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Hopewell Archeology:

The Newsletter of Hopewell Archeology in the Ohio River Valley

Volume 5, Number 1, June 2002

1. Preliminary Report, 2001 Investigations, Hopeton Earthworks

By Mark J. Lynott Midwest Archeological Center and John Weymouth University of Nebraska, Lincoln

Although the Hopewell mounds and earthworks of Ross County, Ohio, have been well known to the scientific community for more than 150 years, many simple and basic questions have yet to be answered about the sites, and about the people and culture who built them. Early archeological research focused on mounds and mortuary behavior (e.g., Squier and Davis 1848; Thomas 1894; Mills 1922; Moorehead 1922) and yielded a great deal of information about the artistic and ritual aspects of Hopewell life.

Recent trends in Hopewell research have emphasized settlement pattern analysis and the relationships of the larger mound and earthwork sites to smaller villages and hamlets (Dancey and Pacheco 1997; Pacheco 1996). Comparisons among the large mound and earthwork sites have demonstrated some broad general similarities, but the structure and configuration of most sites are surprisingly diverse. The most thoughtful attempts to build broad explanatory models about the Hopewell world continue to be plagued by a lack of understanding about the chronology, structure, and function of individual earthwork sites. We believe this can be overcome with sustained, multi-year studies of individual earthwork sites. The Midwest Archeological Center has initiated a long-term study of the Hopeton Earthworks. This paper summarizes the results of research conducted in 2001.

The Midwest Archeological Center began research at the Hopeton Earthworks in 1994 with a combination of geophysical surveys and strategic testing. Subsequent research was conducted in 1997 and 1998 (Lynott 2001). The 2001 investigations, which are described here, are a continuation of that work. This work is intended to answer specific questions about the site and to develop a model to better interpret the nature and significance of the archeological resources at this location. The 2001 investigations included geophysical surveys in association with strategic testing. This research was conducted at the southern end of the “square” in an area approximately 350 m x 100 m. The research objectives for the 2001 research season were to:

(1) Begin developing a topographic map of the earthworks and site to document their current conditions and create a base map that can be used to document past, present, and future research at the site.

(2) Conduct geophysical surveys within the 2001 research area to determine whether geophysical survey data can be used to interpret the internal structure of mounds and earthworks.

(3) Conduct geophysical surveys to identify anomalies that may be related to Hopewellian activities associated with the earthworks.

(4) Excavate two trenches across the south and west walls of the square to examine the structure of the wall and better understand how that structure is reflected in the geophysical survey data. Study the construction of the wall to determine whether the wall was built during a single construction episode in a relatively brief time, or whether it was built as a series of episodes over a more prolonged period of time.

(5) Conduct test excavations over a series of magnetic anomalies to better determine the value of magnetic survey data for interpreting subsurface features associated with Hopewellian activity at the site. Use the test excavations to expose and study subsurface features that may reflect the nature of prehistoric activities associated with the earthworks. Compare the various anomalies and features found inside the earthworks with anomalies and features found outside the earthworks.

Research Area

Hopeton Earthworks is a vast site that covers more than 200 acres (81 hectares). The site is located on an alluvial terrace on the east side of the Scioto River. The terrace is composed of glacial outwash. The Chillicothe Sand and Gravel Company mines the rich sand and gravel deposits to the northwest and west of the earthworks.

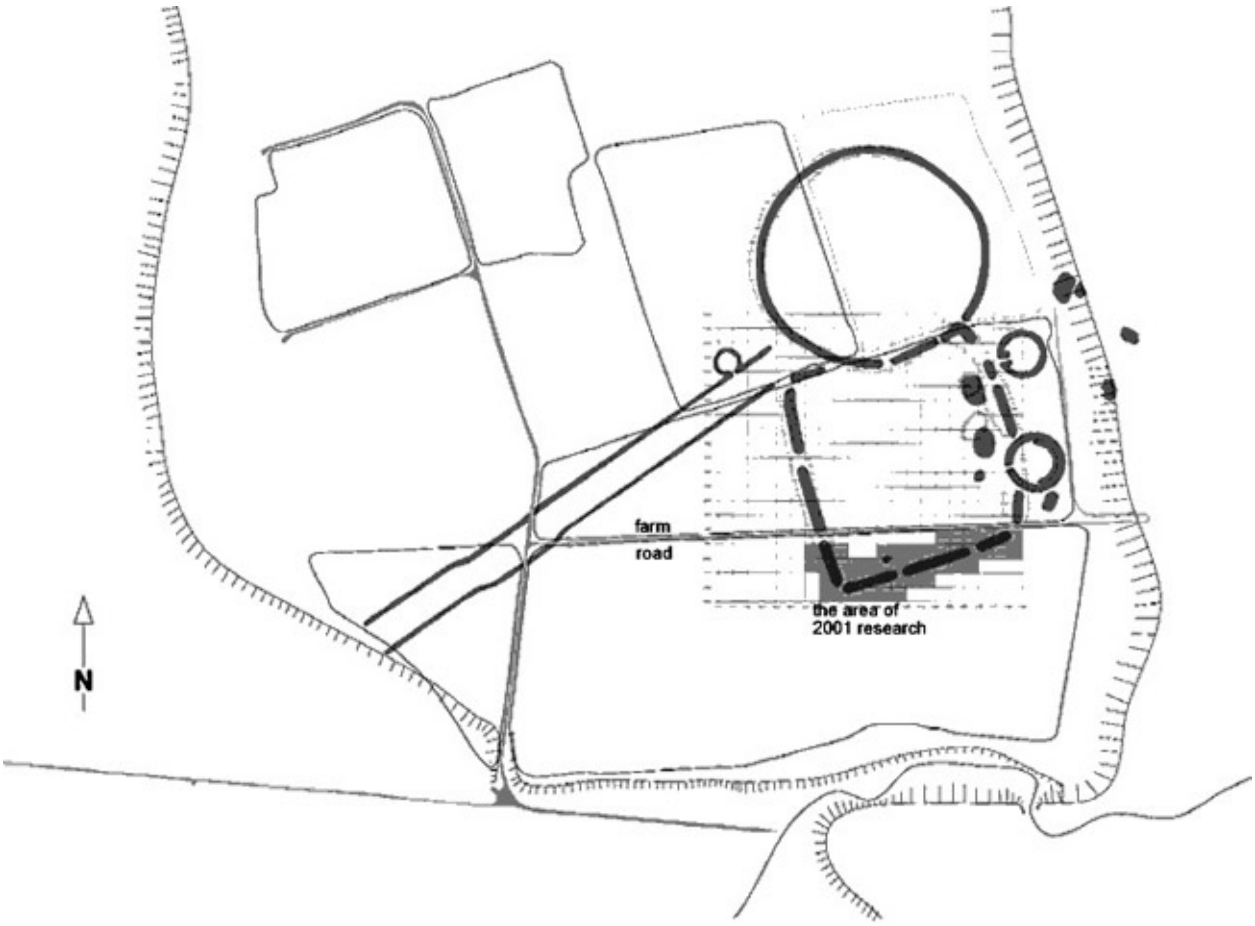

Figure 1. Hopeton Earthworks with the 2001 research area highlighted in gray, corresponding to the area shown in Figure 2.

The 2001 investigations were focused on the southern edge of the earthworks (Figure 1). This area is generally known as the "square" (Squier and Davis 1848; Thomas 1894). The area is located immediately south of a farm road and measures approximately 300 m east-west and 100 m north-south. The area was mowed immediately prior to our geophysical survey in May, and again immediately prior to test excavations in June.

Geophysical Survey

Geophysical survey work was conducted at the Hopeton Earthworks from May 12 through May 17, 2001. The geophysical survey work conducted by the Midwest Archeological Center was limited to magnetic surveys using a Geoscan FM-36 fluxgate gradiometer and a Geometrics G858 cesium gradiometer.

During the course of this research, the Midwest Archeological Center and Hopewell Culture National Historical Park sponsored a workshop on geophysical survey techniques. The contemporaneous scheduling of these two events allowed Dr. Bruce Bevan to conduct independent geophysical prospection studies at the Hopeton Earthworks site (Bevan 2001).

The 2001 geophysical survey at Hopeton Earthworks was conducted on the south side of the east-west farm road that passes through the square. The area surveyed is part of the overall Hopeton Earthworks grid system and is located between 2800 and 2900 north and between 2860 and 3160 east. Geophysical survey data was collected in blocks measuring 20 m x 20 m (Figure 1). A total of 47 blocks were surveyed, covering an area of 18,800 m².

Data was collected at intervals of 1.0 meter between transects. Forty-five blocks were surveyed with the G858 cesium gradiometer, and fourteen blocks were surveyed with the FM-36 fluxgate gradiometer.

The Geometrics G858 cesium gradiometer was in the vertical configuration, with the lower sensor 30 cm above the surface and the upper sensor 100 cm above the lower sensor. The survey was in the 'walking' mode using a 0.2-second cycle with traverses spaced at intervals of 1.0 meter, and readings spaced about 14 cm apart. The magnetic data map in Figure 2 provides a composite result of all the G858 survey blocks clipped at ± 10 nT/m. Since the sensor separation was 100 cm, the results are essentially total field data with the values numerically equal to nT.

The most notable accomplishment of the geophysical survey was the discovery that the western and southern walls of the square are very distinctly visible in the magnetic survey data (Figure 2). The sharp boundaries on the interiors and exteriors of the walls are in marked contrast to existing topography, which is very gradual due to years of agricultural activities.

The sharp magnetic contrast between the core of the wall and the surrounding soils suggested that the interior of the wall must have been constructed from a material that differed markedly from the soils that occur naturally on the terrace.

Magnetic survey data was used to select an area for test excavation that might best expose some of the better preserved sections of the wall. The strong magnetic lines marking the earthwork wall lines are separated by 10 to 15 m. The magnetic maxima are 15 to 20 nT. Breaks in the wall line anomalies correspond to the gateways mapped by Squier and Davis (1848) and Thomas (1894). We believe the east-west streaking that occurs at various places is the result of deep plow scars.

A subset of these blocks, plus two additional blocks, were surveyed with a Geoscan FM?36 fluxgate gradiometer. The FM-36 gradiometer is vertical, with sensors separated by 50 cm and the lower sensor at about 30 cm above the surface. The traverses were separated by 1.0 meter, and the readings were taken in the automatic mode with 8 readings per meter, which gives intervals of 12.5 cm. Examination of the data indicates that the G858 and FM-36 data sets are generally comparable.

An east-west line in Blocks AQ, AR, and AS was examined with several geophysical survey methods by Bruce Bevan (2001). He conducted a magnetic survey, and carried out a traverse with a GSM-19fg gradiometer. The sensor spacing was 1.5 meters and the lower sensor was 0.57 meters above the surface. The measurement interval was 0.1 meters.

A comparison of the data from this survey with the G858 and FM-36 indicates that all three surveys produced comparable results. The G858 maximum is about 11 nT/m above the background, and the maxima

for the GSM-19fg and FM-36 are 8 nT/m and 6 nT/m above the background. The lower value for the GSM is because the lower sensor was higher above the surface. The lower value for the FM-36 is due to the smaller sensor separation in the instrument.

During the course of the magnetic survey of the wall, data was also collected from areas immediately inside and outside of the square wall. It was hoped that this survey data would identify anomalies that might represent features resulting from Hopewellian activities associated with the earthwork. Examination of the survey data resulted in the identification of 11 anomalies that might represent prehistoric features.

Topographic Survey

In June 2001, Archeologist Bruce A. Jones, Midwest Archeological Center, conducted a topographic survey of the research area. This was the first detailed topographic survey at the Hopeton Earthworks since Colonel Middleton surveyed the site for the Bureau of American Ethnology in 1890 (Thomas 1894).

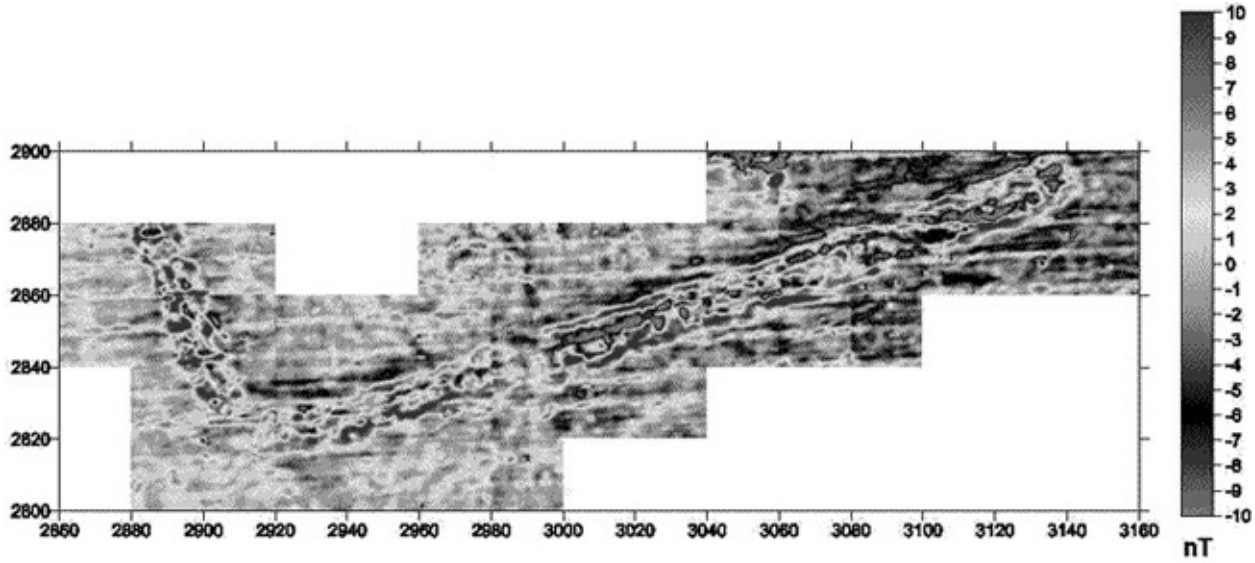

Figure 2. Magnetic map of the Hopeton Earthworks, south part of the "square."

Comparison of the magnetic map (Figure 2) and the topographic map (Figure 3) of the study area indicates that the magnetic maxima lie within the area of highest topography, but that the magnetic maxima are closer together while the topographic data shows that sediments from the wall are more widely spread.

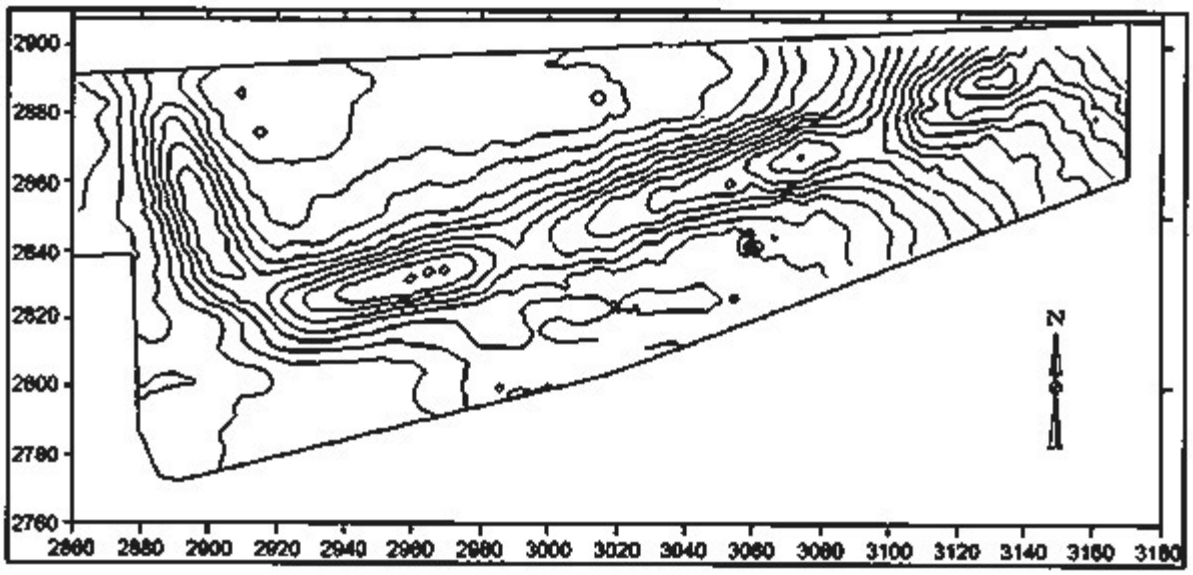

Figure 3. Topographic map of the Hopeton Earthworks, south part of the "square." The contour interval is 0.5 m.

Visual examination of the site and the topographic map clearly shows that the wall has been flattened by cultivation. However, it is interesting that the material causing the magnetic high in the wall has not been dispersed by the spreading out of wall soils by plowing.

Strategic Test Excavations

The Midwest Archeological Center, with assistance of field school students from the University of Nebraska, Lincoln, and the Milton Hershey School, Pennsylvannia, conducted test excavations in the study area from June 13 through June 29, 2001. Test excavations consisted of four 2-x-2-meter units and a trench 48 meters north-south and approximately 1.5 meters east-west.

The four 2-x-2-meter test units were placed to expose four different anomalies. All four units were located adjacent to, or near, the exterior of the south wall of the square. Test units were assigned numbers corresponding to the arbitrary numbers assigned to the magnetic anomalies, so the four corresponding Test Units 2, 3, 4, and 6 were excavated.

Metal horseshoes were found in Test Units 2 and 3 that may have produced signals that were misinterpreted as prehistoric features. No evidence of a prehistoric feature was observed in Test Unit 3, but a horseshoe and modern agricultural disturbance may have produced Anomaly 3.

A large post hole was exposed at 1.0 meter below surface in Test Unit 2, so it is possible that the anomaly that was observed in this area was due to the post hole rather than the historic metal horseshoe fragment. Test Units 4 and 6 exposed two important prehistoric features that appear to be related to the Hopewell activities at the earthworks.

Trench 1 was about 1.5 meters wide and 48 meters long; it was located between 2880N and 2832N and between 3018.5E and 3020E on the site grid. The purpose of the trench was to transect a segment of the south wall of the square. The trench was excavated by backhoe.

The backhoe operator carefully removed small amounts of soil along the trench alignment, and archeologists were able to monitor the work and divert excavation when several possible features were exposed. After the backhoe removed the majority of the fill, the archeological team hand-excavated five possible features within the trench. Three of these proved to be prehistoric features.

Excavators cleaned the walls of the trench to expose them for further study by Dr. Rolfe Mandel, who spent two days at the Hopeton Earthworks with the research team. Dr. Mandel inspected the trench profile and noted that "the reddish fill strongly resembles a well-developed alluvial soil in the immediate vicinity of the site. Iron-bearing minerals in the parent material (sandy alluvium) were weathered during pedogenesis, thereby producing Fe2O3."

The general construction sequence for this segment of the south wall can be reconstructed from the stratigraphy in the trench. First, all topsoil was removed from the area upon which the wall was built. This exposed a compact yellow clay-loam subsoil. Additional yellow clay-loam, similar to the subsoil base, was then brought in from another location and piled up to form a wall. A red sandy clay was then piled on the top and outside (south) of the yellow clay-loam wall. Then, topsoil was piled on the top and both sides of the wall. The contact between the yellow and red soils is very sharp, and it would appear that little time elapsed between these two construction phases (Figure 4).

The magnetic profile from the cesium gradiometer survey along the trench line (before excavation) had two strong, narrow maxima that must be related to the iron-oxide content of the soils. Micromorphological and magnetic susceptibility studies of soil columns are being conducted to further evaluate this interpretation. The trench profile revealed two 'A' horizons that sloped upward towards the middle of the wall segment and appeared to represent the original surfaces of the wall. These have been covered by slopewash from the top of the wall as a result of historic and recent agricultural activities.

The stratigraphy in this wall segment is only generally similar to that reported by Ruby (1997) for the north-west corner of the square. A second trench, planned for the west wall of the square, was not excavated in 2001 due to time limitations.

Features

Ten soil stains were initially assigned feature numbers during the excavation of the trench and test units. Seven of these appear to be the result of prehistoric cultural activities; the others are the result of rodent activity. Two post holes were recorded in Trench 1, and another was located in Test Unit 2. A fourth possible post hole or shallow pit was identified in the fill of the wall within Trench 1.

The other features included a burned log in Feature 6, which was located at the base of the wall in Trench 1, a fired-clay basin in Test Unit 4, and a large pit in Test Unit 6. These latter three features warrant further discussion and illustration.

Feature 1 is located in Test Unit 4 and represents a large clay basin that has been hardened by fire (Figure 5). The basin has a raised rim on the north and west sides and slopes slightly downward to the southeast. Although the feature extends into the east wall of the test unit, enough of the basin was exposed to note that it appears to represent a prepared clay surface that was hardened by repeated exposure to fIre. The basin contained burned soil, charcoal, and ash.

Several ceramic sherds were found on the northwest edge of the basin. Although this basin is not as symmetrical and well prepared as the features routinely called crematory basins at other Hopewell sites, it is clear that it is similar in form and construction. No bone was present in association with this feature, but the evidence for repeated fires is likely indicative of ritual activities.

Feature 6 is located at the eastern end of a segment of the south wall and appears to have been built at the edge of one of the many gateways to the square. The feature was located in Trench 1 near the base of the yellow clay that was piled up to form the first component of the wall. Two burned logs were lying horizontally at a level immediately above the undisturbed yellow clay subsoil upon which the wall was built (Figure 6). The feature appears to be contemporaneous with the start of construction on this segment of the wall and should provide sufficient carbon for radiocarbon dating.

Feature 9 is located in Test Unit 6, which is on the south side of the southern wall of the square. The feature is located about 10 meters outside one of the gateways in this part of the wall. The feature appears to be a large pit. The fill of the pit is similar in color to the surrounding subsoil, but the presence of abundant prehistoric artifacts, combined with a looser-textured soil in the pit, made it possible to distinguish the pit during careful excavation.

Only a sample of the pit fill was excavated, but fire-cracked rock, bladelets, pottery, and mica were abundant in the pit. Excavators recovered what appears to be part of a tetrapod ceramic vessel that contained mica. In numerous cases, small pieces of mica were found adhering to the interior surfaces of ceramic sherds.

A heavily used ground-stone celt was also found in the pit fill. Further analysis is necessary, but the pit may contain refuse from ritual activities or from the preparation of objects for ritual activities.

Summary

The 2001 research at the Hopeton Earthworks focused on the southern end of the square. Magnetic survey data provided evidence that the core of the wall was intact, and gateways dividing the wall into sections can be detected from the magnetic data. Several anomalies appear to indicate prehistoric features, and these were also recorded. Subsequent testing confirmed that the core of the southern wall of the square is still intact.

Field observation of stratigraphy detected a complex construction sequence that appears to have occurred over a relatively short time. Micromorphological and magnetic susceptibility analysis are planned to evaluate this interpretation. Strategic testing to examine four anomalies provided evidence for several features, including a fired-clay basin and a pit containing what appears to be refuse from ritual activities or preparation of materials for ritual activities. The methodology employed in 2001 appears to be effective in addressing the research problems and questions identified for this multi-year project.

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About the Authors

Mark Lynott is Manager, Midwest Archeological Center. John Weymouth is Professor Emeritus, University of Nebraska, and winner of the 1998 Fryxell Award for his use of geophysical studies in archeology.

2. The John L. Cotter Award for Excellence in National Park Service Archeology

PREFACE: In honor of his long and distinguished career and his pioneering contributions to professional archeology within the National Park System, this unofficial annual award was established by agency staff as inspiration for student and professional archeologists to continue Dr. John L. Cotter's model of excellence.

PURPOSE: To recognize a specific archeological project within a unit of the National Park System, conducted by National Park Service staff, cooperator, permittee, or consultant as guided by senior National Park Service staff archeologist(s), each fiscal year, which meets or exceeds the criteria below.

AWARD: The selected project lead person(s) will receive a commemorative non-monetary award and certificate bearing name(s) of principal investigator(s), project dates and field unit name. Presentation of award shall be at a suitable gathering of NPS archeological staff, followed by a brief project presentation. The award will be announced through official NPS public affairs channels.

CRITERIA: Candidate project leader(s) and the work within park submerged or terrestrial site(s) shall address the following elements for eligibility:

(1) Exemplary multidisciplinary research design, which includes testable inquiries (e.g., cultural patterns, affiliations, cultural change, or other analytical concepts of anthropology) as objectives, and data from other supporting disciplines;

(2) Involvement of high school or college students who performed work elements which contributed significantly to project goals;

(3) Innovative scientific analysis, curatorial management meeting federal standards, and interpretation of archeological material culture were integrated with research design inquiries, and appropriate specialists' assistance was utllized in these activities;

(4) A program(s) was stated to improve local public education regarding research results and benefits of new knowledge about past peoples as well as increased scientific values;

(5) Publication plans identified funding for printing of project results as professional reports, including electronic formats.

PROJECT TYPES: Eligible projects may be a phase of a continuing multi-year program or a single-year project that addresses prehistoric or historical park archeological resources through excavation, survey, or inventory actions, sponsored focused symposia, analysis and description of an artifact collection, or combinations of these activities. If not NPS funded, the project must contribute to a field unit's strategic management of its archeological resources.

NOMINATION: A project begun and completed in FY 2002 or begun in an earlier fiscal year and completed in FY 2002 and its supervisory staff may be nominated by an NPS career employee or non-NPS professional archeologist familiar with the work (other than the Review Committee members or persons otherwise directly involved). Nominations addressing criteria above should be less than 10 pages with fewer than five photographs and other graphics. Six copies will be forwarded to the Office of the Department of the Interior Consulting Archeologist, labeled "Cotter Award Nomination" with a dated transmittal letter copied to Committee co-chairs. The due date for FY 2002 nominations will be in early 2003. Contact Roger Kelly or David Orr (below) for exact deadline and other details. Electronic submittal is recommended.

REVIEW OF NOMINATIONS: At least six NPS supervisory archeologists will be requested by the Consulting Archeologist to review nominations received and place them in rank order with a recommendation for award. This Committee may seek input from previous awardees or non-NPS archeological experts, if needed. A consensus decision is needed. The Consulting Archeologist's Office will be informed of the award recommendation within four weeks of nomination receipt.

ANNOUNCEMENT: The Review Committee will schedule a suitable presentation event, usually during the annual National Park Service meetings prior to the Society for American Archeology annual conference. Public announcement will be made within NPS public affairs channels.

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3. Reply to Mark Lynott's Review of Mysteries of the Hopewell

In the previous issue of Hopewell Archeology (Vol. 4, No. 2, pp. 8-9) Dr. Mark Lynott reviewed Mysteries of the Hopewell: Astronomers, Geometers, and Magicians of the Eastern Woodlands by William F. Romain. Mr. Romain's response to the review is presented here.

Dear Mr. Lynott,

Thank you for your recent review of my book, "Mysteries of the Hopewell: Astronomers, Geometers, and Magicians of the Eastern Woodlands" (University of Akron, 2000). In the interests of scientific inquiry, I hope you will print this letter in your newsletter. Given the abbreviated format of the newsletter, I will keep my comments brief.

Perhaps the most serious criticism you raise is that "One of the most notable shortcomings of this book ... is that it fails to satisfactorily address time." You go on to say, "This is most evident in the author's effort to relate Hopewell earthworks to … events in the year A.D. 250." I am sorry I was not clear enough in my explanation on pages 106 and 107, that the date of A.D. 250 simply represents a convenient date for calculation purposes, near in time to the mid-point of Hopewell florescence from about 100 B.C. to A.D. 500. The change in the sun's rising and setting azimuths over time is caused by a slowly decreasing change in the obliquity of the ecliptic. This change is equal to about 40 seconds of arc per century. Given this rate of change, it is a simple matter to establish that in 100 B.C., with all other values held the same, at Hopeton or Mound City, the sun would have set at an azimuth of 299.39 degrees. In A.D. 500, the sun would have set at an azimuth of 299.48 degrees. The difference of 0.09 degrees is negligible. For all practical purposes, a person viewing the sunset in A.D. 500, would have seen the sun set in virtually the same place on the horizon as it did in 100 B.C.

I am not proposing that these earthworks were built in the year A.D. 250, or used only in that year; but rather, based on the calculations just discussed, the A.D. 250 date is simply a good reference point to use when making these sorts of calculations.

A second criticism raised by reference to Marshall, is that "archaeoastronomers are selective in the potential azimuths they choose to emphasize." And further, "dozens of potential azimuths at the Hopeton Earthworks ... are ignored ... ".

While it is true that many potential alignments are ignored, it is an error in logic to think that all possible azimuths necessarily need to be accounted for. Let me provide an analogy.

Let's say I'm building a simple, rectangular-shaped house. I decide to orient the house so that the front door and living room window face a nearby mountain peak. Stated another way, the minor axis of the structure is now in alignment with the mountain. By design, what matters here is only the one sightline or azimuth to the mountain. The fact that other azimuths can be drawn through the corners, or parallel to the back wall of the house, is not relevant to why the house was oriented in the direction we established. So too, although other sightlines or azimuths can be drawn through all of the Hopewell earthworks, most were probably not used for astronomical purposes.

One way we ascertain the intentionality of a proposed alignment is by checking to see if the same alignment occurs at other sites. In the case of the Hopewell, solstice sightlines are found at several sites (having accurate surveys) — thus demonstrating the likelihood that the Mound City and/or Hopeton solstice alignments were also deliberate.

In connection with my proposed Hopewell unit of length, Mr. Lynott correctly takes me to task for not sufficiently quantifying the distances between post holes. I appreciate that criticism and will correct that oversight in my Ph.D. dissertation, and in my second book, "Lost Worlds of the Hopewell."

I note that Mr. Lynott does not offer any criticism relevant to Part Two of the book, wherein I propose that the Hopewell earthworks were perhaps meant as symbols of the earth and sky, or earth, upperworld, and underworld — and that they were likely used for ceremonies relating to passage from this world to the next, death and rebirth, and world renewal. In this regard, it is interesting to note that in their book, "Indian Mounds of Wisconsin" (University of Wisconsin Press, 2000), Robert Birmingham and Leslie Eisenberg recently proposed a similar explanation for the effigy mounds in Wisconsin, based in part on the work of Robert Hall and R. Clark Mallam.

If what Mallam, Hall, Birmingham, Eisenberg, and myself are proposing is accurate, then it may be that we will soon be in a position to demonstrate a continuity in belief systems extending from historic Native American groups, back through time, to the ancient Hopewell and perhaps, even beyond. I hope this brief note has helped clarify a couple of issues. Thank you for your interest in my work.

Sincerely,

William F. Romain

4. Meeting Calendar

Midwest Archaeological Conference 48th Annual Meeting

October 3-6, 2002

Ramada Hotel and Conference Center, Columbus, Ohio.

Conference information is available at <http://anthropology.ohio-state.edu>

Southeastern Archaeological Conference 59th Annual Meeting

November 6-9, 2002

Beau Rivage Resort and Casino, Biloxi, Mississippi.

Conference information is available at <http://www.uark.edu/campus-resources/seac/>

Forthcoming

The next issue of Hopewell Archeology will feature the discovery of a new earthen circle at the Hopewell site and an update on the continuing research at the Hopeton Earthworks. We are always looking for short contributions relating to Hopewell archeology. Potential authors should contact the editor.

5. Detecting the Shriver Circle Earthwork, Ross County, Ohio

by Jennifer Pederson and Jarrod Burks

Ephraim Squier and Edwin Davis surveyed the Mound City Group area over 150 years ago. Although primarily interested in this earthwork complex, with its more than 20 mounds surrounded by a low embankment, their map also depicted an oblong circular enclosure located less than 1,500 feet from Mound City's southern embankment wall. Named after Henry Shriver, owner of the surrounding farmland in the mid-1800s, the Shriver Circle consists of a large circular embankment flanked by an exterior ditch (Figure 1). Six gateways break the circumference of the circle, which has a diameter exceeding 1,000 feet. In the 1840s, the embankment measured 5 feet high and 25 feet wide at the base, while the ditch was 4 feet deep and 20 feet wide (Squier and Davis 1848:Plate XIX).

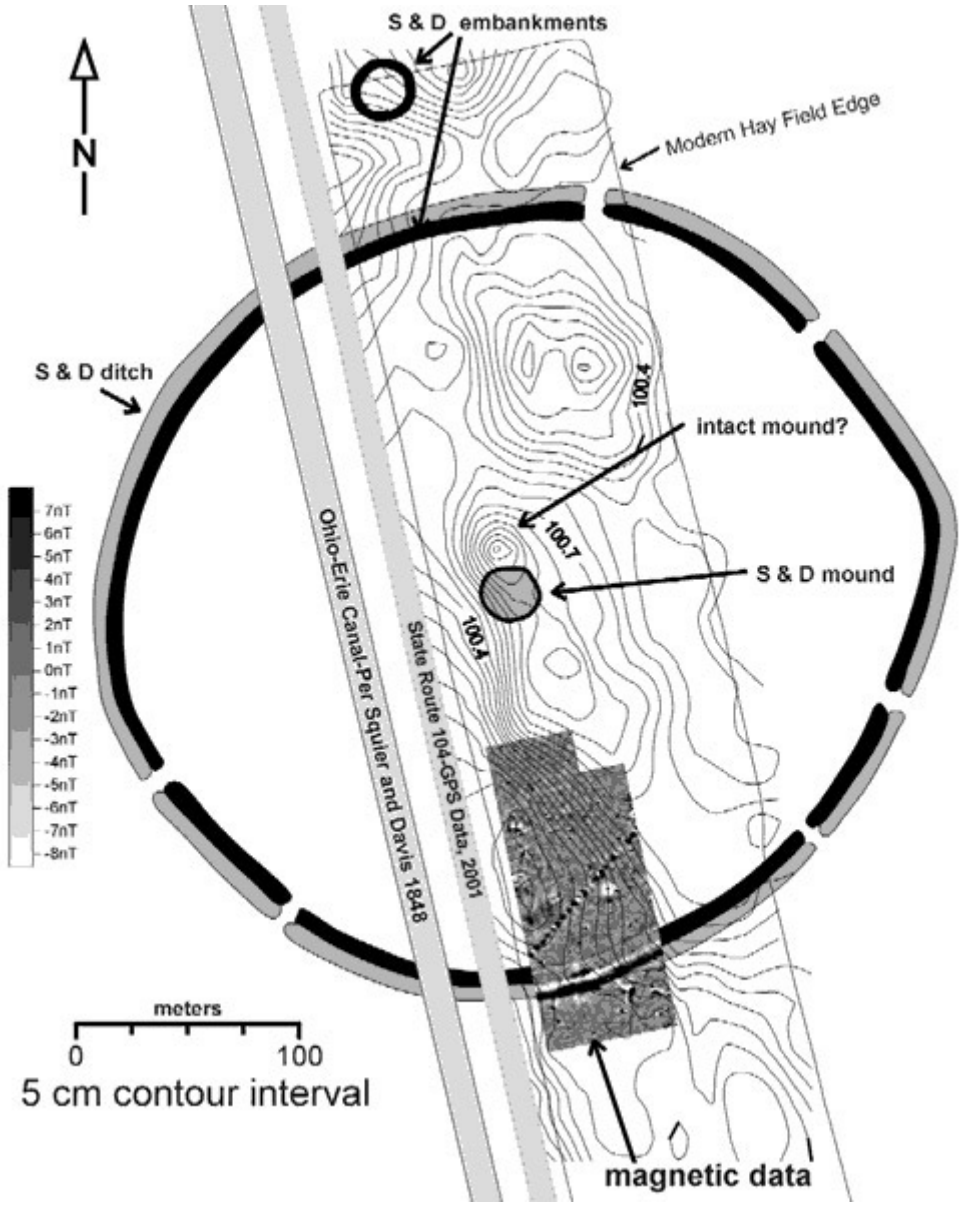

Figure 1. The Shriver Circle, the survey area, and selected contemporary features.

Near the enclosure's center, Squier and Davis mapped a low mound 40 feet across and 5 feet high. Excavation into the mound's center uncovered a large altar containing burned bones, 10 copper bracelets, and 2 plates of mica, leading Squier and Davis (1848:55) to conclude that the mound was "clearly a place of

sacrifice." Artifacts found within this mound coincide with materials found in quantity at Mound City (e.g., mica). However, some of the artifacts, namely the copper bracelets, look similar to those found in mounds attributed to the Adena culture.

Today the earthwork has all but disappeared from the ground surface. Even prior to Squier and Davis, the earthwork was impacted by nearly 50 years of agriculture, bisected by a main thoroughfare, and trenched for the construction of the Ohio and Erie Canal. Since the mid-1800s, the Shriver Circle has suffered through a number of additional disturbances, including continued agricultural plowing, grading to make way for parade grounds associated with the WWI Camp Sherman training facility, the construction of a large prison, and the expansion of State Route 104. Each of these disturbances, joined by a healthy community of ground hogs, has chipped away at various parts of the earthwork. Until recently, no intensive archeological research had been conducted at the site.

In spring 2001, archeologists from Hopewell Culture National Historical Park began geophysical testing of the site in an effort to relocate its southern limit. This research was driven, in part, by a proposal to widen State Route 104. We conducted a survey of a 60-x-60-m area using a Geoscan Research fluxgate gradiometer, the FM-36. This survey clearly located a 60-m-long section of a ditch and embankment that correlate very closely to the measurements given by Squier and Davis in 1848 (Figure 2).

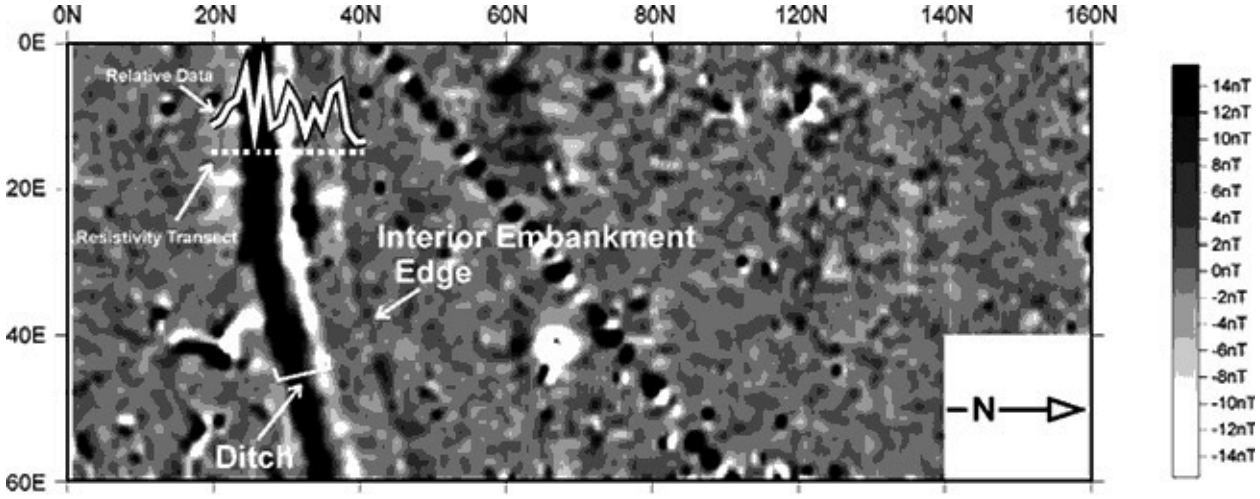

Figure 2. Magnetic survey data from the Shriver Circle collected during the Archeology for Teachers Workshop, June 2001. Crew included J. Pederson, P. Castro, L. Davis, E. Karshner, and J. Burks.

Furthermore, the linear bands of magnetic high and low readings over the ditch suggest that it was partially in-filled by organically rich soils, especially along the outer edge, and partially in-filled by less-magnetic soils along the interior edge, perhaps eroded down from the embankment. Whether this signature is the result of rapid in-filling from agricultural plowing subsequent to Squier and Davis's visit or a backfilling event during construction of Camp Sherman remains to be discovered.

Figure 1. The Shriver Circle, the survey area, and selected contemporary features.

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Spurred on by these results, we enlisted the help of teachers enrolled in the park's 2001 Archeology for Teachers Workshop. Over the course of a week, the teachers collected magnetic, resistivity, topographic, and GPS data. The additional magnetic data included several anomalies with the potential for being cultural features.

The transect of resistivity data was collected with off-the-shelf components (i.e., a digital multimeter, barbecue skewers, and a six-volt lantern battery) arranged in a Wenner array of four probes with one-meter spacings. Even this simple geophysical test (Figure 2), which we conducted to demonstrate the accessibility of geophysics for pre-college teaching, revealed useful information about the Shriver Circle. Not only did it produce a classic double-peak signature over the ditch, but it also seems to have detected the inside edge of the embankment -- as did the magnetic survey.

Figure 2. Magnetic survey data from the Shriver Circle collected during the Archeology for Teachers Workshop, June 2001. Crew included J. Pederson, P. Castro, L. Davis, E. Karshner, and J. Burks.

While other projects now dominate our summer agenda, we plan to return to the Shriver Circle to test the western portion of the site using these same techniques. By using geophysical testing and accurate mapping techniques, we can efficiently document subsurface features covering large areas without excavation. In addition, these techniques clearly show that earthworks, without surface expression, can still be successfully located even after 200 years of historic and modern disturbance.

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