Hopewell Archeology:
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Volume 6, Number 2, March 2005

1. Newark Earthwork Cosmology: This Island Earth

By William F. Romain, Ph.D.

Most descriptions of the Newark earthworks (e.g.,Squier and Davis 1848;Thomas 1894) consider the complex to include: the Octagon and Observatory Circle, Wright Square, Great Circle, Large Oval, numerous smaller circle earthworks along the parallel walkways, and perhaps an outlier earthwork, such as the Salisbury Square. In addition to these earthworks, I propose that another feature should be included in our thinking of what comprises the Newark earthworks complex – namely, Geller Hill.

Geller Hill is a prominent feature located about 7,000 feet southwest of the Newark Great Circle **(figure 1)**. The hill is the central feature of Geller Park, in Heath, Ohio. The hill is roughly 35 feet in elevation, 1,150 feet in length, and 700 feet wide at its base. In Hopewell times (note 1), Geller Hill would have been the highest feature on the flat Newark plain where the geometric earthworks were built. Several lines of evidence suggest that Geller Hill was included in the design and layout of the Newark earthworks.

Figure 1. View of Geller Hill, Heath, Ohio. Photo by the author.

First, the geometric relationship between Geller Hill, the Newark Octagon, and the Newark Great Circle describes a fairly accurate isosceles triangle. An isosceles triangle has two equal sides and consequently, two equal angles. In the case of the Geller Hill-Octagon-Great Circle triangle, the two sides that are of near equal length are the sides that extend from the apex of Geller Hill to the centers of the Octagon and Great Circle, respectively. In **(figure 2)**, the triangle just described is labeled A-B-D, with point A at the apex of Geller Hill.

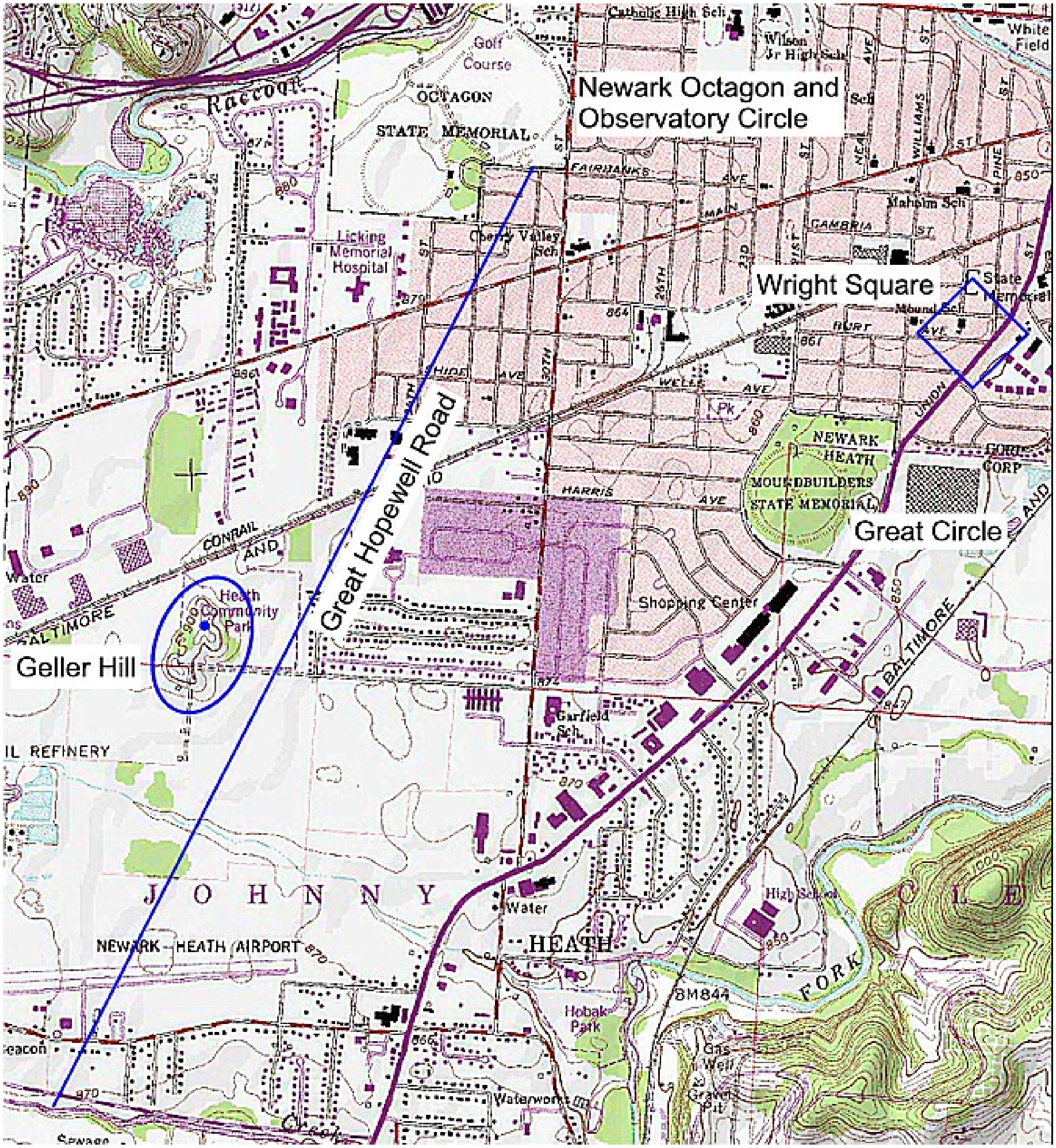

Figure 2. Section of USGS 7.5 minute series map (Newark Quardrangle) showing the triangular relationship between the Newark Octagon, Great Circle, and Geller Hill.

In 1982, Hively and Horn (1982:S8) identified a unit of length, used by the Hopewell. This unit of length is equal to the diameter of the Newark Observatory Circle – hence, they refer to the unit as 1 OCD.

One OCD is equal to 1,054 feet. Hively and Horn found this unit of length expressed not only in the diameter of the Observatory Circle, but also in the linear dimensions of the Newark Octagon.

With reference to the Geller Hill isosceles triangle, as mentioned, sides A-B and A-D are nearly equal to each other. Of special interest is that the lengths of these two sides are both, near-multiples of 7 OCDs. The length of 7 OCDs is equal to 7378 feet. As measured by reference to a digitized USGS 7.5-minute series topographic map for the area, the distance from point A at the apex of Geller Hill to point B at the center of the Octagon is 7,392 feet. This differs from the ideal 7 OCD length by 14 feet, or 0.2 percent. Similarly, the map-measured distance from point A on Geller Hill to point D at center of the Great Circle is 7,498 feet. This differs from the ideal 7 OCD length by 119.6 feet, or 1.6 percent. Thus the measured Geller Hill-Octagon-Great Circle triangle varies from the geometric ideal by an average of less than 1 percent. The magnitude of this linear deviation from the ideal falls well within the range of similar analyses for other Hopewell earthworks – e.g., Fort Ancient (Romain 2004a).

The statistical likelihood that the centers of two geometrically shaped Hopewell earthworks would be situated about the same distance from Geller Hill strictly due to chance is slim. The likelihood that both distances would also be near multiples of the OCD strongly suggests that the linear relationship between Geller Hill and the two geometric earthworks was intentional.

Hively and Horn (1982:table II) showed that the major axis of the Newark Octagon earthwork is closely aligned to the moon's maximum north rising point. The same alignment appears represented in the Geller Hill-Octagon-Great Circle triangle. In **(figure 2, above)**, point C is the bisection point of line B-D. If a line is drawn from point A on Geller Hill through bisection point C, that line is found to extend along an azimuth of 53°.3. Given a date of A.D. 100 and apparent horizon elevation of 0°.5 (corrected to 1°.34), the lower limb moonrise as observed from the top of Geller Hill would have been at azimuth 52°.2. The lunar alignment of the bisected triangle therefore, is to within 1°.1. Like the Newark Octagon, the symmetry axis of the Geller Hill triangle is closely aligned to the moon's maximum north rise point. From Geller Hill, the moon would have been observed to rise at a point on the horizon about equi-distant between the Octagon and Great Circle and balanced between the two.

The most significant archaeological feature of Geller Hill is the existence of possible burial mounds located at the top of the hill **(figure 3)**. Notably, the Salisbury map of 1862 shows several of these possible mounds. Further, the Salisburys make the following observations:

> …about one and one half miles distant from the octagon, is seen a little to the right, standing boldly out in the plain, an irregular isolated hill about 75 ft. in height covering a surface of perhaps ten acres. On this lonely hill in the midst of the plain, are some 8 or 10 small mounds, generally situated on the highest points. Whatever people selected this locality as the last resting place of their dead, deserve some credit for such a proof of their good taste (Salisbury and Salisbury 1862:28).

Review of the literature suggests that the features identified by the Salisburys have not been excavated. Further investigation is needed to determine if the features noted by the Salisburys are man-made. In general appearance, however, the features look like Hopewell burial mounds.

Figure 3. Panoramic composite showing several of the burial mounds located at the top of Geller Hill. Photos by the author.

Parallel walls once extended between several of the Newark earthworks. Long parallel walls extended, for example, between the Octagon and Wright Square. Another set of parallel walls extended from the Octagon, in a southwest direction, at least as far as Ramp Creek. By reference toReeves (1936) it is possible to reconstruct the trajectory of the parallel walls from the Octagon to Ramp Creek. From this analysis it is found that the Octagon-Ramp Creek parallel walls passed within 400 - 500 feet of the base of Geller Hill. It may be that Geller Hill was a destination option when transiting the walled pathway. If that is the case, then the special status of Geller Hill is indicated.

In summary, geometric relationships, measurement data, astronomical data, and archaeological evidence all strengthen the hypothesis that Geller Hill was included in the design, layout, and possibly, ritual functioning of the Newark earthworks complex. The question is, what made Geller Hill important to the Hopewell? To help answer this, it is necessary to view Geller Hill and the Newark complex as an integrated whole.

Bradley T. Lepper (2004:80) has argued that the Newark complex was not merely a set of arcane symbols; but rather, functioned as a “gigantic machine or factory in which energies from the three levels of the Eastern Woodland Indian’s cosmos …were drawn together and circulated through conduits of ritual to accomplish some sacred purpose.” Lepper (2004:80) compares the Newark complex to ‘giant superconducting supercollider.’ Although thought provoking, the analogy Lepper draws is not one I would use. Native Americans do not think of created things in terms of machines, or factories – terms that bring to mind images of cold steel structures and dehumanized work places. While many Western people may think of non-human and non-animal things as inanimate, Native Americans, on the other hand, often consider such things to possess a life essence, spirit, or soul. Among the seemingly non-living things that Indians sometimes think of as having a life essence are smoking pipes, effigy masks, weapons, and natural phenomena to include certain rocks, sun, moon, rivers, and mountains (see e.g., Hallowell 1975 [1960]). Given this, it might be appropriate to think of the Newark complex in more organic terms as might be the case if we consider the complex as a functioning microcosm of the Eastern Woodland Indian cosmos. By functional microcosm, I mean a smaller, dynamic manifestation, or expression. A functional microcosm of the Eastern Woodland Indian cosmos replicates on a reduced scale, mythic time and space at the beginning. This alternative interpretation is presented below.

In shamanic thought generally (e.g., Eliade1964; Furst1976) and among Native American peoples in particular (e.g.,Lankford 1987; Hudson 1976), the cosmos is often thought of as having three basic levels – i.e., Upperworld, earth, and Lowerworld **(figure 4)**. These three levels are vertically connected by an *axis mundi*. In Native American cosmology, the Upperworld is the realm of the sky, sun, and stars, as well as powerful celestial birds known as Thunderbirds. By contrast, the Lowerworld is a watery world, located opposite to the Upperworld. It is the realm of fishes, frogs, snakes, and related creatures.

Chief of the Lowerworld creatures is either the Great Horned Serpent or Underwater Panther. The Upperworld and Lowerworld are antithetical to each other.

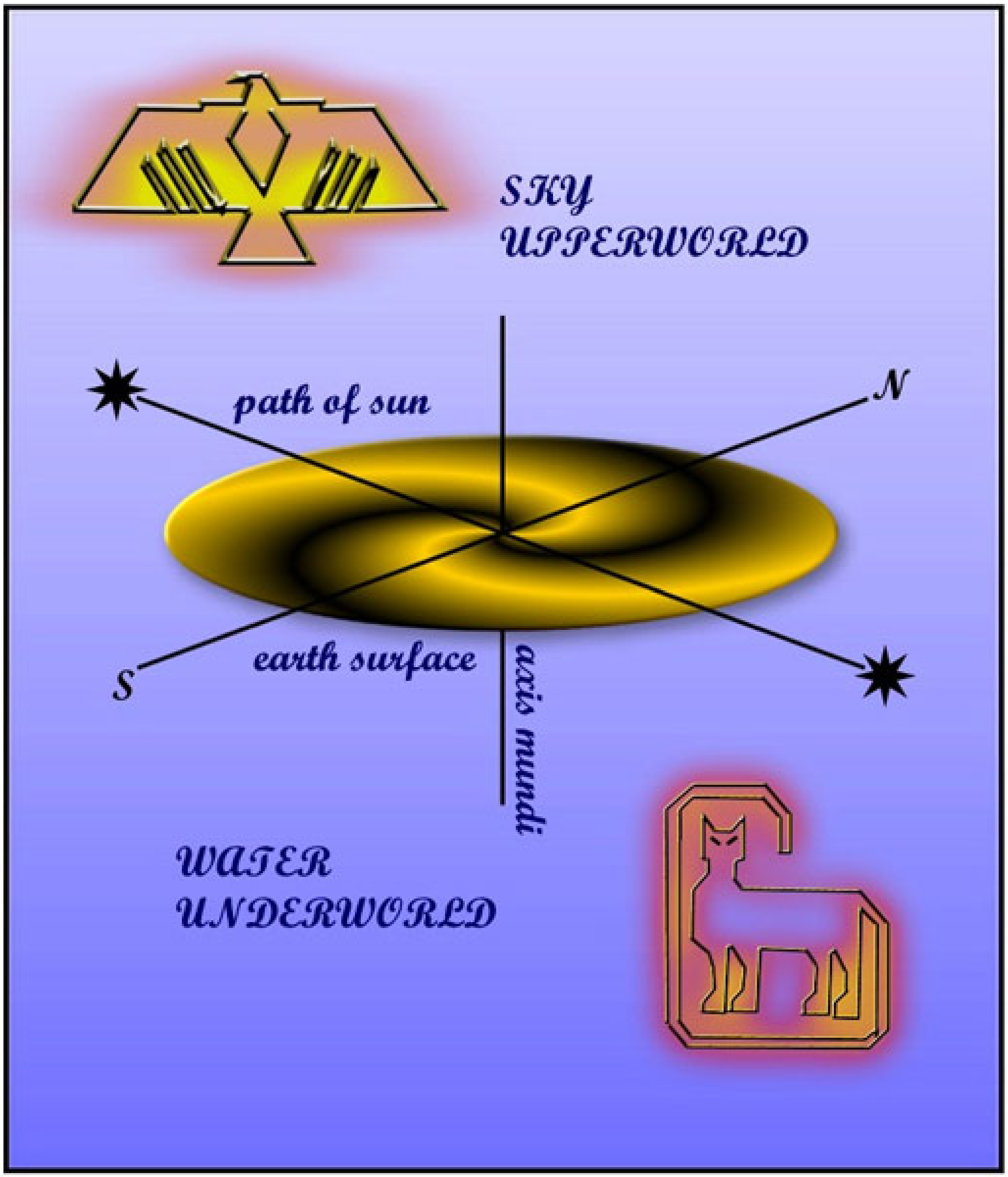

Figure 4. Idealized representation of the Eastern Woodlands cosmos.

Balanced between the Upperworld and Lowerworld, is the earth. In many cosmologies, the earth is described as a flat, circular island floating in a surrounding primordial sea. Associated with the belief that the earth is a circular island floating in a surrounding sea are many examples of the Earth-diver myth – wherein a mythical creature, such as the otter, is said to have dived to the bottom of the primordial sea to bring back a piece of mud, which magically expanded, thereby creating the earth.

Physical evidence indicates that the Great Circle was built in a prairie setting(Lepper 2004:78). While the area extent of this prairie is unknown, it is possible that a large part of the area occupied by the Newark earthwork complex was likewise, covered by prairie. Human activities may have further reduced any forest cover in the vicinity of the earthworks. In this sort of setting, Geller Hill would likely have been visible from the Octagon and Great Circle earthworks, located less than two miles away. Certainly, the Octagon and Great Circle would have been visible from Geller Hill.

The Newark earthworks are located at the confluence of three watercourses. Less obvious is the extent to which watercourses surround the Newark plain – to include Geller Hill. The watercourses that surround the Newark plain include Raccoon Creek, South Fork Licking River, and Ramp Creek. As **(figure 5)**, shows, out of a 360-degree circle perimeter around the entire complex, these watercourses enclose about 320 degrees of that circle. By calculation therefore, water surrounds approximately 90% of the Newark complex. Notably, the use of water barriers to separate Hopewell earthworks from the surrounding topography is known elsewhere – e.g., at Fort Ancient (Connolly 1996; Romain 2004a).

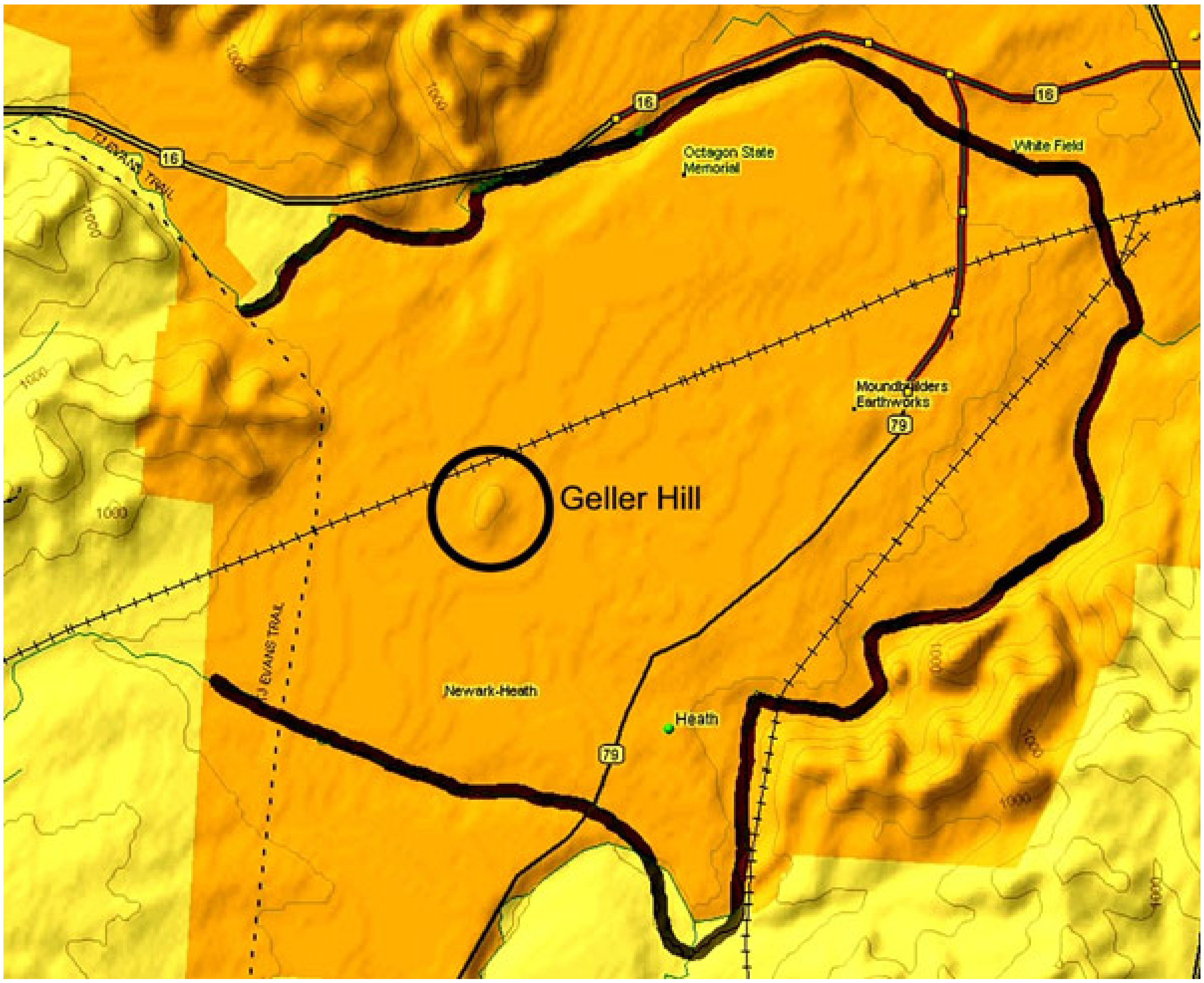

Figure 5. Relief map showing the Newark plain and location of Geller Hill. Highlighting traces the course of Raccoon Creek, Ramp Creek, and the South Fork Licking River.

If we apply the archetypal cosmological model discussed earlier to the topographic observations just noted for Newark, we find some intriguing correspondences. In this thought exercise, the Newark complex is equivalent to the island earth, surrounded by the primordial sea. The primordial sea is represented by the surrounding waterways of Ramp Creek, Raccoon Creek, and the South Fork Licking River. Located in the symbolic center of this island earth, Geller Hill serves as an *axis mundi*, connecting the three cosmic realms.

In this view, consistent with Native American understandings of the cosmos, the Newark complex was balanced between cosmic realms. As such, the Newark complex was a cosmic center; and it was in this center that the mound builders performed the most sacred of their rituals – i.e., rituals intended to maintain cosmic balance, ensure plant and animal abundance, maintain health, and facilitate in death, the transition of the soul from the land of the living to the land of the dead. In this view, the Newark complex was a functional microcosm of the Hopewell universe. Indeed, it may be that many of the other Hopewell enclosures that are surrounded by water – particularly the hilltop enclosures – were constructed with this cosmological idea in mind. Alternative explanations for what we find in the archaeological record are always possible. What is clear, however, is that, if we are to understand phenomena as complex as the Newark earthworks, we need to expand our thinking beyond the two-dimensional map limits depicted more than a hundred years ago. We need to consider relationships between the earthworks and surrounding environment to include earth, sky, and water (Romain 2000, 2004b). Importantly too, we need to frame our interpretations based not in Euro-centric views of the world; but rather, in Native American terms.

As to Geller Hill, purchase and conservation of the section held in private ownership and currently under plow would be desirable. Additionally, I think it would be useful to initiate further investigation. Magnetic survey, soil resistivity, and ground penetrating radar studies, as well as emergency salvage work of the section currently under plow - if purchase of that section is not an option - might help answer questions not only about the nature of the possible burial mounds discussed earlier; but also, broader questions relating to the geometric earthworks.

We know, for example, from reports dating to the early 1800s, that some Middle Woodland period people were buried in the now obliterated, Cherry Valley Mound group, located within the Oval earthwork. According toSalisbury and Salisbury (1862), no fewer than eleven mounds existed in this group. Squier and Davis (1848:72) document the discovery of fourteen individuals found in one of the Cherry Valley mounds. Newspaper reports document one or two additional individuals recovered from the area. What seems missing, however, are the significant numbers of burials we might expect, given that Newark is the largest geometric complex of its kind in the world. For a site this size, we might expect to find at least scores, or even hundreds of burials, as reported for other major Hopewell centers such as Mound City, Liberty, Seip, and Tremper. Having said this, I would not be surprised if, one day, we find the Newark shamans, chiefs, and Ancient Ones, buried near their earthworks – perhaps high on Geller Hill – ever watchful over their people, ever connected to their ancestral lands – this island earth.

Acknowledgments:

This article is dedicated to my Native American friends in southern Ohio, who welcomed me into their circle, gave me an Indian name, and tried to teach me something about Indian ways. Thanks especially, to Jean, Charla, and Doug.

Many thanks to Pat Mason and Bob Geller for background information on Geller Hill. Special thanks to my mother, Frances Spania Rothenberg for her thoughts and encouragement; and to my wife, Evie, for her patience and support.

References Cited:

Connolly, Robert P.
1996. Middle Woodland Hilltop Enclosures: The Built Environment, Construction and Function. Ph.D. dissertation. University of Illinois at Urbana-Champaign, Urbana, Illinois.

Eliade, Mircea.
1964. *Shamanism: Archaic Techniques of Ecstasy*. New York: Pantheon Books.

Furst, Peter.
1976. Shamanistic Survivals in Mesoamerican Religion. *Actas del XLI Congreso Internacional de Americanistas* 3:149-157.

Hallowell, A. Irving.
1975 (1960). Ojibwa Ontology, Behavior, and World View. In *Teachings from the American Earth*, edited by D. Tedlock and B. Tedlock. New York: W.W. Norton.

Hively, Ray, and Robert Horn.
1982. Geometry and Astronomy in Prehistoric Ohio. *Archaeoastronomy (Supplement to Vol. 13, Journal for the History of Astronomy)* 4:S1-S20.

Hudson, Charles.
1976. *The Southeastern Indians*. Knoxville: University of Tennessee Press.

Lankford, George E., ed.
1987. *Native American Legends. Southeastern Legends: Tales from the Natchez, Caddo, Biloxi, Chicasaw, and Other Nations*. Little Rock: August House.

Lepper, Bradley T. 2004.
The Newark Earthworks: Monumental Geometry and Astronomy at a Hopewellian Pilgrimage Center. In *Hero, Hawk, and Open Hand: Ancient Indian Art of the Woodlands*, edited by R. F. Townsend and R. V. Sharp. New Haven: The Art Institute of Chicago and Yale University Press.

National Park Service.
2001. *Long Range Interpretive Plan for the Hopewell Culture National Historic Park*. Washington, D.C.: U.S. Government Printing Office.

Reeves, Dache M.
1936. A Newly Discovered Extension of the Newark Works. *Ohio State Archaeological and Historical Quarterly* 45:187-193.

Romain, William F.
2000. *Mysteries of the Hopewell : Astronomers, Geometers, and Magicians of the Eastern Woodlands*. Akron, Ohio: University of Akron Press.

2004a. Journey to the Center of the World: Astronomy, Geometry, and Cosmology of the Fort Ancient Enclosure. In *The Fort Ancient Earthwork: Prehistoric Lifeways of the Hopewell in Southwestern Ohio*, edited by R. P. Connolly and B. T. Lepper. Columbus: The Ohio Historical Society.

2004b. *Hopewell Geometric Enclosures: Gatherings of the Fourfold.* Ph.D. dissertation. University of Leicester.

Salisbury, James, and Charles Salisbury.
1862. Accurate Surveys and Descriptions of the Ancient Earthworks at Newark, Ohio. Transcribed from the original by B. T. Lepper and B. T. Simmons: Manuscript on file, American Antiquarian Society, Worcester, Massachusetts.

Squier, Ephraim G., and Edwin H. Davis.
1848. *Ancient Monuments of the Mississippi Valley. Smithsonian Contributions to Knowledge Vol. 1*. Washington, D.C.: Smithsonian Institution.

Thomas, Cyrus.
1894. Report on the Mound Explorations of the Bureau of Ethnology for the Years 1890-1891. In *Twelfth Annual Report of the Bureau of American Ethnology*. Washington, D.C.: Smithsonian Institution.

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2. Design and Layout of the Newark Earthwork Complex
By William F. Romain, Ph.D.

The Newark earthwork complex is the largest and most complicated geometric complex of its kind in the world. **(Figure 1)** shows the complex as represented by Squier and Davis (1848: Pl. XXV).

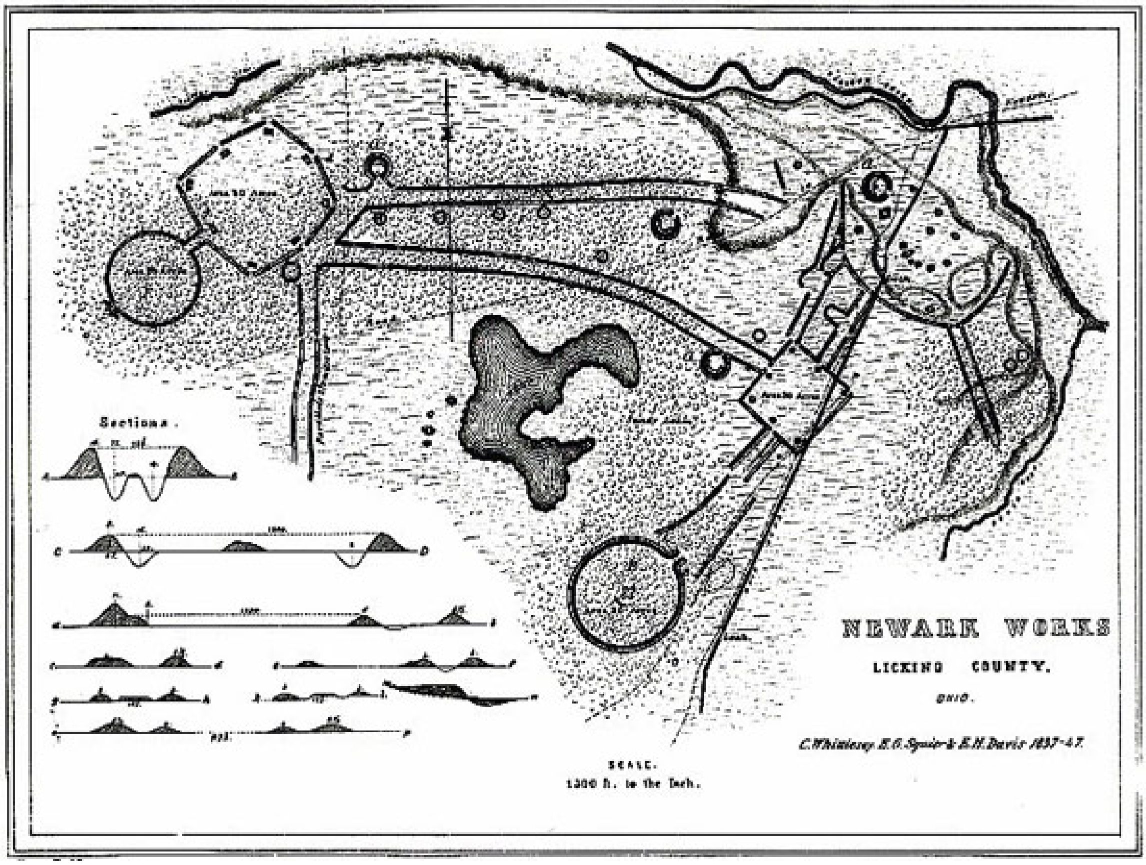

Figure 6. Squier and Davis's (1848: Pl. XXV) map showing the Newark earthwork complex.

(Figure 2) shows what remains of the complex today – i.e., the restored Octagon and Observatory Circle and the Great Circle. Also shown is Geller Hill. The likely location of the Great Hopewell Road (Lepper 1995) and Wright Square are also indicated, based on surviving remnants and aerial photographs (Reeves 1936).

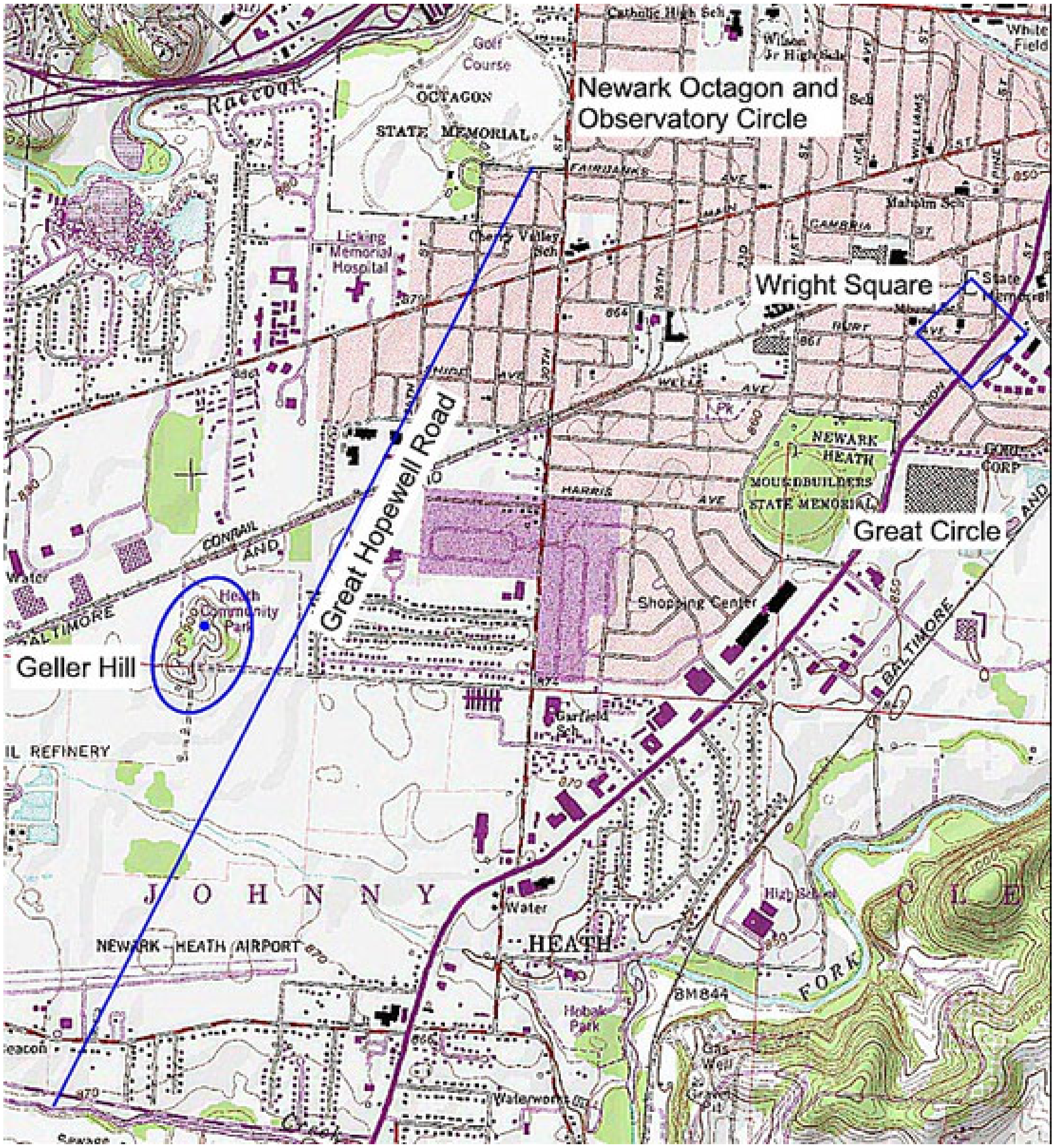

Figure 7. USGS 7.5-minute series topographic map showing part of the Newark earthwork complex. Wright Square and Great Hopewell Road drawn by the author based on information from aerial photographs and surviving remnants. (The oval earthwork and most of the parallel walkways shown on the Squier and Davis map are no longer visible.)

Looking at the Squier and Davis map, a casual observer might think that the large geometrically shaped earthworks, such as the Octagon, Great Circle, and Wright Square were arbitrarily located on the Newark landscape. As demonstrated below, this was not the case. Each earthwork is situated at precise coordinates and in a fashion that follows an internally consistent logic.

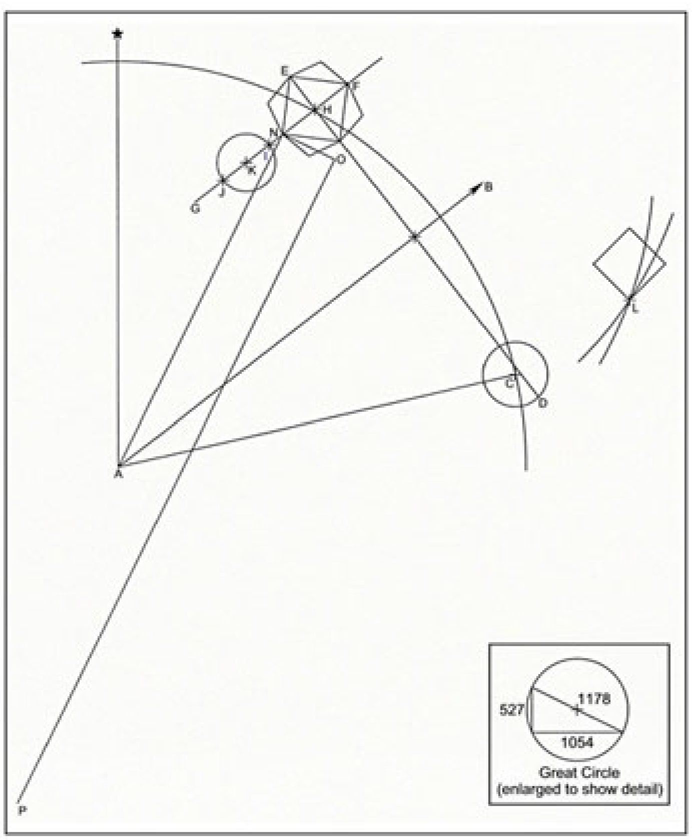

Figure 8. Schematic plan showing geometric and astronomic relationships among various features of the Newark earthwork complex.

With reference to **(figure 3, above)**, the following exercise shows how the Newark complex might have been designed and laid-out.

1. Point A is the apex of Geller Hill. Draw line A-B at an azimuth of 52°.2, which is equal to the moon's maximum north rise position as viewed from the top of Geller Hill (A.D. 100, lower limb tangency, apparent horizon elevation of 0°.5, corrected to 1°.34.)

2. Draw an arc having a radius of 7 OCD from point A. (One OCD is equal to 1,054 feet – which is the diameter of the Observatory Circle – see Hively and Horn 1982.)

3. Construct a circle having a diameter of 1,178 feet - equal to the size of the Great Circle. (Note that the diameter of 1,178 feet for the Great Circle is equal to the hypotenuse of a right triangle whose sides are equal to 1 OCD and ½ OCD, respectively.)

4. Draw line, D-E. Make line D-E, 7 OCDs in length. Situate line D-E so it is perpendicular to lunar azimuth line A-B, bisected by line A-B, and 589 feet from the 7 OCD radius line as measured along line A-B. The distance of 589 feet is one-half of the Great Circle diameter – which in step 3, was shown to derive from the OCD unit of length.

5. Position the center of the Great Circle on the 7 OCD radius line so its circumference meets line D-E at D.

6. At point E, construct a square having sides equal to 1 OCD. Orient the square so its diagonal falls on line D-E.

7. Construct an octagon around the square. Do this by drawing a series of arcs, each having a radius equal in length to the diagonal of the square. (Diagonal of square = 1,490 feet) Use each of the square's corners as the center for each arc. Connect the intersection points of the arcs by straight lines, thereby creating an octagon.

8. From Octagon point F, draw a line perpendicular to line D-E. Label this new line F-G. Line F-G is parallel to line A-B. Thus the Octagon is lunar-aligned. (See Hively and Horn [1982] for a further discussion of this lunar alignment.)

9. Locate the center of the Octagon and label it point H.

10. Locate points on line F-G that are 1 and 2 OCDs, respectively, from point H. Label these points, I and J.

11. Construct a circle on line F-G, using points I and J to establish its diameter. The diameter of the resulting circle will be 1 OCD - equal to the diameter of the Observatory Circle.

12. Establish the center of the Observatory Circle. Label the center of the Observatory Circle, point K. From point K, draw an arc having a radius of 7 OCDs.

13. Likewise, from point E on the Octagon, draw an arc having a radius of 7 OCDs. Mark the point where the two arcs intersect, point L.

14. Construct the Wright Square, oriented to the cardinal directions, using point L to situate the south corner of the Square. Note that each side of the Wright Square is 925 feet in length. This length is related to the OCD in the following manner. As mentioned, the diameter of the Great Circle is equal to the hypotenuse of a right triangle whose sides are 1 OCD and ½ OCD, respectively. The diameter of the Great Circle therefore is 1,178 feet. From this it follows that the circumference of the Great Circle is 3,700 feet. If the Great Circle circumference is divided by 4, the result is 925 feet. Thus, the 925-foot length is related to the OCD.

15. The azimuth and location of the Great Hopewell Road are established in the following way. From point A on Geller Hill, draw a line to point N on the Octagon. The azimuth of this line is 26°.2. From point N, draw a line 1 OCD in length perpendicular to line A-N. Mark the end of this line, point O. The reciprocal of 26°.2 (the azimuth of line A-N) is 206°.2. From point O, extend a line for a distance of 13,040 feet. along the azimuth of 206°.2. This line represents the length and azimuth of the Great Hopewell Road as far as Ramp Creek.

The above representations are idealized geometric constructions. The actual Newark earthworks vary in a few minor respects from the ideal – see **(figure 4)**. The Great Circle earthwork, for example, is not quite a perfect circle. Its diameter varies between 1,163 feet and 1,189 feet, for an average of 1,176 feet (Thomas 1894:462). So too, certain of the actual Octagon's walls vary from the geometric ideal in both length and azimuth - possibly to bring the walls in closer alignment with significant lunar positions. The azimuth of the major axis through the actual Octagon and Observatory Circle extends along an azimuth of 51°.8, while the geometric ideal, based on the moon's calculated azimuth is 52°.2 - for a difference of 0°.4. Thomas (1894:466) gives the lengths of the Wright Square walls as 926 and 928 feet – which differs by 1-3 feet from the geometric ideal of 925 feet. Also, the major axis of the Wright Square is skewed about

2° from the ideal, perhaps taking into account ground observations referenced to the distant horizon elevation.

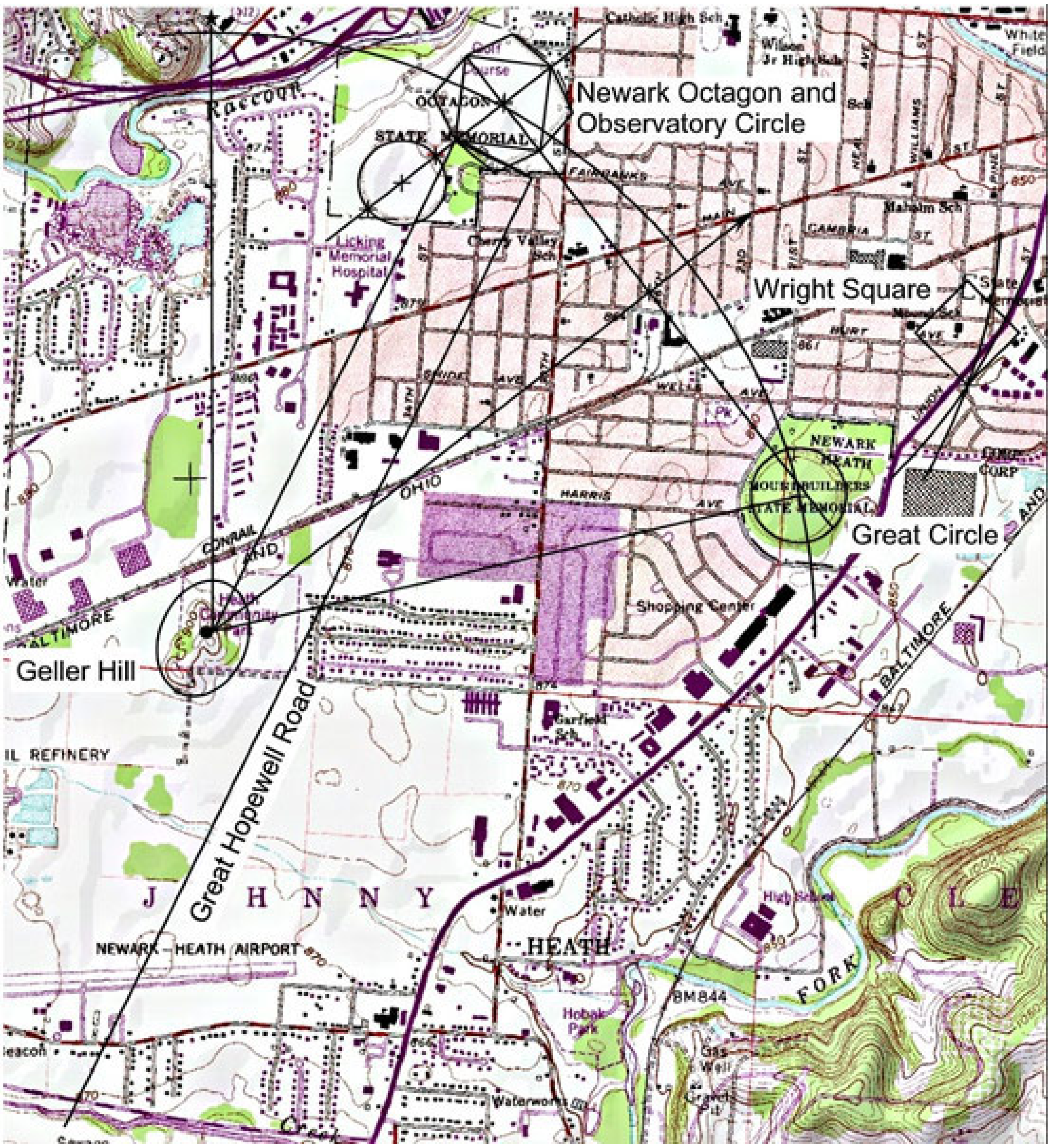

Figure 9. Ideal geometric design shown in figure 3 overlaid onto USGS 7.5-minute series map for the Newark area.

As for the Great Hopewell Road, remnants are still visible today at point O. These remnants are about 3 feet in height, extend for dozens of feet, and are located near the northeast walls of the Octagon. Sections of the south half of the Road can be identified in early aerial photographs (Reeves 1936). Reeves's (1936:fig. 4) representation of the Road, drawn based upon his aerial photographs, shows the Hopewell Road intersecting a modern-day road just south of the Newark-Heath airport. From these data, the azimuth of the actual Road can be plotted and is found to be 206°.9. This differs from the azimuth of 206°.2 for the geometrically plotted Road by 0°.7.

Several conclusions derive from this exercise:

1. The location of each earthwork is geometrically and astronomically related and dependent upon other earthwork components. Each earthwork is an integral part of a larger design.

2. The entire complex is, in effect, generated from Geller Hill – the suggested *axis mundi* for the Newark complex.

3. The complex was laid-out based on the moon's maximum north rise point and multiples of the OCD unit of length. The significance of the lunar maximum north rise for the Hopewell may have been based in the recognition that that event defines a temporal and spatial maximum in an 18.6-year cycle. Maximum nodes in any cycle imply a complementary opposite – to include, for example, a lunar maximum south rise. Notions of complementary opposites, bilateral symmetry, and cosmic dualism appear to have been important to the Hopewell and are expressed in a wide range of scales, from the structure of their earthworks, to designs incorporated in their artwork.

4. The most commonly used multiple unit of length was 7 OCD. Seven is considered an important number by many Native Americans. In Indian belief systems, the number 7 derives from the 4 cardinal directions, plus the center, zenith, and nadir.

References Cited:

Hively, Ray, and Robert Horn.
1982. Geometry and Astronomy in Prehistoric Ohio. *Archaeoastronomy (Supplement to Vol. 13, Journal for the History of Astronomy)* 4:S1-S20.

Lepper, Bradley T.
1995. Tracking Ohio's Great Hopewell Road. *Archaeology* 48 (6):52-56.

Reeves, Dache M.
1936. A Newly Discovered Extension of the Newark Works. *Ohio State Archaeological and Historical Quarterly* 45:187-193.

Squier, Ephraim G., and Edwin H. Davis.
1848. *Ancient Monuments of the Mississippi Valley; Comprising the Results of Extensive Original Surveys and Explorations. Smithsonian Contributions to Knowledge Vol. 1*. Washington, D.C.: Smithsonian Institution.

Thomas, Cyrus.
1894. Report on the Mound Explorations of the Bureau of Ethnology for the Years 1890-1891. In *Twelfth Annual Report of the Bureau of American Ethnology*. Washington, D.C.: Smithsonian Institution.

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3. The 2004 Field Season at High Bank Works, Ross County, Ohio

by N'omi B. Greber Cleveland Museum of Natural History

Introduction

The High Bank Works (33Ro60) are located southeast of Chillicothe on a glacial outwash terrace about 17 meters above the active flood plain of the Scioto River. They are one of the more complexly designed sets of enclosures among the numerous enclosure sites found in the central Scioto region. The major sections include a relatively rare octagonal enclosure, small and large circular features, and linear walls (Figure 1).

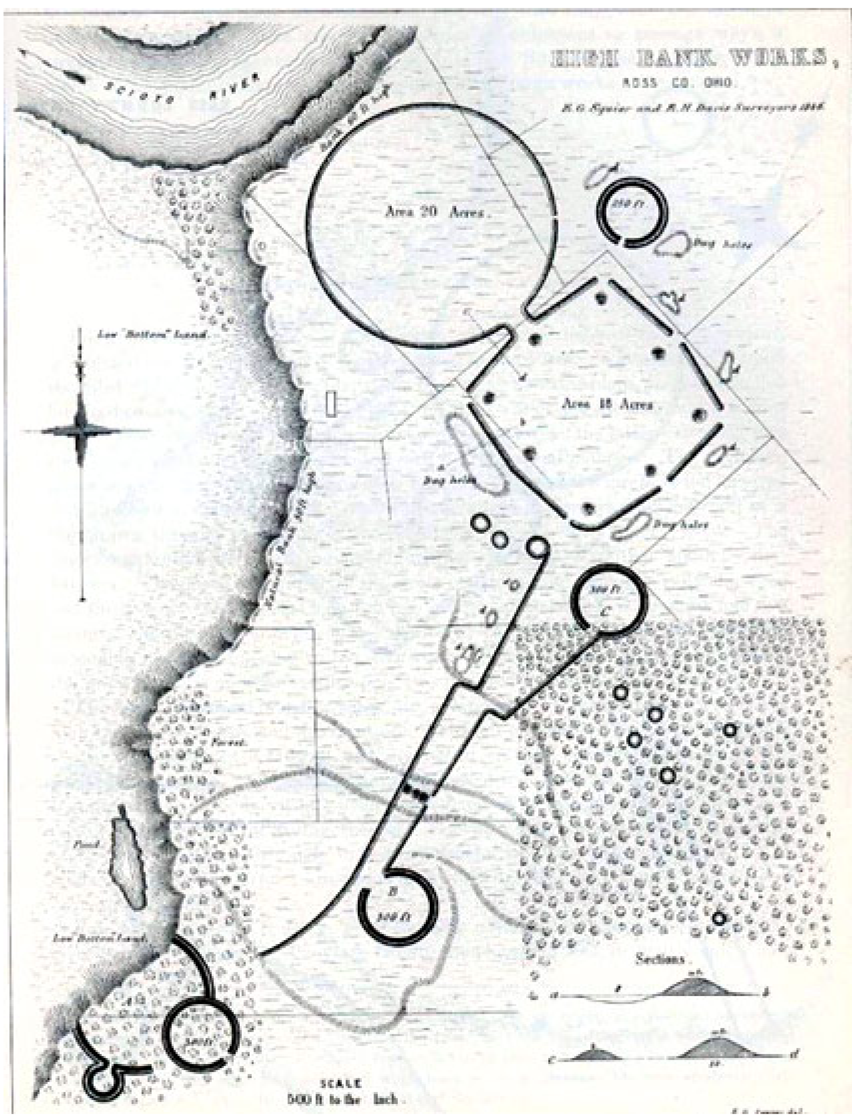

Figure 10. Ground plan of High Bank Works as drawn by Squire and Davis (1848:Plate XVI).

As recorded in the mid-nineteenth century, the walls of the Octagon were about twelve feet (ca 3.7 meters) high and enclosed 18 acres (ca 7.3 hectares). The attached Great Circle walls surrounded a slightly larger space but were only about five feet (ca 1.5 meters) high (Squire and Davis 1848:Plate XVI). By the end of the century the walls were much degraded and the easterly side of the Great Circle was not easily followed on the ground. Also, by this time, a farm lane was in use that cut across portions of the octagon, circle, and the short neck that joined them. This wagon path has been enlarged and is now used by modern vehicles including trucks and large farm equipment (Figure 2).

Figure 11. Aerial view of the High Bank Great Circle and Octagon. View taken in 1938. Note the farm lane that crosses the walls.

Field work this past season continued studies that are part of long term research aimed at placing enclosure sites into the context of both other types of structural remains such as buildings and mounds, and the well known artifacts. Since 1994 a combination of geophysical surveys and limited excavation and coring has produced details of the design and construction of the Great Circle wall (Greber 1998, 1999, 2002).

Field Work

During June and July 2004 geophysical survey was undertaken over the segments of the Octagon walls north of the farm lane, a portion of the site currently part of Hopewell Culture National Historical Park (Figure 2). A goal for the short season was to obtain geophysical data from the Octagon walls for comparison with geophysical and excavation records of the Great Circle wall and 1972 excavation profiles of the Octagon (Greber and Shane 2003).

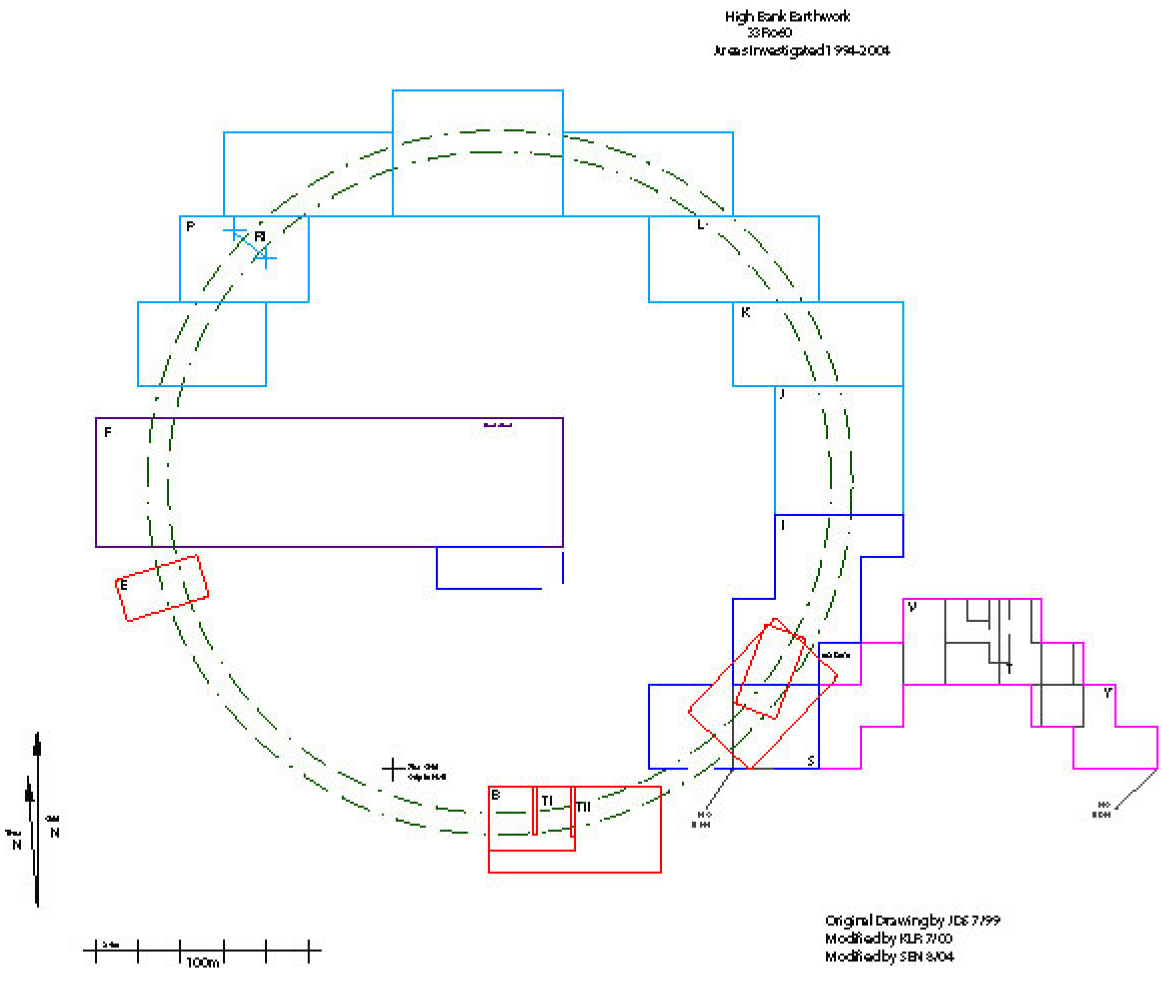

Figure 12. A stylized circle wall superimposed on the location of geophysical study areas, Cleveland Museum of Natural History, 1994-2004.

The geophysical survey blocks were located in the CMNH site grid and labeled S through X in a continuation of the practice of previous surveys (Figure 3, above). In each sub-block (i.e. S1, S2,...) transects were set at one meter intervals. Magnetic readings were taken in zig-zag fashion using a FM 36 gradiometer **(Figure 4)**.

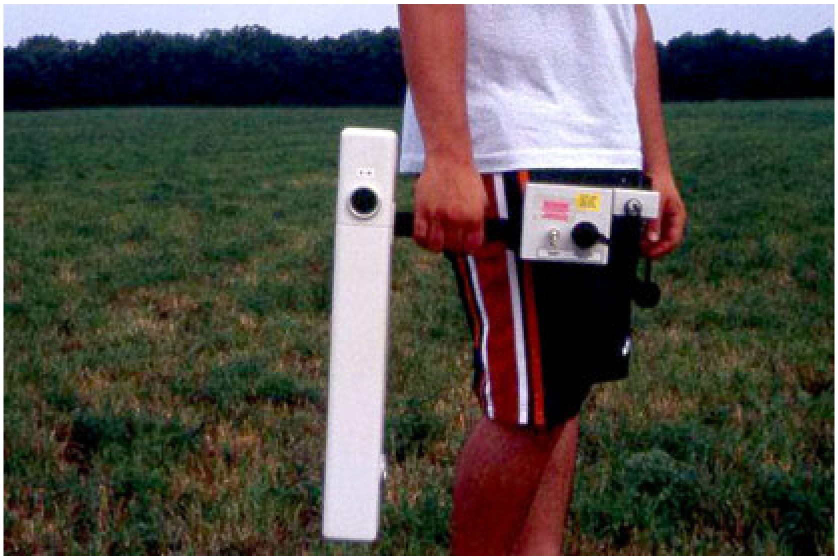

Figure 13. The FM 36 gradiometer owned by the University of Akron and used in the 2004 survey. Held here by CMNH Kirtlandia Intern Stuart Neilis.

Figure 5, based on data from the recent survey, a magnetic map of portions of the remnant walls north of the lane. As a control, Block S was set to overlap portions of Block H recorded in the1999 magnetic survey. The 2004 results completely reproduce the earlier data.

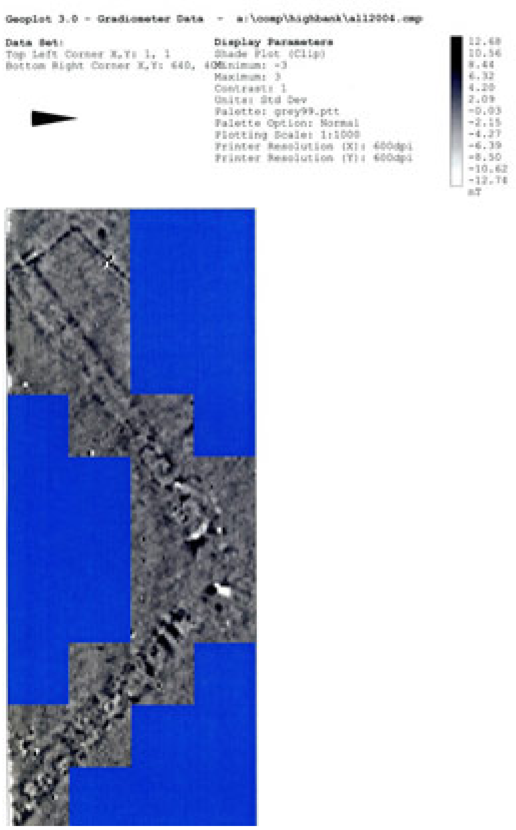

Figure 14. Geoplot map of 2004 survey area.

John Weymouth combined data from 1999, 2001, and 2004 (Figure 6) that show the distinctive usual trace of the Great Circle wall. The signals from the outer edges of the wall are more pronounced than those from the inner side. This contrast apparently represents the contrast in the composition of the inner and outer lowest strata that extend along major sections of the Great Circle wall. These strata were identified in small scale test trenches (Greber 1999, 2002). The easterly side of the two short parallel walls that join the Great Circle and portions of two segments of the Octagon are also visible. The pattern seen in the data from the Octagon walls differs from that of the major portion of the Great Circle.

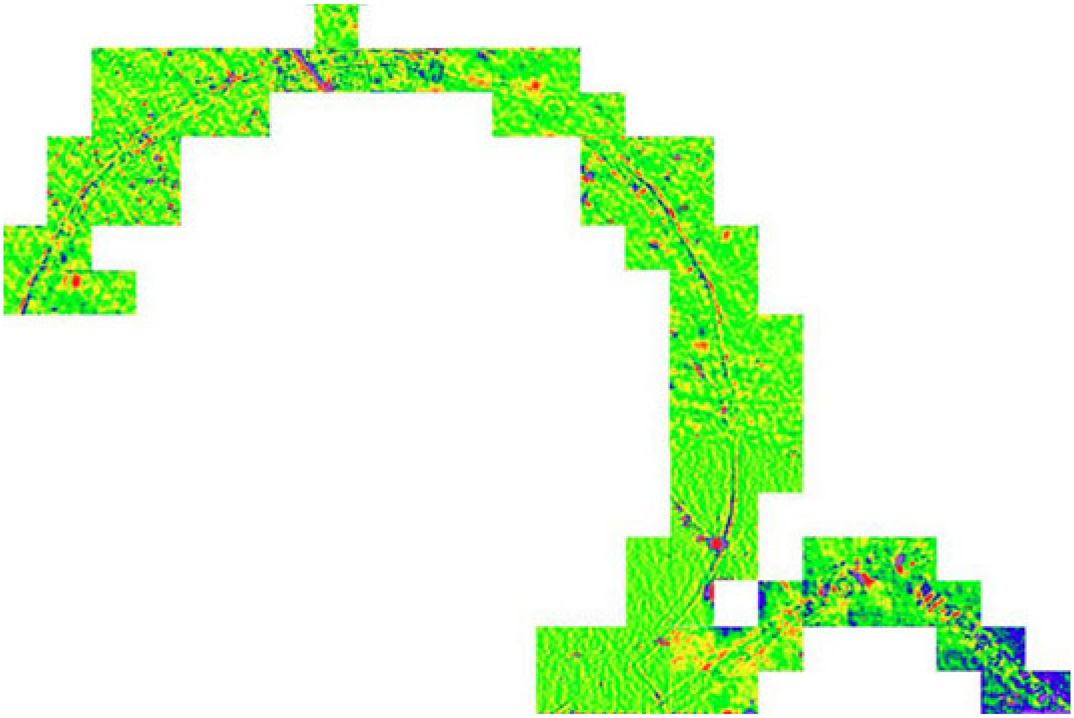

Figure 15. Compilation of 1999, 2001, and 2004 magnetic survey data prepared by Dr. John Weymouth, University of Nebraska.

There is not as great a contrast in the signals from the outer and inner sides of the segments and the internal signals are more "jumbled". This pattern is consistent with the wall profiles recorded in the three test trenches excavated in 1972 across two separate wall sections of the Octagon south of the lane (Greber and Shane 2003). An anomaly, located between the ends of the two wall segments, is at the point where lines extending from the ends of the wall segments would cross. Thus, the anomaly may indicate a corner point of a regular octagonal shape marked by the original builders as part of the original design and possibly used in planning the construction of the Octagon walls.

Comments

This season's field work continues to demonstrate the usefulness of intertwining the results of geophysical surveys and the ground truth obtained in small scale excavations. The new geophysical maps appear to be consistent with the results of the early 1972 excavations. They also provide new information suggesting a direction for possible future work. The apparent existence of an anomaly between the ends of the Octagon walls should be corroborated by additional geophysical surveys. This is a significant point in the ground plan design. Future studies of the area might answer questions concerning the original construction methods and possibly reveal features that would be of particular interest in astronomical research such as that Ray Hively and Robert Horn have begun at High Bank (1984).

Acknowledgments:

Dean Alexander, Superintendent of Hopewell Culture National Historical Park, gave access to Park land at High Bank. As always the entire Park staff welcomed and supported our work. In particular, Jennifer Pederson arranged for living accommodations and helped with other practical matters, Kathy Brady-Rawlins gave instructions in the use of a total station, Dawn Walters was a gracious and hard working addition to the field crew. The total station, FM 36 gradiometer and lap top computer used by CMNH Kirtlandia Intern Stuart Nealis for the magnetic survey were loaned to the project by Dr. Timothy Matney, University of Akron. Dr. John Weymouth, University of Nebraska, continues to share his expertise in explaining theoretical geophysics to archaeologists and his time in putting together data from separate surveys. I thank them all.

References Cited:

Greber, N'omi B.
1998. Geophysics and Archaeology: A Case Study from the High Bank Earthworks, Ross County, Ohio. Invited paper presented at the Fryxell Symposium, Annual Meeting of Society for American Archaeology, Seattle, March 1998

1999. Combining Geophysics and Ground Truth at High Bank Earthworks, Ross County, Ohio. *The Ohio Archaeological Council Newsletter,*11(1):8-11.

2002. A Preliminary Comparison of 1997 and 2002 Limited Excavations in the Great Circle Wall, High Bank Works, Ross County, Ohio. *Hopewell Archeology: The Newsletter of Hopewell Archaeology in the Ohio River Valley,* Volume 5, Number 2:1-6.

Greber, N'omi B. and Orrin Shane III
2003. Studies of the Octagon and Great Circle, High Bank Works. Paper presented at 68th Annual Meeting of the Society for American Archaeology, Milwaukee, Wisconsin April 2003.

Hively, Ray and Robert Horn
1984. Hopewellian Geometry and Astronomy at High Bank. Supplement to Volume 15, *Journal for the History of Astronomy*: S85-S100.

Squier, Ephraim and Edwin Davis
1848. *Ancient Monuments of the Mississippi Valley: Comprising the Results of Extensive Original Surveys and Explorations*. Smithsonian Contributions to Knowledge 1. Washington, D.C.

Hopewell Archeology:
The Newsletter of Hopewell Archeology in the Ohio River Valley
Volume 6, Number 2, March 2005

4. Geophysical Investigations of the Hopewell Earthworks (33RO27), Ross County, Ohio
By Arlo McKee

Abstract

The Hopewell site in southern Ohio is one of the most important and famous prehistoric sites in North America. Built about AD 100, it consists of more than 3 miles of earthworks and over 40 mounds. The earthworks of the Ohio Hopewell suggest a substantial investment of human labor and cultural organization that is still poorly understood after more than 150 years of study. Geophysical survey techniques can provide the means to study these earthworks in a rapid and nondestructive manor. For the past 200 years, these earthworks have been subject to the degradation of agriculture. A study comparing multiple geophysical survey techniques on the Mound 23 area of the Hopewell site was conducted in 2004. The results of magnetic, resistance and conductivity surveys were compared.

Introduction

Throughout the Ohio River valley, during the period between 200 BC and AD 400, inhabitants of this region built hundreds of earthen mounds and dozens of earthen enclosures. Most of the mounds appear to be associated with mortuary activities, and often contain elaborate and artistic objects made from a wide range of exotic raw materials. The earthen enclosures are typically geometric in form, and range in size from a few acres to more than one hundred acres. Archeologists have named the archeological record associated with these mounds and earthworks the Hopewell Culture, after a site located about 6 miles northwest of Chillicothe, Ohio.

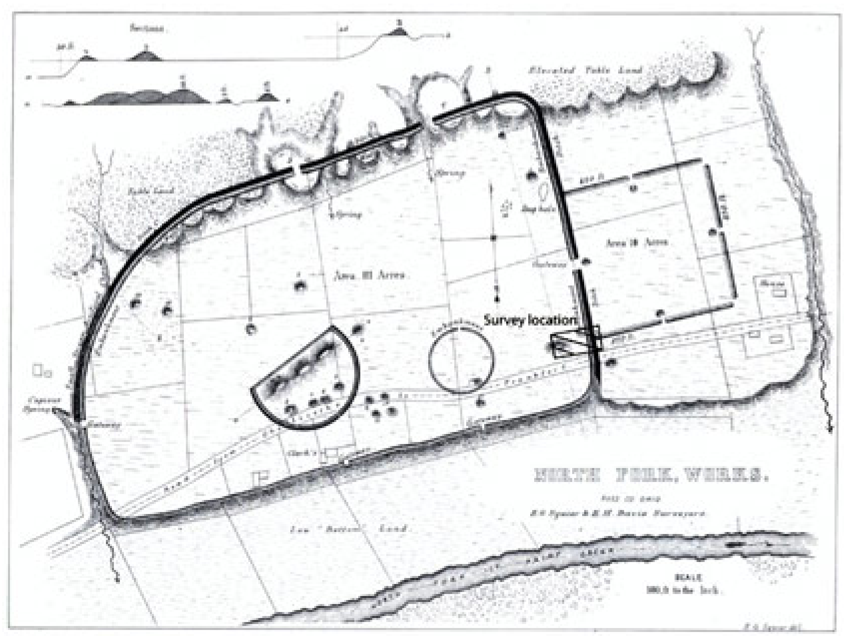

Figure 16. 1846 map of the Hopewell Earthworks (Squier and Davis, 1848).

Site Background

The Hopewell mound group was first documented in 1820 by Caleb Atwater. At that time, the land was owned by W. C. Clark, so the site was named Clark's Fort. Since that time there have been only three major investigations into the archeological remains of the site. These major investigations focused primarily on the burial mounds associated with the earthworks. The site was first excavated by Ephraim G. Squire and Edwin H. Davis in 1845. During their investigation, they estimated that the embankments cover over three miles in length and the earthworks contain three million cubic feet of placed earth (Squire and Davis, 1847). A structure of this size suggests a substantial investment of human labor and social organization. This is truly remarkable considering the land surrounding the Scioto river valley is littered with dozens of these earthworks.

The next excavation was led by Warren K. Moorehead in 1891. At that time, Moorehead renamed the site after the landowner, M. C. Hopewell. His work, too, focused almost exclusively on the burial mounds. Among the mounds he excavated, one of the largest included mound 23, which was surveyed during this project. More than 50 burials were found within the mound and hundreds of exotic burial goods were recovered. At the base of the mound, Moorehead (1922) noted a floor of varied sized gravels.

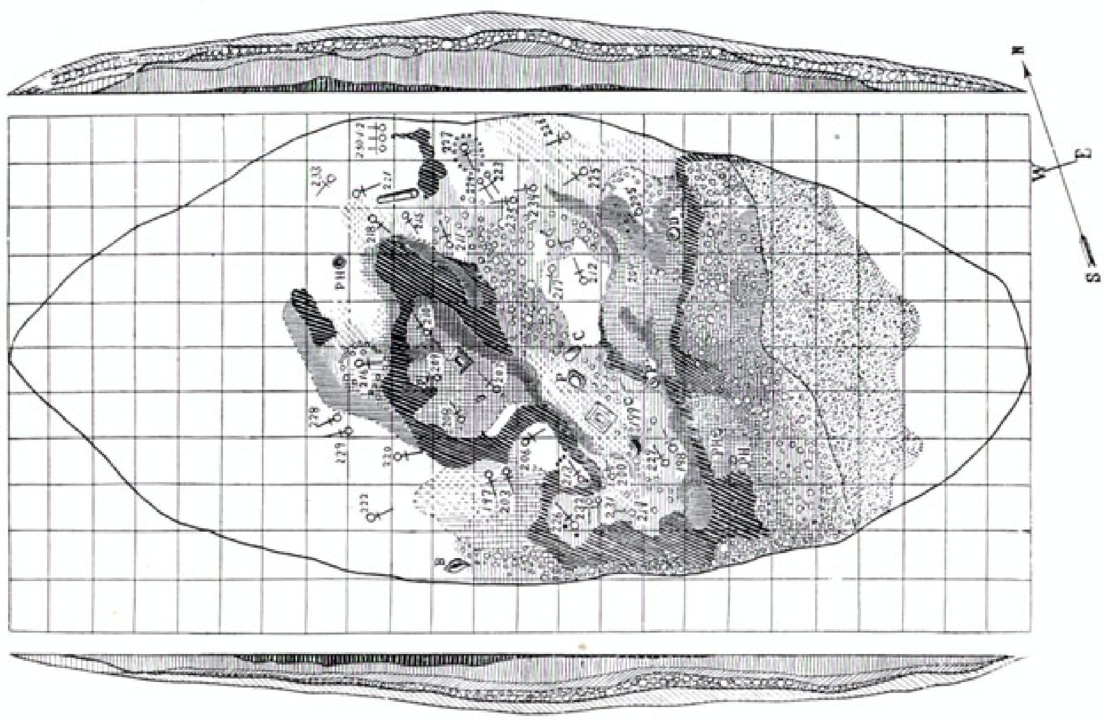

Figure 17. 1891 plan-view map of mound 23 (Moorehead, 1922).

It is important to note the method Moorehead's team employed for excavation. Moorhead's team used horse drawn scrapers to reduce the mound to about four feet above the modern surface. The team then hand excavated the remainder. The team excavated a trench to the base floor of the cultural remains and placed the backfill behind them. They then stripped mostly vertical layers from the wall of the trench, thus moving their excavation perpendicular to the minor axis of the mound. This excavation strategy that means that, excepting artifacts, nearly all of the original materials of the interior portion of the mound are still more or less in situ. The soil may be moved, but it was moved uniformly and only by a distance of ten feet or so.

In 1922 the last major excavation of the Hopewell site was conducted by Henry C. Shetrone. The excavation was conducted to reexamine all of the previously excavated mounds (Greber and Ruhl 1989, Shetrone 2004). Shetrone found that the western third of the mound had not been adequately examined. Again, Shetrone found the gravel base floor and noted that it contained a great degree of burned soils.

Geophysical Survey Methods in Archeology

Geophysical surveys in archeology can be a very useful tool to guide excavations and to examine variation in subsurface features and soils over large areas. The use of geophysical survey techniques can supply an excavation with a "road map" to subsurface features without disturbing the site. There are many different types of surveys, each with its own sensitivities and drawbacks. As Weymouth (1986) notes, there are two general types of geophysical methods: *active* and *passive*. The vast majority of methods employed for archeological purposes fall under the active category. The active survey methods used for this research include electromagnetic conductivity and electric resistance. In each of these methods, a signal is sent from the measuring instrument into the ground. Depending upon the electrical properties of the soils, the signal will then be altered from its original state and sent back to the instrument to be measured.

Resistivity. Of all the geophysical methods currently utilized for archeological purposes, resistivity surveys were the first to gain popularity. This method sends an electric current into the soil via two conducting probes placed a few centimeters in the ground. Two other probes measure the voltage that is transferred through the ground. The ratio of the voltage to the current that is applied yields the resistance according to Ohm's Law ($R=V/I$ where R=resistance, V=volts, and I=current). The principal factor that determines soil resistance is its water content and distribution (Weymouth, 1986; Clark, 1990). When the ground is completely saturated, soil resistance will be at a minimum because water is a good conductor of electricity. Conversely, when the ground is completely devoid of moisture, electrical resistance will be at a maximum. Optimally, a survey would be conducted when the ground is moderately saturated. In this case, the water distribution between soil horizons, and buried cultural remains, would be uneven. For example, the soil in a buried ditch or pit tends to be less dense than the surrounding earth. This would allow for a greater accumulation of moisture within the fill than in the surrounding area. Hence, the ditch would appear as a low resistance area compared to the surrounding soils.

The depth the current will travel through the soil depends on the spacing of the probes and the physical characteristics of the soil itself. In a uniform matrix, the voltage will travel in regular hemispheres between the current probes. Generally, the depth of penetration will equal the horizontal spacing of the current probes (Clark, 1990; Kvamme, 2001). This survey used the Geoscan Research RM-15 parallel twin configuration and a 0.5-meter probe separation. This allowed for roughly a 0.5-meter maximum penetration.

*Conductivity.*Conductivity is the theoretical inverse of resistivity. However, because of the way in which a conductivity meter senses information, it can yield differing results. Conductivity meters employ non-contact transmitting and receiving coils. An electromagnetic signal is sent out by the transmitter and induces a current in the soil. This current creates a secondary magnetic field which is then sensed and measured by the receiving coil. Introducing a new magnetic field in the soil makes this method sensitive to metals which will appear as extreme values. This survey, however, still retains sensitivity to the same types of features as a resistance method. The Geonics EM-38 was used for the conductivity portion of this survey. This instrument operates on a frequency of 14.6 kHz and houses a 1 m coil separation, it is capable of delivering four measurements per second. The EM-38 also has two settings for depth. The vertical dipole mode, which measures a depth up to 1.5 m, was used in this survey.

*Magnetic.*Magnetometry was the only passive geophysical method employed in this study. This method measures the relative strength of the earth's magnetic field. The magnetic properties of a soil depend on the concentration of iron compounds like hematite, magnetite, and maghaemite (Weymouth 1986). Undisturbed earth will yield a uniform magnetic field, whereas buried ditches, etc., will tend to be more or less magnetic than the surrounding matrix. Magnetometers are generally most sensitive to metals and fired materials. Metals will appear in magnetic data as paired strong positive and negative values which is referred to as a dipole. When a material is heated to a certain point the heat will "reset" the material's magnetic clock. This process is called *thermoremanent magnetism* (Weymouth 1986). The atoms of the substance will align themselves to magnetic north at the time of cooling. For this reason burned features, such as hearths, kilns, fired bricks, and burned house floors, are readily visible in magnetic data. Typically, most anomalies will range between ± 5 nanotesla (nT). It is not uncommon, however, for a feature to fall within .1 nT of the background magnetic strength.

The Geometrics G-858 cesium gradiometer was used for the magnetic portion of the survey. The sensors were mounted on a vertical shaft at a 1-meter probe separation with the lower sensor measuring the magnetic field of the soils. The upper sensor measures the background magnetic field. The bottom reading was then subtracted from the top to cancel out the magnetic variance not related to soil conditions.

Survey area

The survey area was a rectangular block 60 meters north-south and 120 meters east-west. The western portion of the block was positioned to cover roughly two-thirds of mound 23. The eastern half of the block covered the east wall and associated ditch of the large enclosure. Additionally, the eastern portion of the block was thought to cover the approximate location of the south wall of the small square enclosure.

At the time of Moorehead's excavation in 1891, mound 23 stood 3-4 meters high and was roughly 46 meters in its greatest diameter. Since that time, the site has been seriously degraded from agriculture. At the time of the survey, mound 23 and the large earth wall stood no more than one meter above the normal ground surface. Nothing could be seen of the earthen ditch or the wall of the small square.

Figure 18. 1891 photograph of mound 23 (Moorehead, 1922).

The survey area was situated to answer three main questions. First, what archeological remains, if any, were left in mound 23? Second, what can be detected within the earthen wall and ditch of the large enclosure? Finally, what is the preservation quality and exact location of the small square enclosure?

Figure 19. 2004 photograph of mound 23.

Survey and interpretation methods

The base lines of eighteen 20 by 20-meter grids were first laid out with a transit. Wooden stakes were then placed in the corners of each survey grid. One hundred meter tapes were then stretched between the east-west running baselines to place the remaining corner stakes. During the survey two 20-meter ropes were placed along the east-west lines of each grid to form a boundary. A third rope was moved along the ground at one meter intervals to serve as a guide. The guide ropes were marked with colored electrical tape every half meter and flagging tape every 5 meters. At the end of data collection, the instruments were then downloaded into a portable laptop computer for processing. Data manipulation was carried out using Geoplot, Surfer 7, and ArcGIS 8. For final presentation, the data was transferred into Surfer7. The grids were set up in Surfer using the Krigging method.

The interpretation process was designed to answer the survey design goals stated previously. Additionally, the survey was intended to provide a means to compare multiple data sets. The goal was to produce an easily interpretable map of the differing data sets that would clearly show the anomalous areas of each survey. To this end, the conductivity and resistance data were filtered and smoothed using Geoplot. The datasets were then exported into Surfer 7 for interpretation. Two differing contour plots were created to highlight the anomalies of each data set. The first contour plot depicted the typical value range of the anomalies present. The second plot reflected a range of standard deviations from the mean of the data set. The contour plots were then exported to ArcGIS 8.3. Each of the three contours were assigned a different color and displayed in partially transparent fashion. The resulting image served as the finished product of this attempt at correlation.

Results

*Resistance.*Resistance data was collected at one meter traverses with a half-meter sampling interval. A total of 14,400 readings were collected for the survey area. The data ranged in values from 27.2 to 95.0 Ohms. The mean of the data was 44.4 Ohms with a standard deviation of 5.75 Ohms.

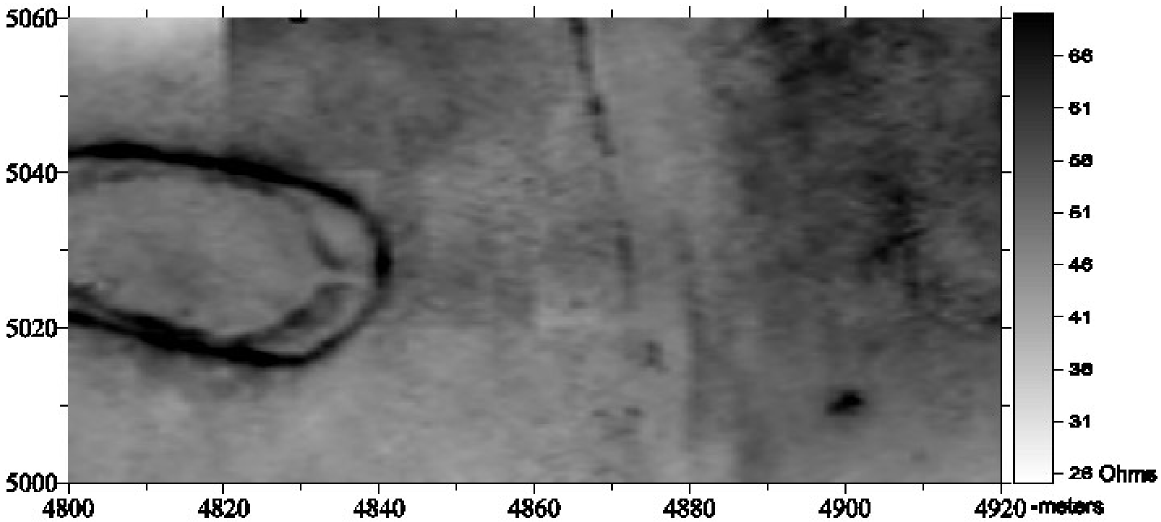

Figure 20. Resistance Data.

Mound 23 is displayed clearly in the resistance data. The highest values in the data set mark the limits of the mound. This ring is probably the result of large gravels that were placed during the construction of the mound. The resistance data also revealed weaker anomalies in the interior portion of the mound. The anomalies probably result from gravels that were associated with the floor of the mound structures.

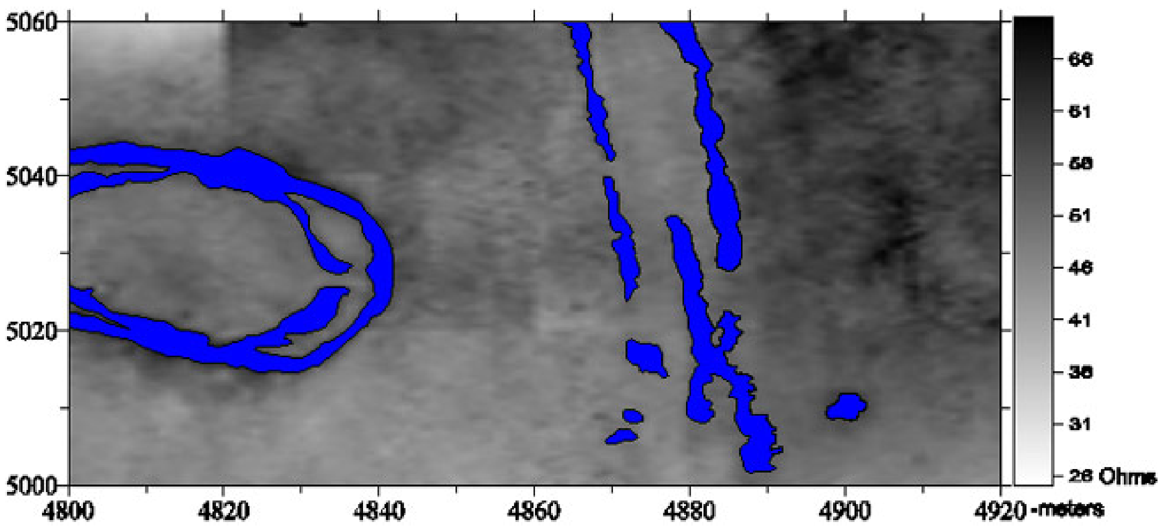

Figure 21. Anomalous areas of the resistance data.

The large earth wall to the east of the mound is displayed as a linear anomaly that runs slightly northwest to southeast. This linear anomaly could also be the result of gravels that were placed during the construction of the earthwork. Near the data point E4885 N5060, there is a boundary that follows the same direction. This boundary separates a zone of high resistance in the east from the lower resistance of the rest of the map. This boundary marks the edge of the earth wall.

*Conductivity.*Conductivity data was collected at one meter traverses with a quarter-meter sampling interval. A total of 28,800 readings were collected for the survey area. The data ranged in values from -4.70 to 11.39 milisemens per meter (mS/m). The mean of the data was 6.26 mS/m with a standard deviation of 1.64 mS/m.

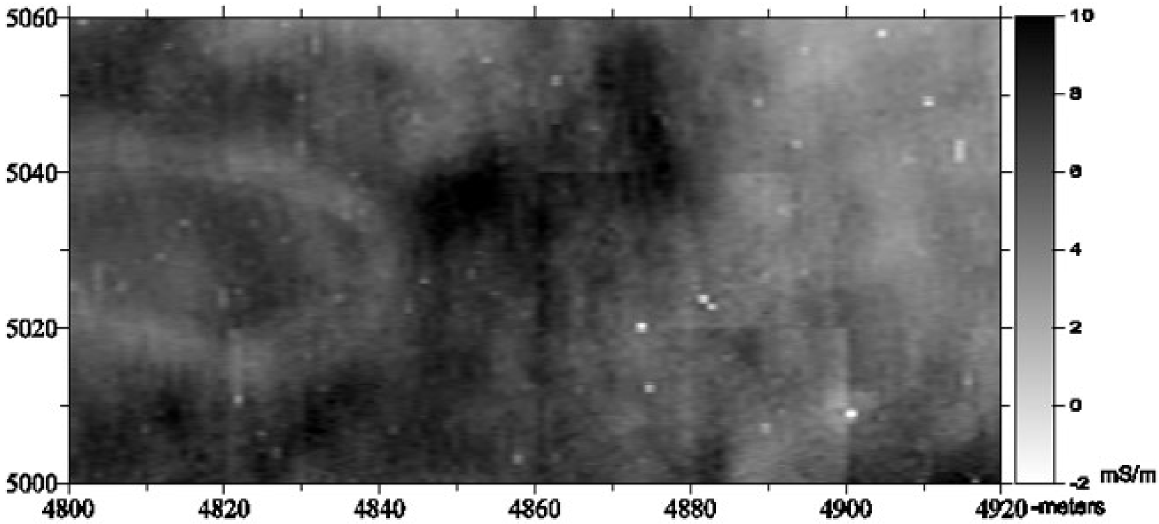

Figure 22. Conductivity Data.

As expected, the conductivity data showed the near inverse of the resistance data. The exception was that the anomalies were not nearly as strong. The anomalies associated with mound 23 appeared as a light halo compared to the background area. Curiously, these values fell within one standard deviation from the mean. This could have been due to the general poor overall conductivity of the soil.

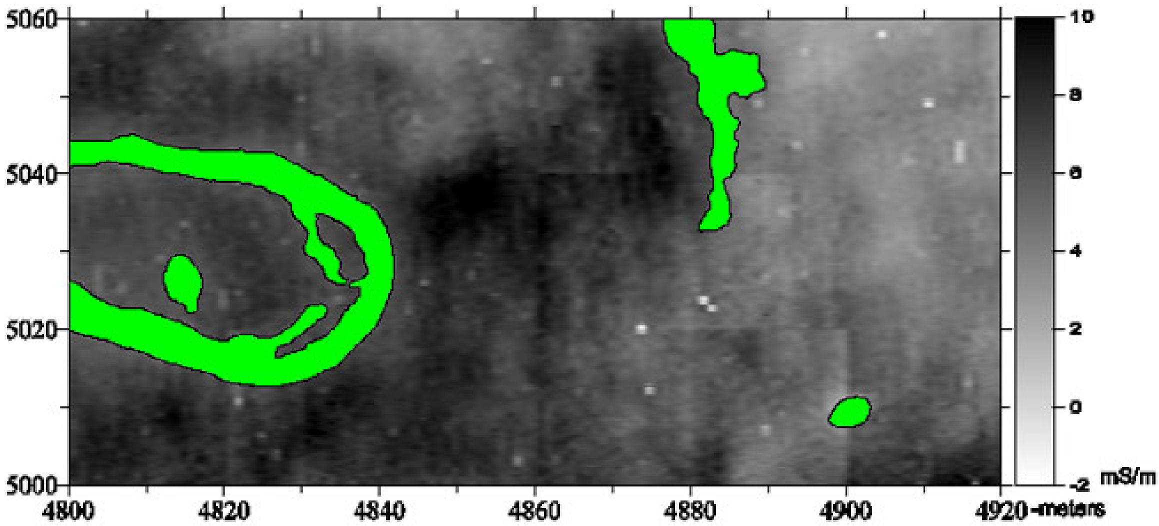

Figure 23. Anomalous areas of the conductivity data.

The same boundary associated with the eastern edge of the large enclosure is also present in the conductivity data. Here, the boundary is marked by values of high conductivity to the west and low values to the east. The values associated with this boundary fall within the same range as the anomalies of the mound.

*Magnetic.*Magnetic data was collected at one meter traverses. The instrument was set to take readings every 0.2 seconds which allowed for roughly 5 samples per meter to be taken. A total of 36,918 readings were collected for the survey area. The background magnetic field strength averaged at 53,3341.58 nT.

The vertical gradient ranged in values from -25.5 to 69.4 nanotesla per meter (nT/m). The mean of the data was 1.91 nT/m with a standard deviation of 3.21 nT/m.

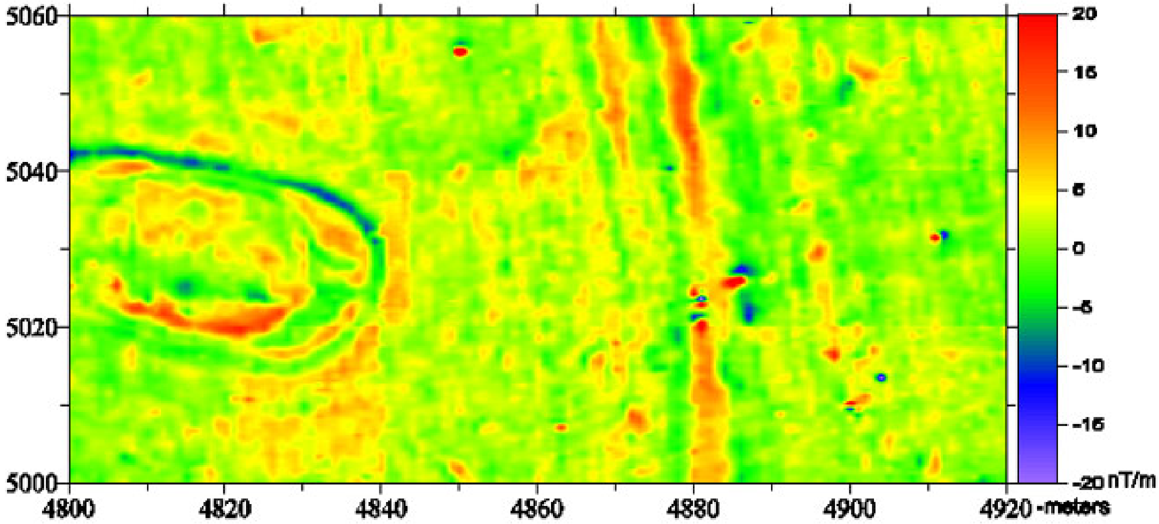

Figure 24. Magnetic Data.

The magnetometer clearly displayed the northern edge of the mound as a strong negative linear anomaly. The interior of the mound is displayed as strong positive values in the south and slightly lesser positive values in the north. These boundaries could mark the walls of burned structures where the walls burned longer or with more intense heat.

The large enclosure is marked by two parallel lines running through the length of the survey area. The east line is of much greater intensity. Additionally, there is a third line to the east which marks the eastern boundary of the ditch.

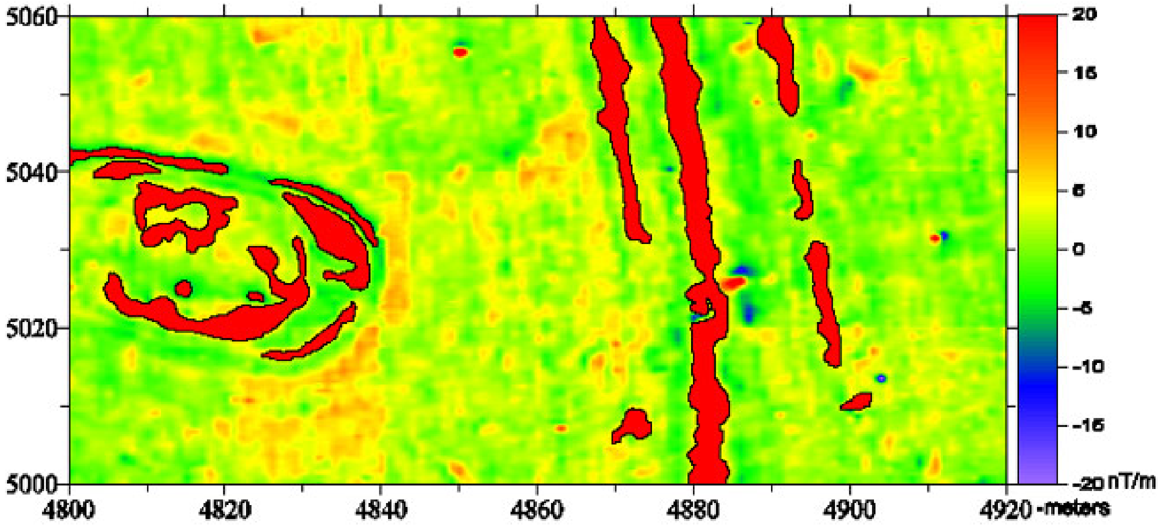

Figure 25. Anomalous areas of the magnetic data.

*Overlay.*The comparison of the three geophysical survey types proved to be quite informative. The plot of the anomalous areas of the surveys showed the exact relationship between the data sets. The anomalies associated with mound 23 showed a close approximation of the physical boundary of the mound. The conductivity and resistance data highlighted the margins of the mound while the magnetometer sensed the interior. The earth wall was displayed in a similar manner to the mound. The outer extremities were displayed by resistance and conductivity, while the magnetometer displayed the interior of the wall.

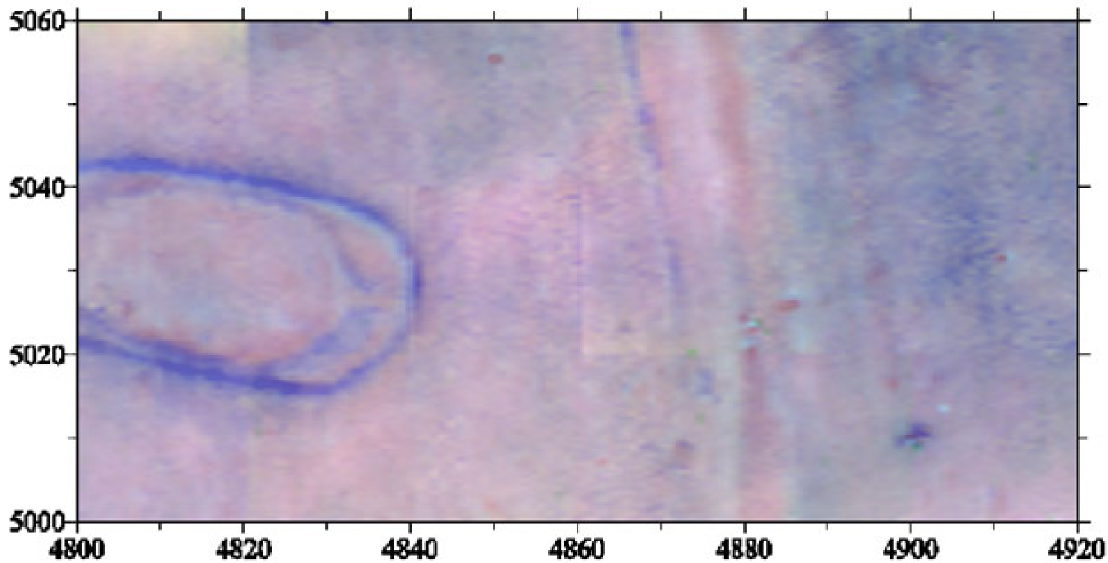

Figure 26. Image of the overlapped data sets. Resistance is displayed from blue to white, conductivity is displayed from white to blue, magnetic data is displayed from red to white.

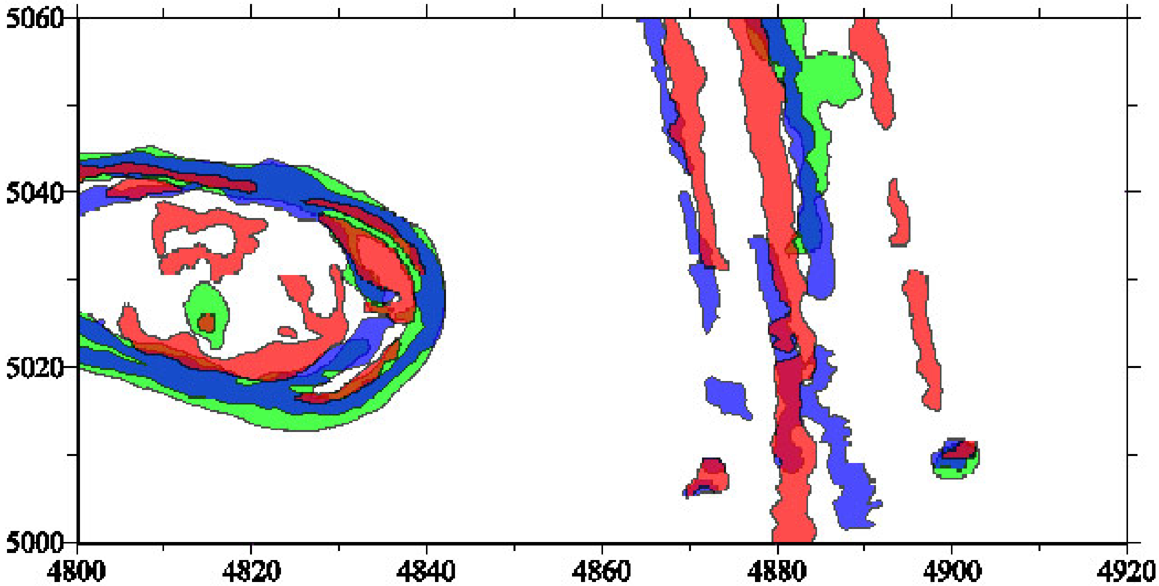

Figure 27. Image of the anomalous areas of the data sets overlapped. Resistance is displayed as blue, conductivity is displayed as green, magnetic data is displayed as red.

Conclusions

As archeological investigation techniques improve, it can often become quite useful to reexamine previous studies. Mound 23 in this survey had been previously excavated twice. Thus, it would be natural to assume that most, if not all, of the cultural remains were removed. However, this study proved that there may still be features of archeological significance left in the mound. Magnetic data pointed to burned surfaces associated with the floors of the pre-mound funeral structures. Based on this evidence, we can now see that the previous excavation strategies were not focused on recovering anything below the floor. Many of the mound's base features may still be intact.

The results from the magnetic data also suggested that the large enclosure is still present below the surface. Resistance and conductivity showed an area of higher conductivity/lower resistance to the east of the large wall. Magnetic data pointed to internal anomalies possibly resulting from ritual burning or a stone lining. The data clearly showed that although the earthworks may not be visible on the ground surface, much of the core of the wall still remains below surface.

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References:

Bevan, B. W.
1998.*Geophysical Exploration for Archaeology: An Introduction to Geophysical Exploration.* Midwest Archeological Center. Copies available from Special Report No. 1.

Clark, A.
1990.*Seeing Beneath the Soil: Prospection Methods in Archaeology.* 2nd ed. B.T. Batsford, London.

Conyers, L. B., and Goodman, D.
1997.*Ground-Penetrating Radar: An Introduction for Archaeologists.* Alta Mira Press, Walnut Creek, CA.

Greber, N'omi B., and Katharine C. Ruhl
2000. *The Hopewell Site: A Contemporary Analysis Based on the Work of Charles C. Willoughby.* Eastern National, Ft. Washington, Pennsylvania. Reprint. Originally published in 1989 by Westview Press, Boulder, Colorado.

Kvamme, K. L.
2001.Current Practices in Archaeogeophysics. In *Earth Sciences and Archaeology*, edited by V. T. H. Paul Goldberg, and C. Reid Ferring, pp. 353-384. Kluwer Academic/Plenum Publishers, New York.

Moorehead, W. K.
1922. *Hopewell Mound Group of Ohio.* Field Museum of Natural History - Anthropological Series 6(5).

Shetrone, H. C.
1927. *Explorations of the Hopewell Group of Prehistoric Earthworks.* Ohio Archaeological and Historical Publications. Volume 35.
2004. *The Mound-Builders.* The University of Alabama Press, Tuscaloosa, Alabama. Reprint. Originally published in 1930 by D. Appleton and Company.

Squier, E. G., and Edwin H. Davis
1998.*Ancient Monuments of the Mississippi Valley*. Smithsonian Institute Press, Washington, D.C. Reprint. Originally published in 1848.

Weymouth, J. W.
1986. Geophysical Methods of Archaeological Site Surveying. *Advances in Archaeological Method and Theory* 9:311-395.

5. Notes and News

Hopeton research continues in 2005 – Archeologists, geophysicists and geo-archeologists plan to continue research at the Hopeton Earthworks in 2005. Fieldwork is tentatively scheduled for June, with students from the University of Nebraska-Lincoln expected to participate. The focus of the June fieldwork will be additional study of a building on the west side of the large rectangular enclosure at Hopeton. Three walls of this building were partially exposed by previous investigations. Visits to the site to view the excavations may be arranged by contacting Hopewell Culture National Historical Park.

Arizona State University to begin work at Seip – Dr. Katherine Spielmann is making plans for explore the remains of a house floor at Seip. Excavations under the direction of Raymond Baby in the 1970s produced evidence of structures that may been built to shelter craft specialists engaged in making objects for Hopewell rituals. The 2005 project is designed to evaluate whether these structures were workshops. Dr. Spielmann will be assisted by students from Arizona State University as part of a field school in archeological methods and research strategies.

Research at High Bank continues in 2005 - Archaeologists from the
Cleveland Museum of Natural History, including Dr. N'omi Greber and a Kirtlandia Society Intern, plan to be at the site in June. Several types of geophysical instruments will be used to confirm the location and character of an anomaly found between two wall segments of the Octagon last season. Additional surveys to compare the apparent difference in the magnetic maps of the Great Circle walls and those of the Octagon will be added as time allows.

Lecture Series – Hopewell Culture National Historical Park is making plans for its annual summer lecture series. Lectures will be given on Thursday evenings at 7:30 pm during the month of June. Contact the park to receive more information. These lectures are free to the public and have been very well attended in recent years.

Geophysics Workshop – The National Park Service will be offering its annual workshop on geophysical prospection methods in Chillicothe, Ohio from May 16-20, 2005. The workshop is titled Current Archeological Prospection Advances for Non-Destructive Investigations in the 21st Century is an excellent opportunity to learn how the latest methods in geophysical research are being used in archeological research, particularly the study of mounds and earthworks. Information about the workshop is available at (website).

The Midwest Archeological Conference will be held in Dayton, Ohio, October 20-23, 2005. Dr. Robert Riordan, Wright State University, and Lynn Simonelli and William Kennedy, Dayton Society of Natural History are conference organizers.