

Relatedness and Social Organization at the Ray Site (11BR104): A Biological Distance Analysis of a Middle Woodland Ridge Top Cemetery in the Illinois Valley

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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. cal 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).

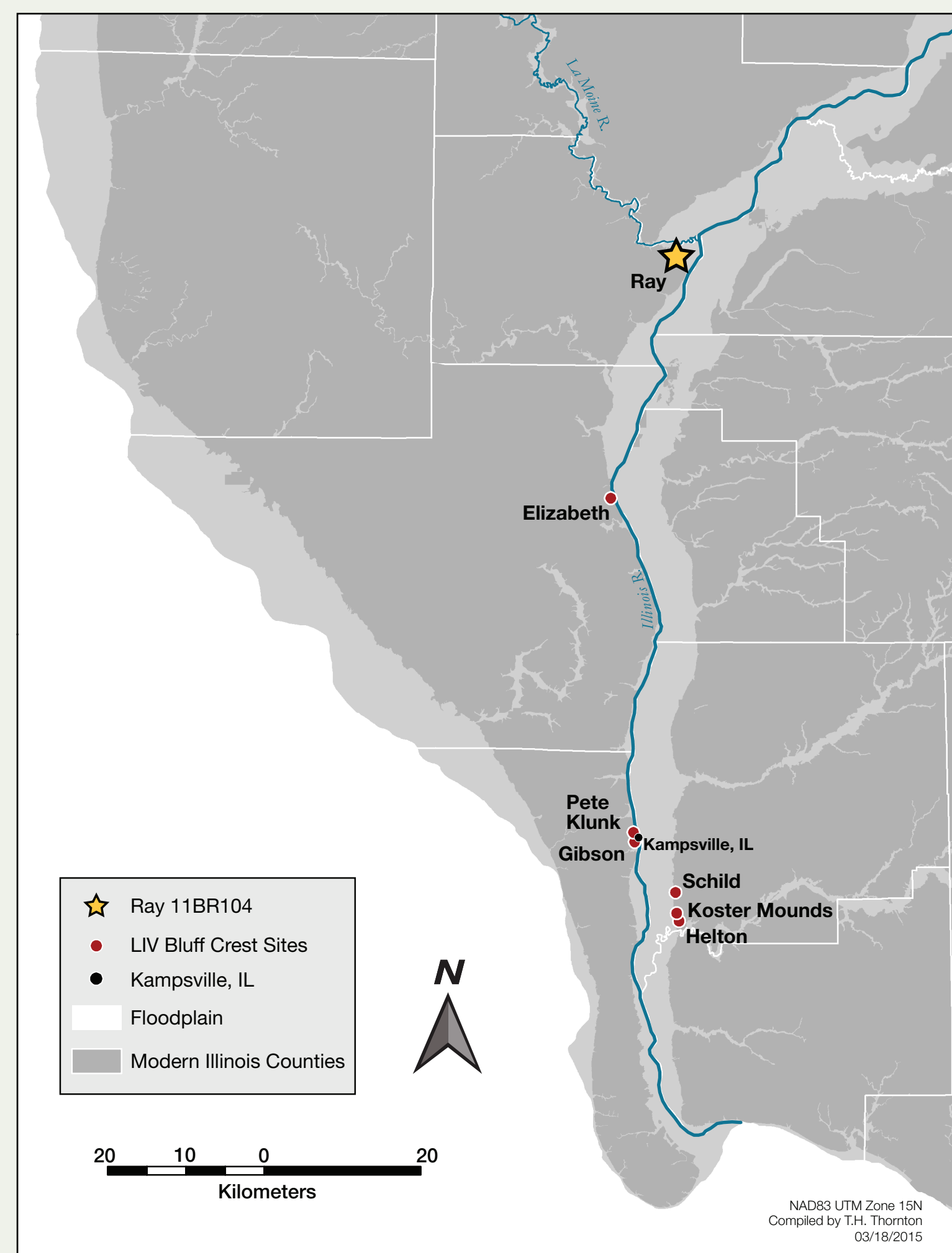


Figure 1. Lower Illinois Valley and Study Sites

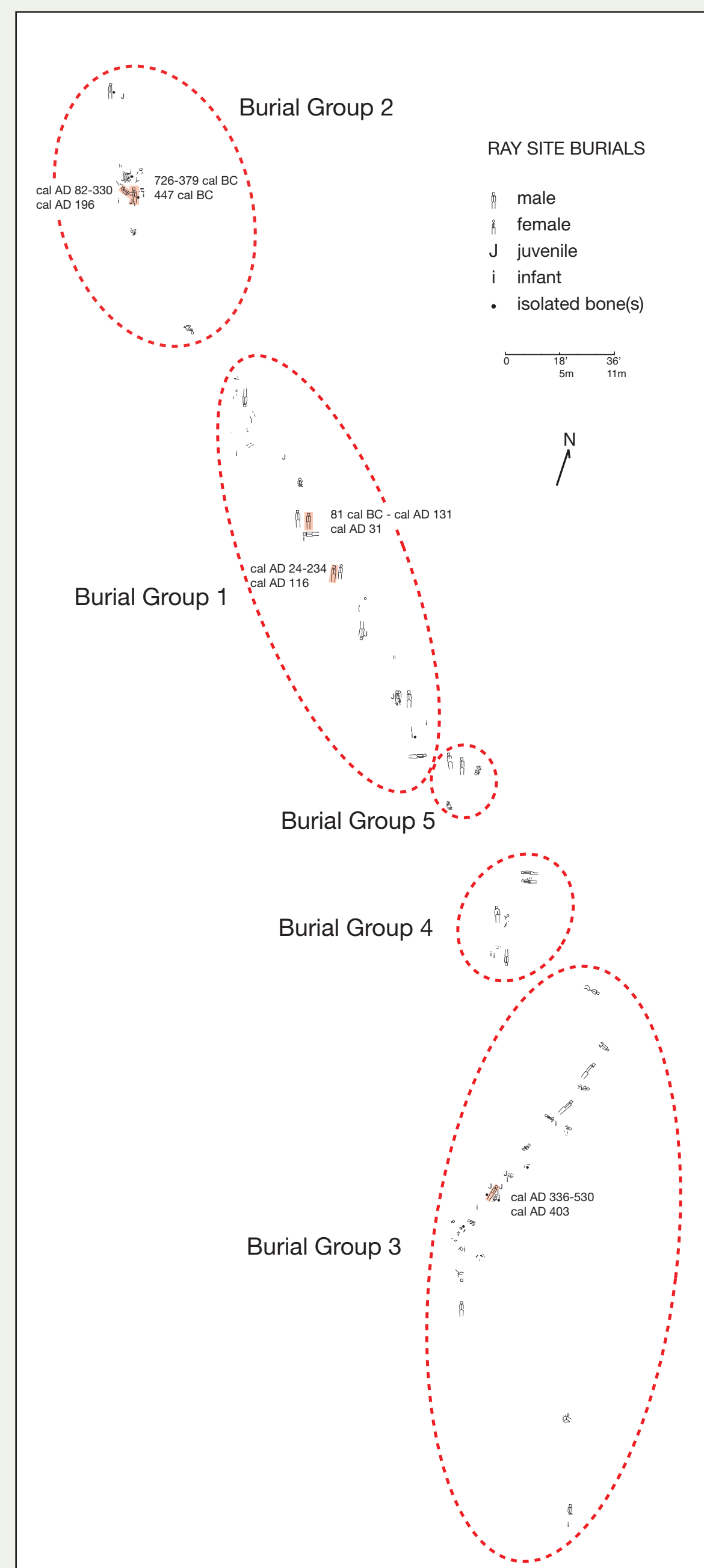


Figure 2. Ray site burials, after Flotow (2006:60-1). Burial groups were identified in the field (CAA Files, Kampsville)

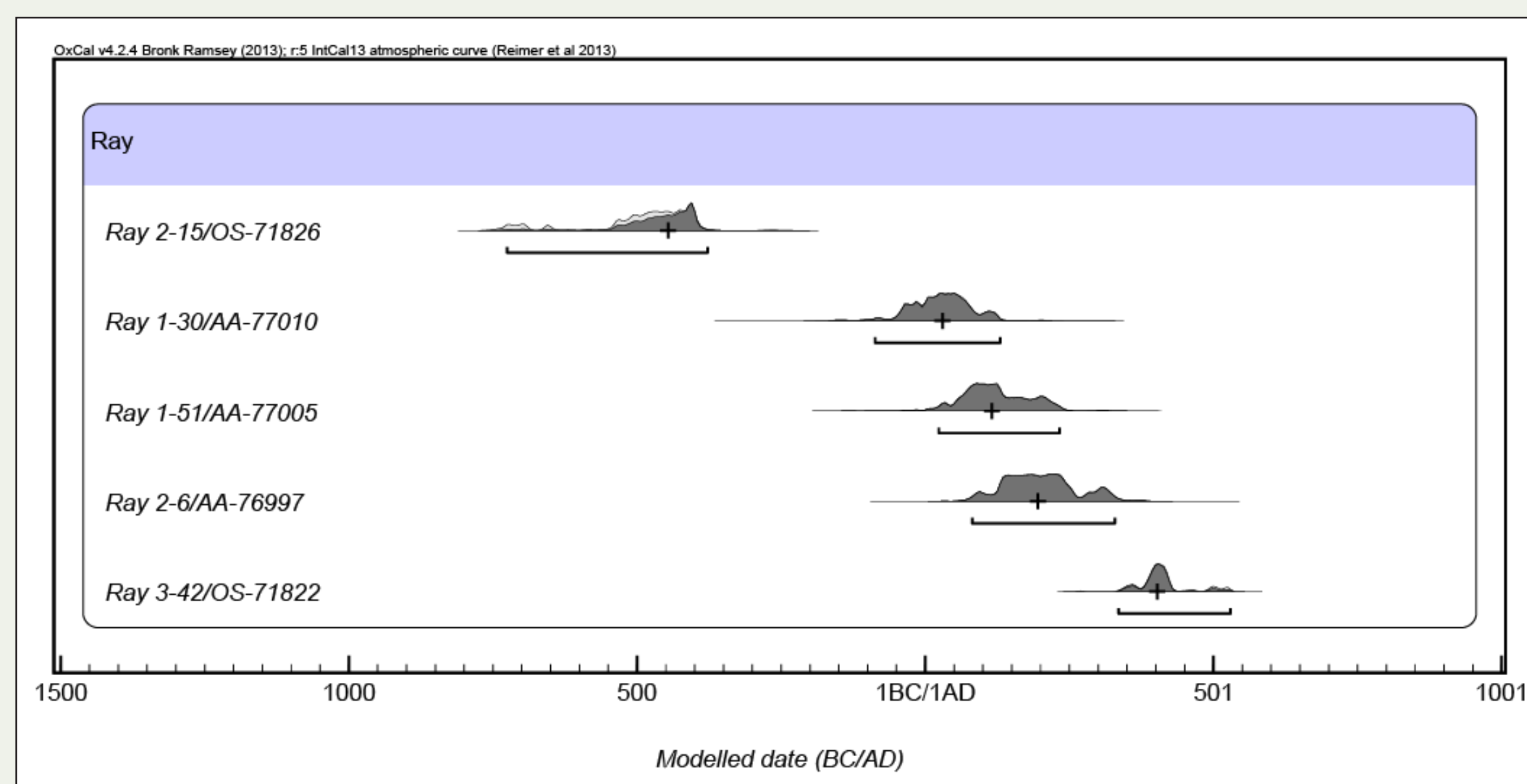


Figure 3. Ray site radiocarbon dates

Expectations

- If those buried at the Ray site were genetically isolated, we expect that the population will have a lower genetic variance (r_{ii}) 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.

Materials

Traits
Epiteric bone present
Parietal notch bone present
Supraorbital foramen present
Divided hypoglossal canal present
Condylar canal present
Parietal foramen present
Apical bone present

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.

Site	Time Period
Ray (RY)	
Elizabeth (EZ)	Middle Woodland (MW)
Pete Klunk (PK)	50 cal BC - cal AD 400
Gibson (GI)	
Elizabeth (EZ)	Late Woodland (LW)
Pete Klunk (PK)	cal AD 400 - 1000
Schild (SH)	
Koster (KO)	
Helton (HN)	

Table 2. Sites and Temporal Components - Multi-component sites were treated as separate units in the analysis. Sites (Figure 1) and temporal components are indicated as site code and time code in the following figures and tables, e.g. Ray Middle Woodland is RY MW.

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_{ii}) are variance estimates for each site or site component. The average of the diagonal values is equivalent to F_{ST} , an estimate of the genetic variation among populations.

Regional Results

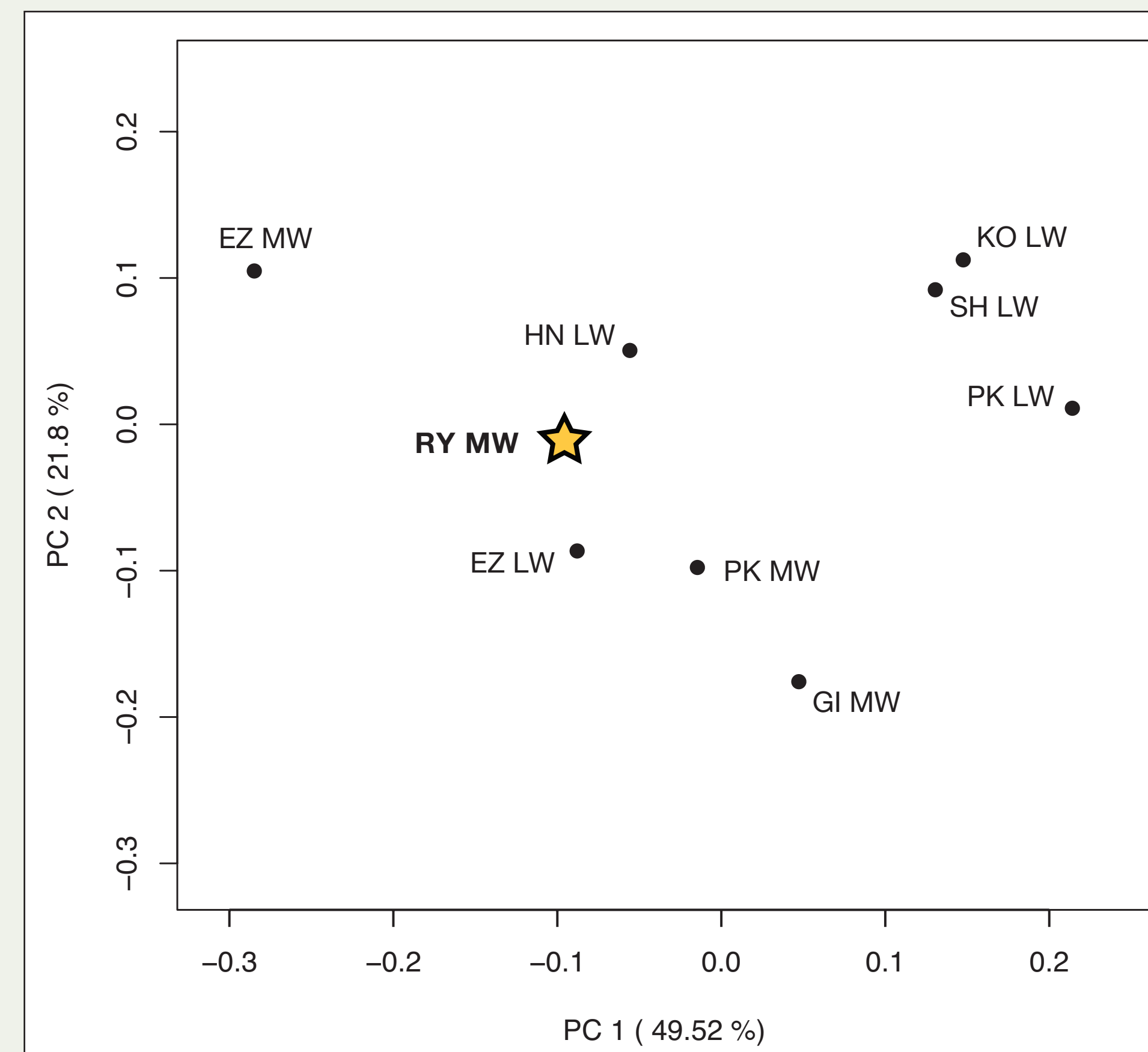


Figure 4. First and second regional R-matrix principal components.

Site	r_{ii}	se
RY MW	.0190	.0109
EZ MW	.0964	.0272
PK MW	.0151	.0064
GI MW	.0383	.0140
EZ LW	.0377	.0177
PK LW	.0611	.0258
SH LW	.0324	.0180
KO LW	.0511	.0175
HN LW	.0290	.0123
F_{ST}	.0422	.0057

Table 3. Regional r_{ii} and F_{ST} values.

Ray Burial Group Results

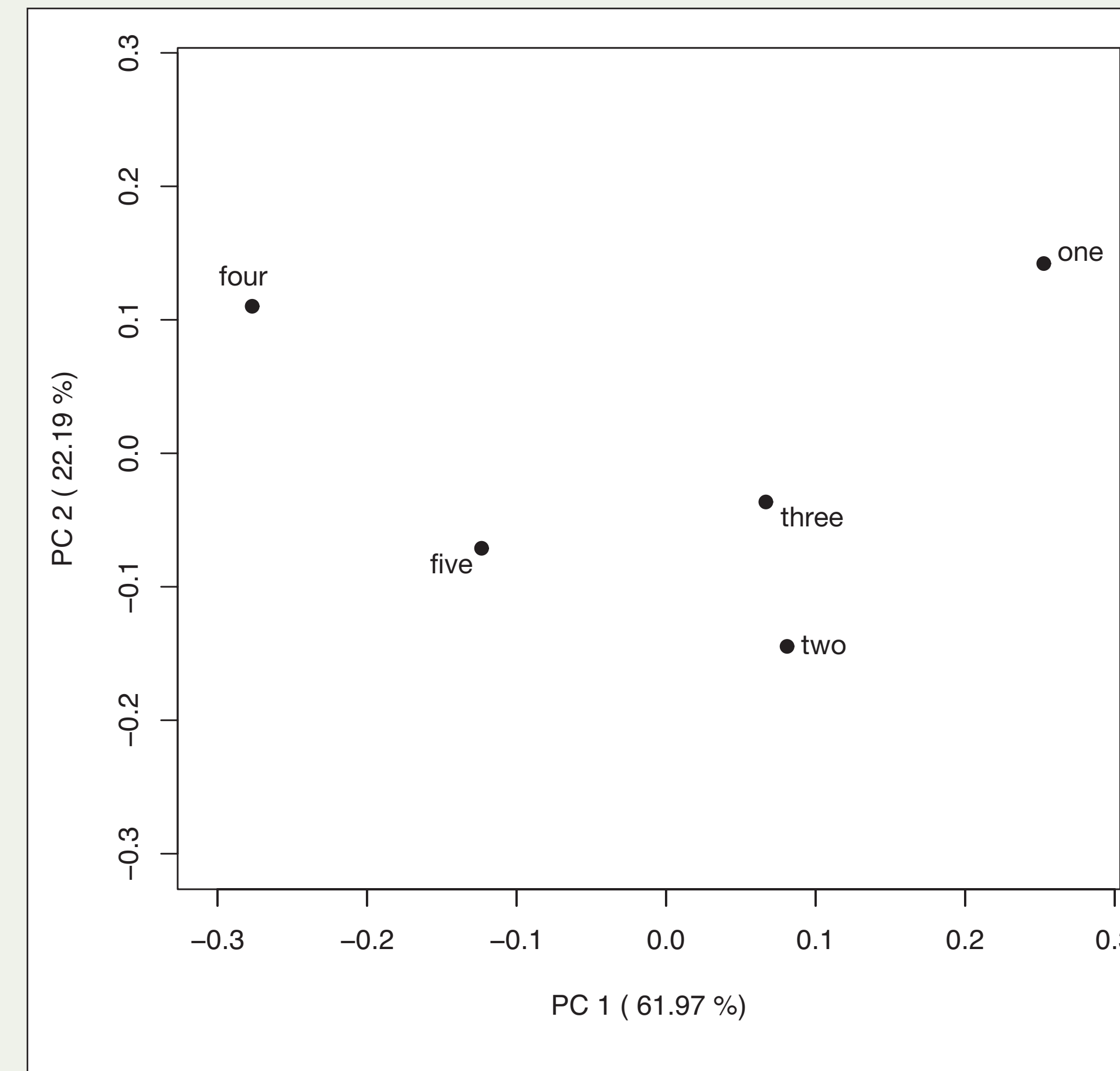


Figure 5. First and second intra-site R-matrix principal components.

Group	r_{ii}	se
Ray 1	.0855	.0519
Ray 2	.0367	.0278
Ray 3	.0187	.0213
Ray 4	.0922	.0853
Ray 5	.0357	.0581
F_{ST}	.0538	.0228

Table 4. Ray burial group r_{ii} and F_{ST} values.

Conclusions

The results of this study depart from expectations for isolation.

- The low regional F_{ST} value suggests little to no genetic differentiation between the site populations.
- Low r_{ii} values for Pete Klunk 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 F_{ST} and r_{ii} values were low, indicating low overall and between cluster variability. Burial Group 3 has the lowest r_{ii} 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.

Literature Cited
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