‰). Analysis of dental enamel from an individual in this context dated between AD 651 and 867 returned $\delta^{13}C$ values of −14.7‰ (M1) and −14.5‰ (M3), indicating the presence of maize in their diet (Cook and Price 2015:125).

These findings fit well with subtle evidence that imply networks of connectivity during the AD 500–1000 period. For example, the discovery of Scallorn-like arrow points (Comstock and Cook 2021) could point to connections between the MOV and western parts of the Midcontinent. Additionally, similarities between some artistic motifs such as the Newtown gorgets (Seeman and Dancey 2000:598) and the Missouri "Jaguar" gorget (Wood 1999) could point to continued regional connections after the apparent dissipation of Hopewell networks. Taking this a step further, we could also see regionally diagnostic pottery forms like the well-known Newtown "angled shoulder" as a precursor to similar vessels in the American Bottom that Griffin (1943) called "Cahokia shoulders": indeed, Perino (1964) also suggested that some vessels, dating between about AD 500 and 900, were precursors to Mississippian angled-shouldered vessels. All these data can be used for testing a variety of hypotheses regarding Woodland and Late Precontact–era connections throughout the Eastern Woodlands.

Toward Multiple Working Hypotheses of Maize in the Eastern Woodlands

Hart and colleagues (2021) suggest that multiple lines of evidence are needed to refine our understanding of regional maize histories. Disparities in the lines of evidence used and possibly in the lines of evidence available in each region make it difficult to form interregional comparisons. Yet these issues also provide opportunities to work together to solve this problem. For example, pan-regional research standards that incorporate analyses of macrobotanical remains, microbotanical remains, and pottery residues would provide multiple lines of evidence while leveling the analytical playing field. Currently, however, the disparities in methods applied to the problem do not allow us to meaningfully parse regional differences.

We also suggest that, as maize histories continue to be considered, refined, and integrated, multiple working hypotheses (sensu Chamberlin 1890) are needed to incorporate complex and varied outcomes. This approach allows us to consider a variety of possibilities while working to foster interregional research. We initiate this process by considering four hypotheses (of many possibilities) that could account for the complex maize histories evident.

Hypothesis 1. Changes in Maize Processing

Significant changes in food production (i.e., from garden horticulture to field agriculture) and/or preparation (the spread of hominy/nixtamalization) techniques around AD 1000 (see Pauketat 2018) increased the chances for charred maize (macrobotanical) evidence to enter the archaeological record. This could account for the low frequency of macrobotanical finds generally before AD 1000 and the common microbotanical evidence where it has been systematically examined.

Hypothesis 2. Regional Disparities in Maize Availability/Acceptance

Maize took complex pathways that did not fill in all areas equally and did not enter areas we might consider more sensible (like the American Bottom) until relatively late in the sequence. Perhaps these rich ecotonal environments did not require subsistence shifts or experimenting with exotic crops. This could account for the sparse maize evidence in the American Bottom, whereas clear evidence exists for pre–AD 900/1000 maize in the MOV, Illinois River Valley, and Great Lakes regions.

Hypothesis 3. Peripheral Maize-System Genesis

Maize-based adaptations formulated outside the American Bottom and became integrated into the historical developments of that region as people and ideas aggregated there from elsewhere into novel cultural forms around AD 900/1000. This could explain disparities in early maize dates and the subsequent shift in focus toward the American Bottom before or at the same time as the Mississippian emergence. This would expand the geographical focus of examinations of maize agriculture developments.

Hypothesis 4. Trade of Maize Grains

Precontact networks of connectivity existed throughout the Midcontinent. It is possible that maize was one of many items exchanged along these networks (e.g., Albert et al. 2018:353). Small amounts of trade maize included in meals would produce microbotanical evidence of maize. At low levels of use it seems unlikely that charred macrobotanical remains would be common. Parsing other aspects of these networks would help create a broader understanding of the pathways that maize took throughout North America.

Conclusion

These working hypotheses help frame the problems and possibilities that exist when considering the spread of maize into the Eastern Woodlands. From this perspective, evidence that does not fit current models in one region need not be problematic for scholars in another region but instead reflect opportunities for dialogue and refinement. We encourage our colleagues to continue thinking in ways that expand our knowledge of this critical transition. Following Hart and colleagues (2021), we also encourage development of a standard of macro- and microbotanical analyses to refine understanding of the nuanced histories of maize. We intend to do so in our region as part of our broader investigation of precontact societies in the MOV.

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Data Availability Statement. All documentation and data for this article are available on request.

Competing Interests. The authors declare none.

Note

1. It should be noted that to our knowledge these samples were not analyzed for $\delta^{13}C$. That analysis should be conducted to confirm that they are indeed maize.

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