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On the Presumed Clovis-Age Structure at the Paleo Crossing Site, Ohio

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ABSTRACT
Recent field re-investigations at the Paleo Crossing site, Ohio—a site first excavated by the Cleveland Museum of Natural History in the early 1990s—were aimed at relocating and expanding the original checkerboard of excavation units. It was in these that postmolds were found and inferred to be from a Clovis-age structure. Yet, unexcavated units in the checkerboard made it impossible to determine if there were additional postmolds or if they aligned or formed a pattern that would warrant the inference of a structure. To resolve these matters, we undertook new excavations at the site. Our field investigations re-located the checkerboard and expanded the original excavation. We found several additional postmolds, but their radiocarbon ages fall within just the last several centuries. Nor were we able to replicate the site's previously-reported late Pleistocene radiocarbon ages or find other evidence to support the onetime presence of a Clovis-age structure. Claims for a Clovis age structure at Paleo Crossing are therefore not supported.

KEYWORDS
Clovis; North America; Paleoindian; postmold; Cleveland Museum of Natural History

Introduction

The Paleo Crossing site (33ME274) is located in Medina County, Ohio. First reported in 1989, it was investigated by the Department of Archaeology at the Cleveland Museum of Natural History (CMNH) from 1990–1993 under the overall direction of David Brose, who was then at the CMNH (Barrish 1995; Brose 1994). It was subsequently reinvestigated in 2016–2018 in a collaborative effort by teams from Kent State University and Southern Methodist University. The site, situated within the Wisconsin terminal moraine in glaciated northern Ohio (Szabo, Angle, and Eddy 2011), sits atop the crest and down the eastern and southeastern face of a glacial kame (Hajic 1993) and is estimated to extend over an area of ca. 10,000 m^2 (Brose 1994). The site area was extensively surface surveyed during both investigations. The original excavations were mostly comprised of a series of scattered, non-contiguous 1 × 2 m and 2 × 2 m units (Barrish 1995). The recent excavations included a few isolated 1 × 1 m and 1 × 2 m units, but the majority formed a contiguous horizontal block that aimed to fill in gaps in the so-called checkerboard (see below) that had been excavated in the 1990s. In total, an area of ca. 200 m^2 has been excavated at the Paleo Crossing site.

The Paleo Crossing site has produced a rich artifact record, including several dozen Clovis fluted projectile points and bifacial preforms, along with an assemblage of more than 400 unifacial tools, a prominent prismatic blade component, graver spurs, evidence of bipolar reduction, preforms and other bifaces, and more than 10,000 pieces of debitage (Eren 2005, 2006, 2010; Eren and Redmond 2011; Eren, Redmond, and Kollecker 2004, 2005; Eren et al. 2018a; Morgan et al. 2015).[1] Visual examination of Clovis artifacts (Tankersley and Holland 1994), along with geochemical analyses (Boulanger et al. 2015), indicate that the great majority of the Clovis artifacts are made of Wyandotte chert derived from outcrops located 510 km (straight-line distance) southwest of the site in the lower Ohio River valley (Boulanger et al. 2015). Other raw materials include chert from two closer Ohio sources: Flint Ridge and Upper Mercer (e.g. Boulanger et al. 2015; Eren et al. 2018a; Tankersley and Holland 1994).[2] Microwear analysis has revealed the Clovis tools to have been used for numerous tasks—butchering, engraving, slicing, sawing, cutting, and scraping—on a variety of materials, including meat, hide, bone, antler, wood, and soft plants (Eren et al. 2018a; Miller 2013, 2014). In addition to the stone artifacts, the site has also yielded a variety of features, including "bathtub shaped pits," zones of flat-lying cobbles, possible hearths, and several "structural postmolds" discovered on the southeastern slope of the kame upon which the site sits (Brose 1994, 64–65).

For a recent overall summary of the excavation history, setting, archaeology, and geology of the site, see Eren and colleagues (2018a); here we focus on the site's postmolds. These are of particular significance, for their presence suggested that Paleo Crossing "might contain some of the earliest known evidence of structures in North America" (Brose 1994, 63). Alternatively, instead of a shelter-like structure such as a wind block or lean-to, Lemke (2016, 179) suggests the Paleo Crossing postmolds may be "remnants of a corral, snare, hunting blind, or other hunting structure." Regardless, if the occurrence of a structure (or structures) could be affirmed, Paleo Crossing would be one of only two Clovis sites in North America to yield such evidence.

The other possible Clovis structure was found at the Thunderbird site in Virginia, where excavations uncovered a series of postmolds "forming a rectangular outline some 24 by 10 feet" (Gardner 1974, fig. 13). However, the postmolds at that site were at the base of the plowzone in relatively shallow deposits that also yielded post-Clovis and Late Archaic projectile points. Its status as a Clovis age structure is viewed as "reasonable but not conclusive" (Carr et al. 2013, 180; see also Gardner 1974, 20).

Although there can be little doubt some sort of structures were used by Clovis groups, their overall scarcity is

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noteworthy and likely testifies to the ephemeral nature of the structures themselves, as well as to the high degree of residential mobility practiced by these groups relative to later Holocene foragers (Kelly and Todd 1988; Meltzer 2009). That also suggests, however, that claims for a Clovis-age structure need to be carefully vetted.

Such vetting includes the case for the supposed structure at Paleo Crossing. In this instance, the claim is based on just three possible postmolds, reported in two of five separate 2 × 2 m excavation units that were arranged in a checkerboard pattern (Brose 1994, fig. 4.6) (Figure 1). It was not clear how many postmolds there may have been in total in that portion of the site. Since the excavation units were not in a contiguous horizontal block, it was not possible to trace how (or whether) the postmolds were aligned or to determine whether they formed a pattern and, if so, whether the size and shape of the pattern might indicate a structure.

The re-examination of issues and cases such as this is important for several reasons. For one, and in regard to this particular case, the site is well-known in North American Paleoindian circles. Yet, its renown for having the earliest, radiocarbon-dated structure in North America rests on what in retrospect is a very shallow archaeological foundation, in terms of the limited fieldwork in the area of the supposed structure, and a scant published record that contains a number of puzzling discrepancies (Brose 1994). Such a re-examination is not based on the fact that in the decades since this claim was made, Paleo Crossing remains one of just two claims for a Clovis-age structure in North America. The scarcity of these features in no way precludes the possibility a structure was once present at this site or other sites of comparable age. Indeed, there is reason to suppose that during this time people constructed structures for any number of possible purposes, including as shelters to get "indoors." However, the scarcity of structures known from this period, coupled with the scanty evidence on which the Paleo Crossing claim is based, does mean that this rare case warrants careful scrutiny and re-investigation. Fortunately, that was still possible 25 years after the conclusion of the original fieldwork at the site.

Accordingly, one of the goals of the 2016–2018 re-investigation at the Paleo Crossing site was to re-locate the 1990s checkerboard, then excavate some or all of the previously unexcavated interstitial units to determine whether a larger block exposure might yield additional postmolds and whether they were part of a larger pattern of postmolds that were demonstrably Clovis in age and affiliation. We report on that investigation here.

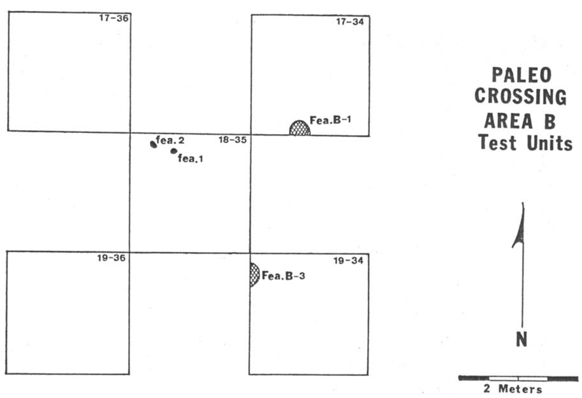

Figure 1. 1991 plan map of Brose's (1994) checkerboard excavation.

Postmold Features and Their Age, as Reported from the Original Paleo Crossing Excavations

The Paleo Crossing site deposits are relatively thin, comprised of three stratigraphic units (Units 1–3): a topmost plowzone of dark brown silt loam that reaches to an average depth of ca. 27 cm below surface (Unit 1, as designated by Hajic 1993).[3] It is underlain by Unit 2, a ca. 10–29 cm thick brown to yellowish brown silt loam that is a combination of loess/colluvial debris, its uppermost portion generally being pebble-free. Unit 2 is the "most likely" source of the Paleoindian material at the site (Hajic 1993, 11). The lowest stratum (Unit 3) consists of a silty clay loam that likely originated in supraglacial or proglacial deposits; no cultural material is thought to occur in primary context in this unit (Hajic 1993). Most of the archaeological material occurs on the south- and east-facing slopes and level area below the kame, with sheet wash having eroded the upper surface of the kame and moved material downslope (in lower areas, sheet flow has over-thickened the plowzone). The checkerboard excavation (see Figure 1) took place on the relatively flat surface below the southeast-facing slope of the kame, within Area B of the site (Eren et al. 2018a, fig. 9.2).

The initial excavation within the checkerboard, which became its center, was a 2 × 2 m unit in Area B of the site (Eren et al. 2018a, fig. 9.2) designated 18-35,[4] excavated in July of 1991 (see Figure 1). Excavation removed the plowzone, at the base of which, in the northwestern quadrant, two features were found and identified as postmolds.

The first of these, Feature 1, was encountered at a depth of 30 cm and extended to a depth of 42 cm below datum (bd). After the feature was exposed in plan view, its southern half was removed; the feature fill was screened, though its contents were recorded as "none" (CMNH Feature Form, Feature 1, 17 July 1991). A profile drawing was made, and a photograph was taken of the exposed cross-section (the photograph is reproduced in Eren et al. 2018a, fig. 9.5, and here in Figure 2). The feature was cross-sectioned in a saucer-shaped pit, the feature itself appearing in section as an inverted cone (Figure 2B; CMNH Feature Form, Feature 1, 17 July 1991). The feature fill was recorded as olive brown (10 YR 4/4) in color with "lots of charcoal flecks" (CMNH Feature Plan View Form, Feature 1, 17 July 1991) and is ca. 7 cm wide at the top, tapering to ca. 2 cm wide at the base and ca. 11 cm deep. Flanking both its sides was a ca. 2 cm wide band of slightly lighter-colored (10 YR 5/4 [light olive brown]) "fine silt" (CMNH Feature Plan View Form, Feature 1, 17 July 1991).

Feature 2 is far more irregular in shape; it too was exposed in plan, then cross-sectioned. It was ca. 14 cm wide at the top, 22 cm wide some 8 cm below the top, narrowed slightly below that, and then bottomed out on a more or less irregular base 14 cm below the top of the feature. The sediment in the main portion of the feature is reported as yellowish-brown silt (10 YR 5/4), though with mottles of lighter-colored (10 YR 6/6) sediment. Unlike Feature 1, Feature 2 is not stake-shaped, nor does it taper from top to bottom—its width is greater than its height—and overall, it is amorphous in form and cross-section, more akin to a root mass than a postmold (Figure 3).

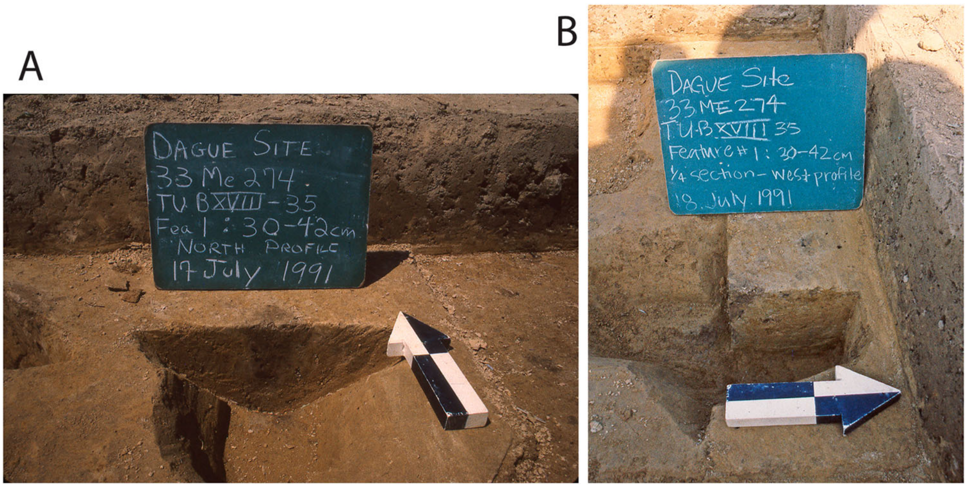

Figure 2. Paleo Crossing 1991 CMNH excavations, Feature 1 profile pictures; A) cross-sectioned and B) quarter-sectioned.

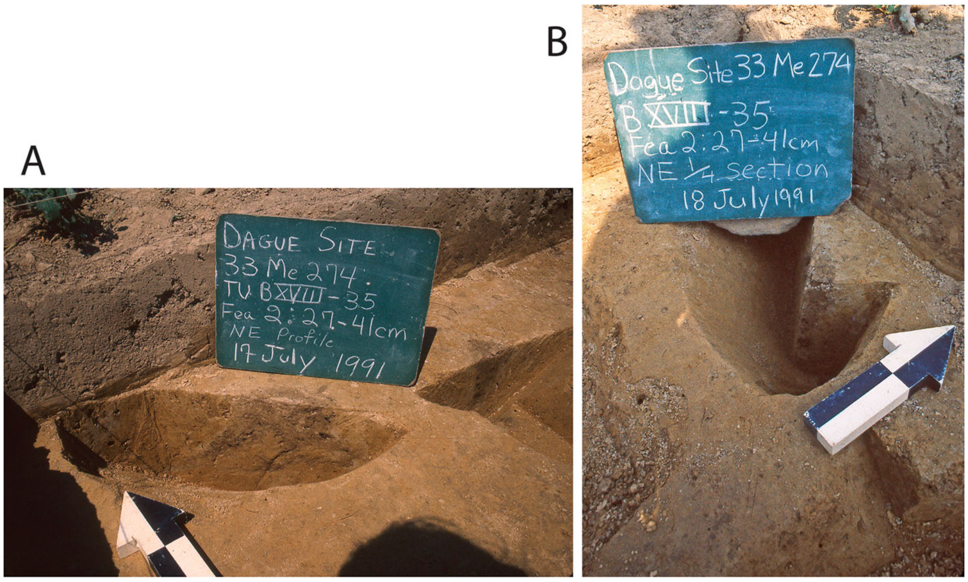

Figure 3. Paleo Crossing 1991 CMNH excavations, Feature 2 profile pictures; A) cross-sectioned and B) quarter-sectioned.

In October and November of 1991,[5] four additional 2 × 2 m excavation units in Area B (17-36, 17-34, 19-36, and 19-34) were placed off each corner of unit 18-35 to form the checkerboard. There is no record in the field forms of additional postmolds having been uncovered in any of the other units in the checkerboard, although other features, not considered to be postmolds, were found. The plan map made in 1991 showed the checkerboard and a pair of large "cylindrical pits" (Brose 1994, 63) designated as Features B-1 and B-3, along with the purported postmolds, Features 1 and 2, in Unit 18-35 (see Figure 1).

In 1994, Brose also reported that "what appeared to be a third postmold" (Brose 1994, 63) had been found in 17-36, in the northwestern unit of the checkerboard. This postmold was depicted on the map he subsequently published in 1994. That 1994 map was based on the original 1991 plan map but now included an additional postmold on the southern edge of 17-36, with a "?" next to it (Brose 1994, fig. 4.6), the question mark signaling a degree of ambiguity regarding this particular spot on the map (it was not labelled as a feature on the map). It is appropriate that this apparent third postmold came with an advisory warning, as it were, since it does not appear on the 1991 excavation plan illustration, and the 17-36 field forms give no indication of a postmold having been found in that unit. Two years after the original work at the site, in August 1993, the previously unexcavated center top unit of the checkerboard, 17-35, was excavated. No features were observed.

Thus, only two possible postmolds were found in the original investigations at the Paleo Crossing site, and only Feature 1 displayed a distinctive postmold shape. According to information on the Feature 1 field form, "lots of charcoal flecks" were found within its fill. The charcoal was subsequently submitted for radiocarbon dating, and in the cover letter accompanying the submission to the University of Arizona NSF AMS radiocarbon facility, Brose stated that the sample was from "charcoal fine screen[ed] and floated from constant volume soil samples" (D. Brose to D. Donahue, December 13, 1991, CMNH Archives). Later, the sample was subsequently described as coming from "charcoal floated from the fill of that postmold" (Brose 1994, 65).

That initial sample returned an age of 12,250 ± 100 ^{14}C years B.P. (AA-8250) (A. J. T. Jull to D. Brose, February 20, 1992, CMNH Archives). The radiocarbon facility subsequently "took several discrete lumps of charcoal from sample AA-8250" to produce five more ages for the feature (A. J. T. Jull to D. Brose, August 22, 1992, CMNH Archives). This set of ages is shown in Table 1.

The radiocarbon ages fall into two groups: one with a weighted mean of 12,150 ± 75 ^{14}C years B.P. (average of AA-8250 A, B, and F) and the other a weighted mean of 10,980 ± 75 ^{14}C years B.P. (average of AA-8250 C, D, and E) (A. J. T. Jull to D. Brose, August 22, 1992, CMNH Archives). That charcoal from the same feature (and presumably the same tree post) returned two clusters of ages more than 1000 radiocarbon years apart raised the question of which age was associated with the Feature 1 postmold (assuming one or the other was associated). Brose assumed that the younger of the two averages was related to the Clovis occupation of the site—based on its compatibility with the lithic assemblage—and for him the salient question was whether "the earlier of the [radiocarbon] events was cultural or natural" (Brose 1994, 65).

To explore that question, "an additional unaltered 'sterile' soil sample, recovered from sub-plowzone levels stratigraphically equivalent to the sediments from the matrix of the Paleo Crossing site postmolds" was submitted by Brose for radiocarbon dating (the location of this sample was not specified by Brose, but it was obtained from an excavation located at 46S, 4E, some 12 m south and 20 m west of the checkerboard units [as indicated on the floor plan for that unit, CMNH Archives]). Charcoal from those sediments returned an age of 12,900 ± 110 ^{14}C years B.P. (AA-10131A), while the sample of soil humates dated to 11,675 ± 90 ^{14}C years B.P. (AA-10131B) (Brose 1994, 65).

This was not the only evidence that there was a natural background of late Pleistocene age charcoal in the deposits on the site. One of the large cylindrical pits seen in the excavations, Feature B-3 in unit 19-34 (see Figure 1), was ca. 35 cm in diameter, and though its "top [was] probably decapitated by plow," it extended some 50 cm down from the base of the plowzone (which at that spot was ca. 38 cm below surface; CMNH Feature Plan View and Stratigraphic Profile 19-34, 1 November 1991). The sediment above Feature B-3 yielded a broken Kirk corner-notched point made of Upper Mercer chert, found at a depth of between 14 and 23 cm bd. Below that, and within the B-3 fill at a depth of ca. 68 cm bd, an "end-shocked base of a Clovis point" was recovered (Brose 1994, 63; see also Eren et al. 2018a, 190). Two charcoal samples derived from flotation processing of soil from the pit fill at depths of 55–68 cm and 68–75 cm bd were submitted for radiocarbon dating and returned ages of 9230 ± 80 ^{14}C years B.P. (AA-8252) and 13,120 ± 100 ^{14}C years B.P. (AA-8251), respectively (Brose 1994, 63) (or median calibrated ages of 10,402 and 15,735 B.P., respectively).

The older of the two ages was "from the thin lens containing the Clovis base" (D. Brose to D. Donahue, December 13, 1991, CMNH Archives) but is obviously two thousand years older than expected. Brose proposed the hypothesis that "partially oxidized fragments … from an ancient A0 horizon [were] reincorporated into colluvial silts overlying the postglacial landforms prior to human occupation" (Brose 1994, 63). The younger age was attributed to charcoal and colluvial sediments having "washed down slope from the area of the Early Archaic occupation on the upper portion of the ridge, long after the Clovis occupation" (Brose 1994, 63). A similar point was raised by A. Freeman, who in 1993 conducted archaeological and geoarchaeological investigations at the site: "I believe that Fea[ture] B-3 may have been a good feature, but was highly bioturbated by root disturbance. The weird radiocarbon dates could be a result of this. Also, given this disturbance, the [Clovis] projectile point *may not* have been in primary position. However, all evidence is pointing to the possibility that the 'mottled' Unit 3 (E. Hajic) is a surface on which Paleoindian activity took place. Alternate explanation is that the artifacts are being moved down onto the top of this unit, however that would not explain why they don't seem to be found in the upper portion of Unit 2. If this is the case, then artifacts in the plowzone are being redeposited downslope" (A. Freeman to N. Greber, July 7, 1993, emphasis in the original; CMNH Archives). Eren and colleagues (2018a, 190) suggested yet another alternative: that the radiocarbon results indicate that the pit was filled (and likely created) more than a millennium after the Paleoindian occupation.

Finally, in 2014, a wood charcoal sample from the 1992 excavations of Feature E-27, a "relatively large, ovoid, shallow, flat-bottomed pit," was submitted for dating (Eren et al. 2018a, 190–191). The result was an age of 4980 ± 30 ^{14}C years B.P. (Beta-378419). This is obviously much younger than expected, suggesting that the dated sample is unrelated to the Wyandotte flakes in the pit or that the use of Wyandotte chert was not restricted to Paleoindians. Regardless, Eren and colleagues observe that a "Middle Archaic to Late Archaic time frame remains undocumented in the known stone tool assemblage from Paleo Crossing" (Eren et al. 2018a, 191; also Eren and Kollecker 2004).

In sum, radiocarbon ages ostensibly associated with the Paleoindian occupation of Paleo Crossing range from ca. 5000 to 13,000 radiocarbon years B.P. That several of those ages conform to a more expected and acceptable age of 10,980 ± 75 ^{14}C years B.P. is reassuring, but only if one

Table 1. CMNH radiocarbon ages from Feature 1, Unit 18-35, Paleo Crossing (sources: A. J. T. Jull to D. Brose, August 22, 1992, CMNH Archives; Brose 1994).

Sample Number	Laboratory Number	Radiocarbon Years B.P.	2δ Calibrated Years B.P. (Median Probability Age in Italics; Calibrated Median Probability Age Estimate in Parentheses)
TU 18-35 B-420	AA-8250 A	12,250 ± 100	13,861–13,936 (.031) 13,993–14,625 (.831) 14,671–14,841 (.137) *14,240 B.P.*
TU 18-35 B-420	AA-8250 B	12,000 ± 110	13,601–14,094 (1.000) *13,889 B.P.*
TU 18-35 B-420	AA-8250 F	12,175 ± 115	13,790–14,529 (.936) 14,700–14,816 (.064) *14,111 B.P.*
Average of AA-8250 A, B, and F		12,150 ± 75	*14,050 CAL B.P.*
TU 18-35 B-420	AA-8250 C	11,060 ± 120	12,758–13,127 (.966) 13,132–13,161 (.034) *12,970 B.P.*
TU 18-35 B-420	AA-8250 D	10,800 ± 185	12,104–12,117 (.003) 12,171–12,238 (.017) 12,250–12,310 (.016) 12,321–12,395 (.017) 12,431–13,118 (.944) 13,143–13,155 (.003) *12,765 B.P.*
TU 18-35 B-420	AA-8250 E	10,980 ± 110	12,749–13,092 (1.000) *12,913 B.P.*
Average of AA-8250 C, D, and E		10,980 ± 75	*12,904 B.P.*

assumes that the reincorporation of older organic material into younger sediments and samples that is hypothesized to have occurred with some samples (Brose 1994, 63) only effected those samples that appear to be too old. That seems an unreasonable assumption. Nonetheless, the 10,980 ± 75 ^{14}C years B.P. for Paleo Crossing has been generally accepted as the proper age for the site (e.g. Prasciunas and Surovell 2015; Waters and Stafford 2007). However, as Eren and colleagues observed, "future fieldwork should focus on procuring more samples for dating, as well as providing firmer justification for disregarding the older dates" (Eren et al. 2018a, 208).

That only Feature 1 appears to have been a postmold and no others were found in the other checkerboard units—including unit 17-35 excavated in 1993—also raises the question of whether a structure was present at Paleo Crossing. This is a separate question from whether the postmold, whatever function it may have had, is Clovis in age.

Resolving these matters required expanding the original checkerboard excavations into a larger contiguous horizontal area to determine if additional postmolds occur and to gain a better sense of the spatial patterning of these and other features and artifacts at the site (Eren et al. 2018a, 208). Given the historic period disturbance of the site, which included fencing, plowing, drilling, and tilling in the 1950s to enhance drainage of the lower portions of the farm field (Barrish 1995, 64; Brose 1994, 63), careful attention would need to be paid to the origin and age of any encountered features, as these could potentially mimic Paleoindian postmolds.

Postmold Features and Their Age from the 2016–2018 Paleo Crossing Excavations

One of the principal goals of the 2016–2018 investigations was to first relocate the units in the 1990s checkerboard, from which a horizontal excavation could then be expanded in hopes of finding additional postmolds, features, or other indicators of Paleoindian activity and with the aim of collecting samples from those features for radiocarbon dating. Finding the 1991–1993 excavations was made difficult by the absence of site maps (the only map available is one constructed years later by co-author Redmond from the original field notes [Eren et al. 2018a, fig. 9.4]), limited data from an instrument survey conducted after the excavations were completed, the absence of permanent datums (two are now in place on site), and the inevitable changes wrought by agricultural activities and erosion over the intervening decades.

Nonetheless, after excavating a series of 1 × 1 m test units and cutting several shallow slit trenches with a small backhoe, the backfilled checkerboard squares were found, recognized either by differential fill or, in a couple of instances, plastic-lined walls (Figure 4).

The portions of the walls and corners that were exposed by us were mapped by total station on to the site grid we established (because there were no adequate maps or surviving datums from the original excavations, we were unable to overlay our grid on the CMNH grid, and as a result, our grid origin and grid north differ from the CMNH grid by several meters and several degrees, respectively). Although the checkerboard squares are now more precisely mapped (Figure 5), we must add the caveat that the walls and corners (which in some squares included baulks) may have sloped during excavations or slumped afterward, and thus the portions we exposed and mapped do not form precise 2 × 2 m squares (assuming they did originally), but instead the outline of the floors and intact walls of backfilled units.

Once the first walls of the checkerboard were located, excavation began with a series of 1 × 1 m units adjacent to its eastern side and, over the course of the 2017 and 2018 excavation seasons, steadily shifted west, working around previously excavated checkerboard units. Ultimately, a total of 33 whole or partial 1 × 1 units were excavated over that span. These excavations filled in the excavation blanks left over in the checkboard, save for the open 2 × 2 m area between 17-36 and 19-36, which would be unit 17-35, in accordance with the 1991 CMNH grid. It has been left as a witness block.

In all cases, our excavations extended through the plowzone into the underlying sediments of Unit 2, with excavations ceasing once artifacts were no longer being recovered. Artifacts were found within the plowzone, frequently at the plowzone contact with Unit 2, and in some cases a short distance below that contact but still within Unit 2 sediments. All excavated sediment was waterscreened through 1/8 inch mesh.

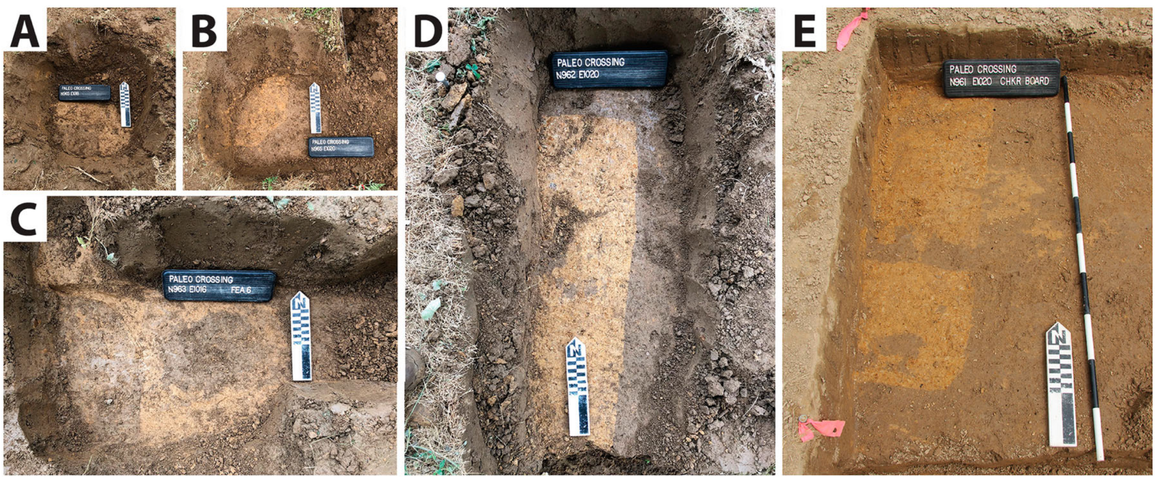

Figure 4. Photo montage showing examples of walls and corners of the 1991 CMNH excavations found in 2017 and 2018. Coordinates shown are those of the recent excavations; note that the photo board in Image C is incorrectly labelled: the dark stain shown is not Feature 6. Unit coordinates correspond to the 2017–2018 grid shown in Figure 5.

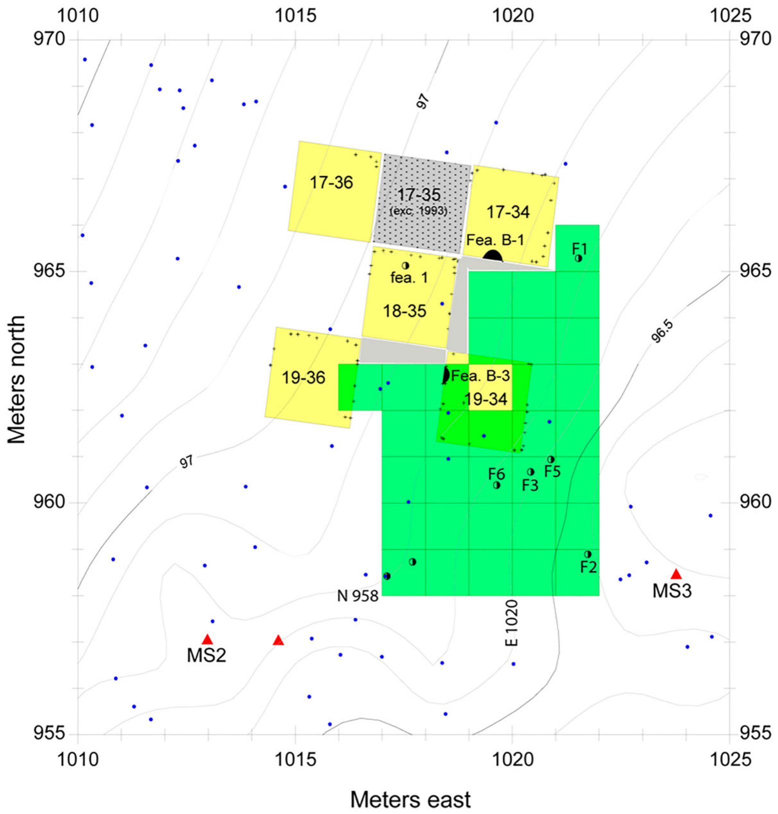

Figure 5. Map showing a portion of the 2017–2018 excavation units (in green) relative to the 1991 CMNH checkerboard (in yellow). The position of the latter is approximated based on discovered walls and corners (see Figure 4). Interstitial areas between the recent excavations and checkerboard units shown in gray. The stippled gray unit 17-35 was excavated in 1993 and was not part of the original checkerboard. The square that would be unit 18-36 on the 1991 grid (west of 18-35) has been left as a witness block. Surface finds and mapping stations from recent work are shown as blue dots and red triangles, respectively. Postmolds and features from 1991 are labelled as in Figure 1; postmolds from 2017–2018 are labelled F1, F2, etc. The two unnumbered circles in the lower leftmost unit of the 2017–2018 excavation block (unit N958 E1017) are Possible PM 1 and Possible PM 2 (see text).

Over one thousand artifacts were recovered, principally debitage, but also a number of formal tools, including scrapers, gravers, and at least one fluted biface, all of which were made of Wyandotte chert, in keeping with the toolstone pattern associated with the Clovis occupation on the site (Boulanger et al. 2015). The artifacts are part of a larger ongoing dissertation study, as well as a new separate microwear study; here, our focus is on the features found during the 2017 and 2018 excavations seasons that are relevant to the question of whether a Clovis structure was once present at the site.

Over the course of the excavations, six distinctive features were encountered that match ones described by Brose (1994). We briefly describe each (Table 2) and illustrate several of them.

Feature 1 (2017) was a large and deep inverted cone-shaped pit found in N965 E1021; the feature was 28 cm in diameter at the top, tapering to 7 cm at the base, and 96 cm from top to base. The fill is silt loam heavily flecked with charcoal throughout (Figure 6). In its dimensions, depth, and density of charcoal, this feature resembles Features B-1 and B-3 from checkerboard units 17-34 and 19-34, respectively (Brose 1994). As described by Brose, "these features were cylindrical pits, about 35 cm in diameter and from 60 to 75 cm in depth measured from their origin in sub-plowzone sediments" (Brose 1994, 63). Pits and postmolds of this size appear to have their origins in deeply set poles or posts, but their morphology alone does not indicate their age, since features of similar size could be historic fence postholes, as well as parts of prehistoric structures (e.g. Redmond 2016).

Feature B-1 was not radiocarbon dated, but Feature B-3 was and, as noted, returned inconsistent ages. Charcoal from our 2017 Feature 1 was submitted for radiocarbon dating and returned an age of 310 ± 30 ^{14}C years B.P. (Table 3). Its median calibrated age (1561 A.D.) is still older than the initial historic era settlement in this region, which dates to the early 1800s (the nearby town of Medina was founded in 1818). The difference between the radiocarbon age and

Table 2. Metric data on 2017–2018 postmolds, definitive and possible.

Feature Number	Northing	Easting	Grid Elevation (m)	Top Diameter (cm)	Top–Bottom depth (cm)
2017—Feature 1	965.284	1021.525	96.443	28	96
2017—Feature 2	958.894	1021.739	95.966	ca. 5	10
2017—Feature 3	960.673	1020.424	96.409	7.7	15.0
2017—Feature 5	960.941	1020.887	96.409	5	7
2018—Feature 6	960.386	1019.641	96.089	55.5	39.3
2018—Possible PM 1	958.730	1017.704	96.483	ca. 10	n/a
2018—Possible PM 2	958.423	1017.114	96.497	ca. 10	n/a
2018—Dark stain	960.500	1019.500	96.450	53.4	39.1

Figure 6. Paleo Crossing 2017 Kent State/SMU excavations, Feature 1 in cross-section, N965 E1021 (DJM Image 2017.5507).

Figure 7. Paleo Crossing 2017 Kent State/SMU excavations, Feature 2 in plan view (DJM Image 2017.5519).

Table 3. Radiocarbon ages from the Paleo Crossing site obtained in this study from charcoal in features and non-feature charcoal excavated at Paleo Crossing. Calibrated ages based on IntCal20. All calibrated ages in years B.P., except for median calibrated ages younger than 2000 CAL B.P., which are also shown as years A.D.

Sample Number	Sample Context	Laboratory Number	Radiocarbon Years B.P.	2δ Calibrated Years B.P. (Median Probability in Italics; Calibrated Median Probability Age Estimate in Parentheses)
2017-18	N960.673 E1020.424 Z96.409, Feature 3 postmold	Beta-485859	190 ± 30	0–34 (.186) 72–79 (.009) 83–99 (.015) 105–113 (.010) 139–225 (.550) 255–301 (.230) *182 B.P./1768 A.D.*
2018-01	N958.236 E1017.786 Z96.476, Unit 2	Beta-564766	190 ± 30	0–34 (.186) 72–79 (.009) 83–99 (.015) 105–113 (.010) 139–225 (.550) 255–301 (.230) *182 B.P./1768 A.D.*
2017-08	N965.284 E1021.525 Z96.313, Feature 1 postmold	Beta-467661	310 ± 30	301–344 (.241) 346–460 (.759) *389 B.P./1561 A.D.*
2017-14	N958.894 E1021.739 Z96.346, Feature 2 postmold	Beta-485858	360 ± 30	316–400 (.511) 405–409 (.007) 422–494 (.481) *405 B.P./1545 A.D.*
2017-20	N960.950 E1020.874 Z96.338, Feature 5 postmold	Beta-485860	460 ± 30	480–538 (1.00) *511 B.P./1439 A.D.*
2018-06	N960.595 E1019.290 Z96.483, Unit 2, "root burn" (see text)	Beta-564769	1150 ± 30	961–967 (.014) 971–1126 (.903) 1162–1175 (.082) *1047 B.P./903 A.D.*
2018-07	N960.386 E1019.641 Z96.089, Feature 6 postmold	Beta-564770	1200 ± 30	1006–1022 (.024) 1057–1117 (.925) 1213–1220 (.009) 1223–1244 (.042) *1119 B.P./831 A.D.*
2018-11	N964.860 E 1020.171 Z96.539, Unit 2	Beta-527945	2060 ± 30	1933–2111 (1.000) *2017 B.P./68 A.D.*
2018-10	N1004.128 E660.474 ca. Z95.200, geological test pit 2018-4, western margin of the field	Beta-527944	2090 ± 30	1947–1961 (.031) 1987–2126 (.955) 2134–2145 (.014) *2052 B.P.*
2018-08	N964.350 E 1018.811 Z96.588, Unit 2	Beta-527942	2160 ± 30	2006–2020 (.022) 2046–2181 (.588) 2196–2205 (.010) 2229–2304 (.380) *2149 B.P.*
2018-04	N962.546 E 1018.330 Z96.495, Unit 2	Beta-527941	3580 ± 30	3730–3739 (.013) 3773–3790 (.036) 3827–3936 (.808) 3938–3976 (.143) *3882 B.P.*
2018-03	N962.842 E1018.487 Z96.454, Unit 2	Beta-527940	3640 ± 30	3849–3858 (.011) 3870–4006 (.800) 4032–4083 (.189) *3953 B.P.*
2018-09	N963.433 E 1019.624 Z96.559, yellow clay	Beta-527943	3660 ± 30	3897–4086 (1.000) *3985 B.P.*

Figure 8. Paleo Crossing 2017 Kent State/SMU excavations, Feature 3 in plan view. The "EH core" on the sign was set when this was thought to have been an "Ed Hajic" core. It was a postmold, just not a Paleoindian postmold (DJM Image 2017.5545).

the arrival of farmers in the area could readily be accounted for were this a fence post hewn from an old tree on the property. Alternatively, perhaps the date is from an earlier, as yet undocumented occupation of the site.

Feature 2 (2017) is a sharply defined postmold found in N958 E1021 and was a size and shape that seemed congruent with a Paleoindian structure (Figure 7). Feature 2 was visible at the contact at the base of the plowzone and the top of Unit 2. It was slightly oval in plan, at its upper surface 4 × 6 cm in size, and extended ca. 10 cm into Unit 2. The fill was a dark reddish brown (5YR 3/4), distinct from the strong brown (7.5 YR 4/6) of the surrounding matrix. The fill was removed as a unit and fine-screened. Organic sediment from the fill returned an age of 360 ± 30 ^{14}C years B.P., with a calibrated median age of 1545 A.D. (see Table 3).

Feature 3 (2017) was found in N960 E1020 and, given its size and circular shape, initially appeared to possibly be a filled core hole (possible, given the geoarchaeological coring that had taken place on site, but which was also not fully mapped). But, on cross-sectioning, it proved to be a postmold that tapered from 7.7 cm in diameter at the top to 1.5 cm at the base, indicating it was not from a coring device. The postmold was 15 cm from top to base, with a reddish brown color (5 YR 3/4) (Figure 8). A possible burned flake of Wyandotte chert (specimen R17-1-7) was found in situ just east of the feature and in Unit 2 sediments. After the fill was removed from Feature 3 (Samples 2017-17 and 2017-18), a plaster cast was made of the feature (Figure 9). Organic material from the fill returned an age of 190 ± 30 ^{14}C years B.P. (see Table 3). Like Feature 2, it resembled a postmold, but if it was, it too was clearly not an ancient one, with a median calibrated age of 1768 A.D.

Feature 5 (2017) was another possible postmold also located in N960 E1020, the same unit as Feature 3, but ca. 50 cm to the northwest. Unlike the other apparent postmolds (or the cylindrical pit of the 2017 Feature 1), Feature 5 was narrower and entered the ground at an angle. The fill was a brown silt (10YR 5/3). After the fill was removed (Sample 2017-13), a plaster cast was made of the feature, which proved to taper to a point, in a manner resembling a small root or stump (Figure 10). Organic material from the fill returned an age of 460 ± 30 ^{14}C years B.P. (median calibrated age of 1439 A.D.) (see Table 3).

The above features were found in the 2017 season. In 2018, two additional, roughly circular postmolds (Possible

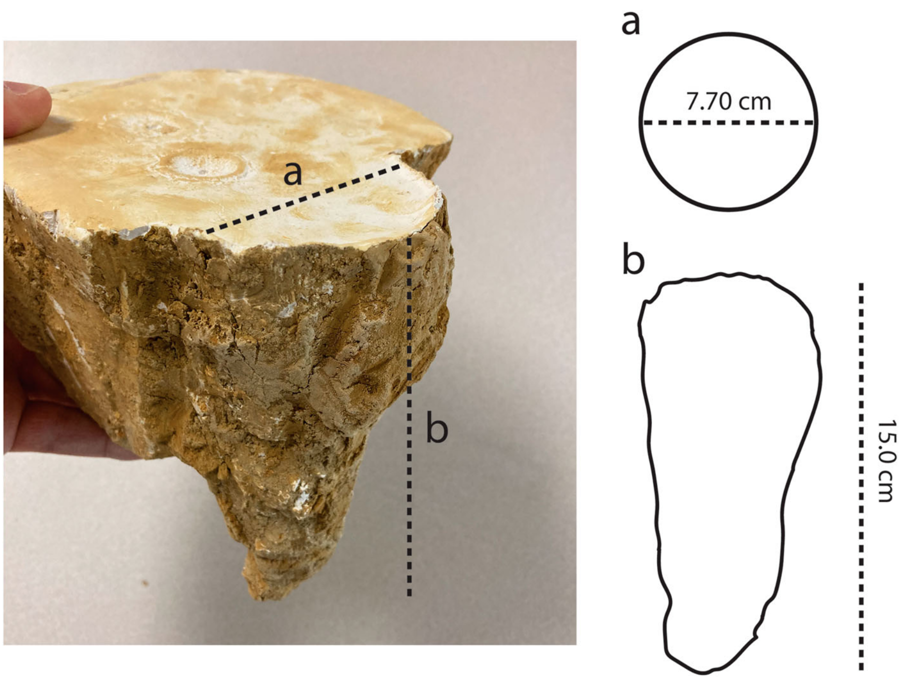

Figure 9. Plaster cast and outline of Paleo Crossing Feature 3 excavated in 2017.

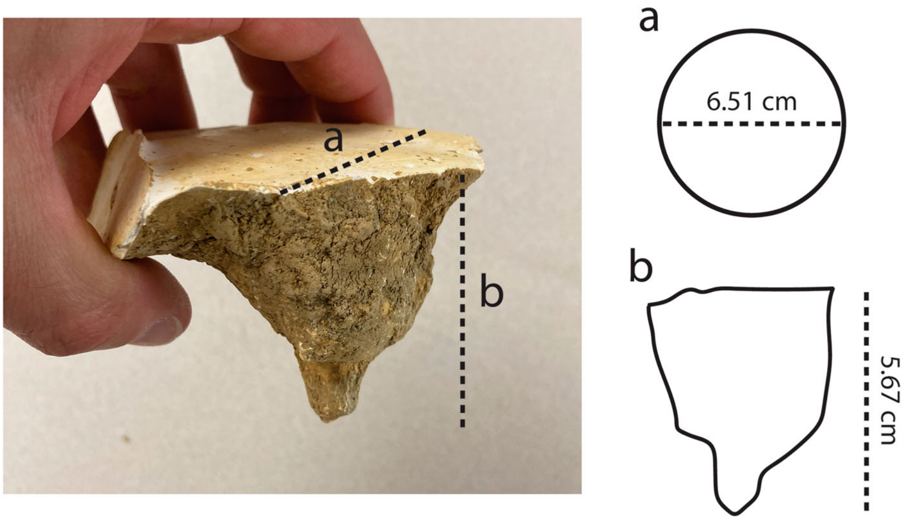

Figure 10. Plaster cast and outline of Paleo Crossing Feature 5 excavated in 2017.

PM 1 and Possible PM 2 [PPM1 and PPM2]) were spotted in N958 E1017. On first glance, these appeared to align with Features 3 and 5 from the previous year's excavation (see Figure 5). Each was ca. 10 cm in diameter, but when cross-sectioned, they proved to lack depth. It is unlikely these represent the bases of postmolds truncated by plowing, for, were that the case—assuming they were comparable to and part of the structure or fence marked by Features 3 and 5 from 2017—they should have had narrower diameters. Alternatively, they may have been the base of a separate and unrelated pair of poles set in the ground or merely a pair of circular stains of unknown origin. In any case, little can be done with them, aside from noting their presence.

Also in 2018, a dark, lozenge-shaped stain ca. 32 × 80 cm containing a concentration of charcoal was found in N960 E1019 in Unit 2, several centimeters below the base of the plowzone in that unit. The stain appeared in the field to be natural, possibly a tree or root burn; charcoal collected from it returned an age of 1150 ± 30 ^{14}C years B.P. As there was no further evidence of cultural material in this unit, excavation of the entire 1 × 1 m was stopped, and only the southern half of the unit was taken down further in order to examine the stratigraphy. Doing so revealed that at further depth the dark-stained area initially interpreted as a tree or root burn narrowed into what appeared as a more clearly defined, square-bottomed postmold (Figure 11). This was subsequently designated Feature 6. Charcoal was recovered from the feature and returned a radiocarbon age of 1200 ± 30 ^{14}C years B.P. By chi-square test, this age overlaps with the age of the charcoal from the presumed tree/root burn in the same unit ca. 39 cm above, suggesting the two samples were from the same tree: the average of the two is 1180 ± 20 ^{14}C years B.P. (median age of 1102 CAL B.P./848 A.D.).

Feature 6 was located several meters from the other large postmolds (Features B-1 and B-3 from the 1990s excavations and Feature 1 reported here). It is possible they were part of a contemporary fence or some other structure; given the many centuries separating the ages of Feature 1 and Feature 6, that seems less likely (although there is the possibility that the difference in their ages reflects charcoal from different portions of the tree, e.g. outer versus inner rings; both of these features, of course, are far younger than the Late Pleistocene and Early Holocene ages reported for Feature B-3).

Given that most of the recently excavated features at Paleo Crossing are just a few centuries old, and none is more than ca. 1100 years old (Features 5 and 6), a part of the focus in the 2018 field season was on dating charcoal from non-archaeological contexts. The goal was to gauge the presence of natural, Pleistocene-age charcoal in the sediments, particularly in Unit 2, which underlies the plowzone and presumably contains the undisturbed Paleoindian occupation of the site. The purpose of this effort was to assess the possibility that the age of features radiocarbon dated in the 1990s could have been inflated by the presence of ancient natural charcoal.

However, none of the charcoal we recovered from Unit 2 in the artifact-bearing area and from a geological test pit some 360 m west of that concentration yielded ages greater than 3660 ^{14}C years B.P. (see Table 3), which is at least

Figure 11. Paleo Crossing 2018 Kent State/SMU excavations, Feature 6 in cross-section (MIE Image 0732).

7,000 radiocarbon years younger than the expected age of the Clovis occupation in Ohio or anywhere else in North America. There is no indication the charcoal yielding these late Holocene ages is anthropogenic, and there is no evidence in the known stone tool assemblage from Paleo Crossing of either Middle or Late Archaic occupations at the site (Eren and Kollecker 2004; Eren et al. 2018a).

Conclusions

There can be great value to revisiting previously excavated sites. In some instances, so much time has elapsed since the original work that new questions can be asked, new methods and techniques applied, and new interpretations can be forthcoming (e.g. Bamforth 2007; Gingerich 2013; Larson, Kornfeld, and Frison 2009; Mackie et al. 2020; Meltzer 2006; Pelton et al. 2017). In other cases, such as this one, it allows an assessment of inferences and evidence, even of longstanding claims that have become part of conventional wisdom, as this one has, or which otherwise seem anomalous, puzzling, or unsupported and hence in need of additional fieldwork to either bolster or reject (e.g. Byerly et al. 2005; Goebel, Waters, and Dikova 2003; Holliday and Meltzer 1996; Jenkins et al. 2014; Todd, Hofman, and Schultz 1992).

It was for both those reasons, but especially the latter, that we re-initiated fieldwork at Paleo Crossing. Although we encountered multiple features that matched those found in the 1990s, some of which appeared to be postmolds, none proved to be of late Pleistocene age. The lack of Clovis age radiocarbon dates from our features is puzzling. Either the ones we encountered are not the same as Feature 1 and Feature B-3 seen in 1991, however much they might resemble one another, or there is something problematic about the radiocarbon ages we obtained—or those radiocarbon ages obtained by Brose. We can at this juncture only speak to the dates we obtained, and those seem straightforward and, to a large degree, consistent. The radiocarbon dates obtained by Brose were less consistent and, by his own admission, hinted at reworking from older sediments on the site. Yet, none of our charcoal from older geological strata yielded Late Pleistocene ages either.

This effort thus represents the third time an independent chronometric assessment has failed to reproduce late Pleistocene ages at Paleo Crossing. As already mentioned, Eren and colleagues (2018a, 191) report that a 0.15 g sample of wood charcoal collected from the fill of Brose's (1994) Feature E-27 at 49 cm bd was submitted for accelerator mass spectrometry dating, resulting in an age of 4,980 ± 30 ^{14}C years B.P. Eren and colleagues (2018b) subsequently attempted to directly date Paleo Crossing's Clovis artifacts via luminescence, which resulted in ages of 9.14 ± 2.18 kya and 8.92 ± 3.03 kya.

Paleo Crossing's previously reported age of 10,980 ± 75 ^{14}C years B.P. (Brose 1994) is routinely cited in discussions of eastern fluted point occupations (e.g. Anderson, Smallwood, and Miller 2015; Boulanger et al. 2015; Ellis, Carr, and Loebel 2011; Faught 2008; Fiedel 2000, 2018; Lothrop et al. 2016; Miller and Gingerich 2013; Prasciunas and Surovell 2015; Spiess, Wilson, and Bradley 1998; Tankersley et al. 1997; Waters and Stafford 2007). Yet, the results reported here, plus those of Eren and colleagues (2018a, 2018b), suggest the radiocarbon age of the Clovis occupation at the site should be considered unknown.[6]

As to the question of whether a Clovis-age structure existed at the site, our excavations cannot confirm such a presence. Although we completed the previously unexcavated squares of the checkerboard and found several postmolds and pits like those seen in the 1990s, none were demonstrably Clovis in age. It is thus unclear what the Feature 1 postmold from the original 1991–1993 excavations represents. If it was from a Clovis age structure, then it is the only postmold that remains from that occupation, all other traces of a possible structure having vanished. That is certainly a possibility. Alternatively, neither it nor the other features found in the original excavations (e.g. Feature B-3) were part of a structure, but some other, undetermined feature from the Clovis occupation at the site. Yet another possibility is that the radiocarbon ages from the original excavations are somehow unrelated to the features themselves, and none are Clovis in age, and instead—like the postmolds and pits found in 2017 and 2018—are from a structure or other feature that dates to more recent times.

At this juncture, we cannot say which of these possibilities, if any, is correct. Thus, as is the case with the possible Clovis age structure at the Thunderbird site (Carr et al. 2013, 180), the evidence for a structure at Paleo Crossing is "not conclusive." In fact, given the relative dearth of postmolds at Paleo Crossing compared to Thunderbird, the possibility Paleo Crossing harbored a structure seems even less likely.

Fortunately, neither ambiguity in regard to the age of Paleo Crossing nor its purported Clovis-age structure lessens its importance as an archaeological site. Its abundant, diverse, and distantly-travelled stone tool assemblage remains one of the richest known from eastern North America and important to our understanding of the populations who colonized the upper Midwest region in late Pleistocene times (Eren et al. 2018a).

Notes

1. These artifact counts will be updated and increased in due course as a result of the 2016–2018 excavations.
2. There is a small, spatially-separate Archaic component at the site (Brose 1994; Eren and Kollecker 2004), but the diagnostic elements of that component are made of Flint Ridge chalcedony and Upper Mercer chert, not Wyandotte chert, the latter appearing to be limited to the site's Clovis component (Boulanger et al. 2015).
3. See also Freeman and Hajic 1994.
4. In the text of his 1994 article, Brose consistently identifies the unit as 17-35 (Brose 1994, 63, 65). That is incorrect: the unit is 18-35, as is confirmed by his figure 4.6 and the original field forms for those units.
5. Brose (1994, 63) puts the excavation of these units early in the 1992 season. That is incorrect, based on the dated field forms.
6. Waters, Stafford, and Carlson (2020, 6) state: "Radiocarbon ages reported on charcoal from the Paleo Crossing site, Ohio, seemed to provide credible and reliable chronological control for the site (5, 29). However, recent excavations show that the reported radiocarbon ages do not accurately date the Clovis horizon (30). Most of the dated samples were collected from post-hole infillings that were described to be part of a prehistoric structure. Subsequent work at the site shows that the postmolds are part of a historic structure (30). Furthermore, the original [CMNH] dates were reported to be on charcoal but were actually on bulk sediments that were a mixture of different strata of different ages. On the basis of this new understanding of the site, all previously reported ages for Paleo Crossing are disregarded and the site is defined as undated." These comments are problematic and disappointing in several respects. The Waters, Stafford, and

Carlson (2020) citation 30 is to a presentation by Eren and colleagues (2018c) at the annual meeting of the Society for American Archaeology (SAA). However, all that was stated in the presentation was "We dated every postmold and our hearth … every date came back dating to the 1700 and 1800s A.D." (Eren et al. 2018c, 6). Nowhere in that presentation was there any mention of "bulk sediments that were a mixture of different strata of different ages." As noted in the text, the original CMNH radiocarbon ages are on charcoal, not bulk sediment. The Eren and colleagues (2018c) presentation did not present the results of the 2018 fieldwork, as that fieldwork took place after the conference. Finally, we gave no permission to cite this presentation and the new data contained within it, nor did Waters, Stafford, and Carlson (2020) ask for permission. While some may consider conference papers part of the public record and fair game for citation/published discussion, the comments made by Waters, Stafford, and Carlson (2020) are inaccurate and apparently based—inappropriately and, again, without the courtesy of asking permission—on a private, informal hallway conversation between Eren and Waters at the meeting regarding unpublished data and results.

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