Introduction

The Middle Woodland period (ca. 50 cal BC - cal AD 400) in the Lower Illinois Valley is well known for its highly visible archaeological record, particularly the numerous earthen mounds that line the valley's bluffs, and the associated Hopewell artifacts from distant locales often interred within them. The Ray site (11BR104), however, is unique. At Ray, the dead were interred in the natural ridge instead of mounds. The absence of burial mounds at the Ray site has led some to suggest that the site's authors and those buried there were culturally and genetically isolated from their contemporaries (Flotow 2006). In this study, we compare biological variability at the Ray site with variability at other Middle and Late Woodland (ca. AD 400-1000) cemeteries within the region to test this hypothesis of isolation. We also investigate intra-site variability between archaeologically-defined burial groups. Despite differences in cemetery structures between Ray and other sites, these differences do not appear to reflect broader processes affecting other cultural and genetic dimensions of the community.

The Ray site is located on a bluff at the confluence of the La Moine and Illinois Rivers in Brown County, IL (Figure 1). The site was excavated by avocational archaeologists, led by Mary and Glen Hanning, between 1975 and 1980, with assistance from archaeologists from the Center for American Archeology, at the time known as the Foundation for Illinois Archeology. Despite the absence of mounds, material culture found in graves at Ray is similar to that found at other Middle Woodland sites in the Illinois valley, e.g. Hopewell and Havana pottery, mica, lamellar blades, bone awls or pins, and copper (Flotow 2006). Additionally, some burials in the cemetery, particularly those in Burial Group 3, include objects similar to late Middle Woodland/Late Woodland materials elsewhere in the region (Figure 2). Recent radiometric assays support the presence of Middle and Late Woodland components at the site (Figure 3).

Materials

<table>
<thead>
<tr>
<th>Traits</th>
<th>Site</th>
<th>Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epiteric bone present</td>
<td>Ray (RY)</td>
<td>Middle Woodland (MW)</td>
</tr>
<tr>
<td>Parietal notch bone present</td>
<td>Elizabeth (EZ)</td>
<td>50 cal BC - cal AD 400</td>
</tr>
<tr>
<td>Supraorbital foramen present</td>
<td>Pete Klink (PK)</td>
<td>Late Woodland (LW)</td>
</tr>
<tr>
<td>Divided hypoglossal canal present</td>
<td>Gibson (GI)</td>
<td>cal AD 400 - 1000</td>
</tr>
<tr>
<td>Condylar canal present</td>
<td>Elizabeth (EZ)</td>
<td></td>
</tr>
<tr>
<td>Parietal foramen present</td>
<td>Pete Klink (PK)</td>
<td></td>
</tr>
<tr>
<td>Apical bone present</td>
<td>Schild (SH)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Koster (KO)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Helton (HH)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Analysis Traits - Seven non-metric cranial traits from adult remains were used to measure biological variability. Traits were selected from a set of 23 discrete traits. Intercorrelated traits and those with demographic effects were removed from the analysis.

Ray Burial Group Results

![Ray Burial Group Results](image)

Figure 3. Ray site radiocarbon dates

Expectations

- If those buried at the Ray site were genetically isolated, we expect that the population will have a lower genetic variance (r_i) than contemporaneous groups in the Lower Illinois Valley, reflecting less genetic interaction with other communities on average. Within the Ray site, we expect low variance in all clusters if the site represents a coherent isolated population over time.
- Deviation from or adherence to these expectations can be compared to cultural data in order to understand the Ray site’s relationship to Middle and Late Woodland population trends.

Methods

Variability was estimated by calculating an R-matrix (Konigsberg 1987, 2006, Relethford and Harpending 1994, Steadman 1998). The R-matrix is a standardized variance-covariance matrix in which the diagonal values (r_i) are variance estimates for each site or site component. The average of the diagonal values is equivalent to FST, an estimate of the genetic variation among populations.

Regional Results

![Regional Results](image)

Figure 4. First and second regional R-matrix principal components.

Ray Burial Group Results

![Ray Burial Group Results](image)

Figure 5. First and second intra-site R-matrix principal components.

Conclusions

The results of this study depart from expectations for isolation.
- The low regional FST value suggests little to no genetic differentiation between the site populations.
- Low r_i values for Pete Klink MW and Ray may indicate more genetic isolation at these sites, but their values are not appreciably lower than the other sites when error ranges are taken into consideration (Table 3). In the principle component analysis, Ray is not clearly spatially or temporally differentiated from the other sites, though it clusters nearest to Helton LW and Elizabeth LW (Figure 4).
- The Ray intra-site analysis FST and r_i values were low, indicating low overall and between cluster variability. Burial Group 3 has the lowest r_i value. Burial Group 3 may be late Middle Woodland/early Late Woodland burials based on associated artifacts and radiometric data.
- Our analyses suggest the community buried at Ray was not genetically isolated. Konigsberg and Buikstra (1995) found evidence of a genetic boundary between Ray and Lower Illinois Valley sites. Nothing here contests their findings. Rather, we suggest those buried at Ray were interacting with other communities not captured in the existing Lower Illinois Valley dataset, presumably Central Illinois Valley groups for which we have little comparative biological data.
- Finally, artifacts included with many burials at Ray were “traditional” Middle Woodland/Hopewell items, including mica, pipes, and Hopewell style vessels. If those buried at Ray were culturally isolated, it was not expressed in the items interred with their dead.

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Reference:


