



## Investigating the identities of isolated crania in the Lower Illinois River Valley through multi-isotopic analysis



Daniel S. Jones<sup>a</sup>, Bethany L. Turner<sup>a,\*</sup>, Jane E. Buikstra<sup>b</sup>, George D. Kamenov<sup>c</sup>

<sup>a</sup> Department of Anthropology, Georgia State University, PO Box 3998, Atlanta, GA 30302, United States

<sup>b</sup> School of Evolution and Social Change, Arizona State University, Tempe, AZ, United States

<sup>c</sup> Department of Geological Sciences, University of Florida, Gainesville, FL 32611, United States

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### ABSTRACT

The Lower Illinois River Valley (LIV) has an extensive record of human habitation extending back over twelve millennia and has been extensively researched by archaeologists to gain insights into indigenous cultural complexity during the Woodland and Mississippian phases. A critical but relatively unexplored aspect of this history is the role of human migration and demographic structure in these complex societies, which could more clearly reconstruct patterns of conflict, exchange, and colonization across different time periods. This study characterizes Sr, and Pb isotopes in tooth enamel from a cross-sectional sample of the Mound 3 human remains ( $n = 15$ ) at the Elizabeth site in the LIV, dated to the Middle Woodland Period (2100–1700 BP), to estimate residential origins and possible residential mobility. Two distinct patterns of mortuary treatment in this sample—nine typical LIV mound interments and six isolated crania arranged in a trench feature—suggest that two distinct groups may have been interred in the mound. However, the significance of this distinction is unclear, including whether or not these isolated crania represent local individuals or non-local people who arrived at the site prior to their deaths. Sr isotopes do not reveal interpretively significant variations in enamel between the typical and feature interments. All of the Pb isotope data form a very well defined linear trend suggesting that Pb in both the typical and feature interments is controlled by similar source(s) or processes. This Pb isotope array can be a result of variable mixing of Pb from two distinct end-members or can be “Pb pseudo-isochron” inherited from local soils developed over ancient bedrock material. Together, these data suggest that the isolated skulls and the typical interments at the site most likely originated from the Midwestern region. The mortuary context also suggests that they were likely not culturally distinct.

### 1. Introduction

The potential for non-local immigrants to be discovered among the individuals in skeletal populations is significant for estimating demographic composition and reconstructing aspects of identity in antiquity. However, developing empirical evidence for individual mobility and immigration in the archaeological record remains a complex endeavor. Multi-isotope analyses have become an established and widespread tool in assessing mobility in ancient skeletal populations, using individuals as the units of analysis within an ecological and geological context (Bentley and Knipper, 2005, Carlson, 1996, Chiaradia et al., 2003, Evans et al., 2006b, Knudson and Torres-Rouf, 2014, Knudson et al., 2012, Knudson et al., 2015, Montgomery et al., 2003, Price et al., 1994, Valentine et al., 2008, White et al., 2000, White et al., 2002, White et al., 1998).

One region that would benefit from empirical, isotopic studies of

individual backgrounds and population dynamics is the Lower Illinois River Valley (LIV), in what is now the central United States. The LIV is a large, diverse area of roughly 2800 mi<sup>2</sup> that encompasses approximately 70 mi of lower river drainage (Fig. 1). The productive environment and diverse ecosystems of the valley have attracted a lengthy human presence in the region, which spans several millennia beginning around 12,000 years BP. As many scholars have noted, the LIV presents an attractive archaeological opportunity, as the area has remained relatively free from the urbanization and resultant site destruction that has plagued many areas of North America. As a result, research on prehistoric human occupation of the LIV, itself a smaller portion of the greater “Eastern Woodlands” complex, has been extremely active since the late nineteenth century, contributing to an immense collection of data and anthropological interpretations that have shed new light on the once-flourishing cultures. However, many questions regarding the prehistoric civilizations of the American Midwest remain.

\* Corresponding author.

E-mail address: [bturnerlivermore@gsu.edu](mailto:bturnerlivermore@gsu.edu) (B.L. Turner).

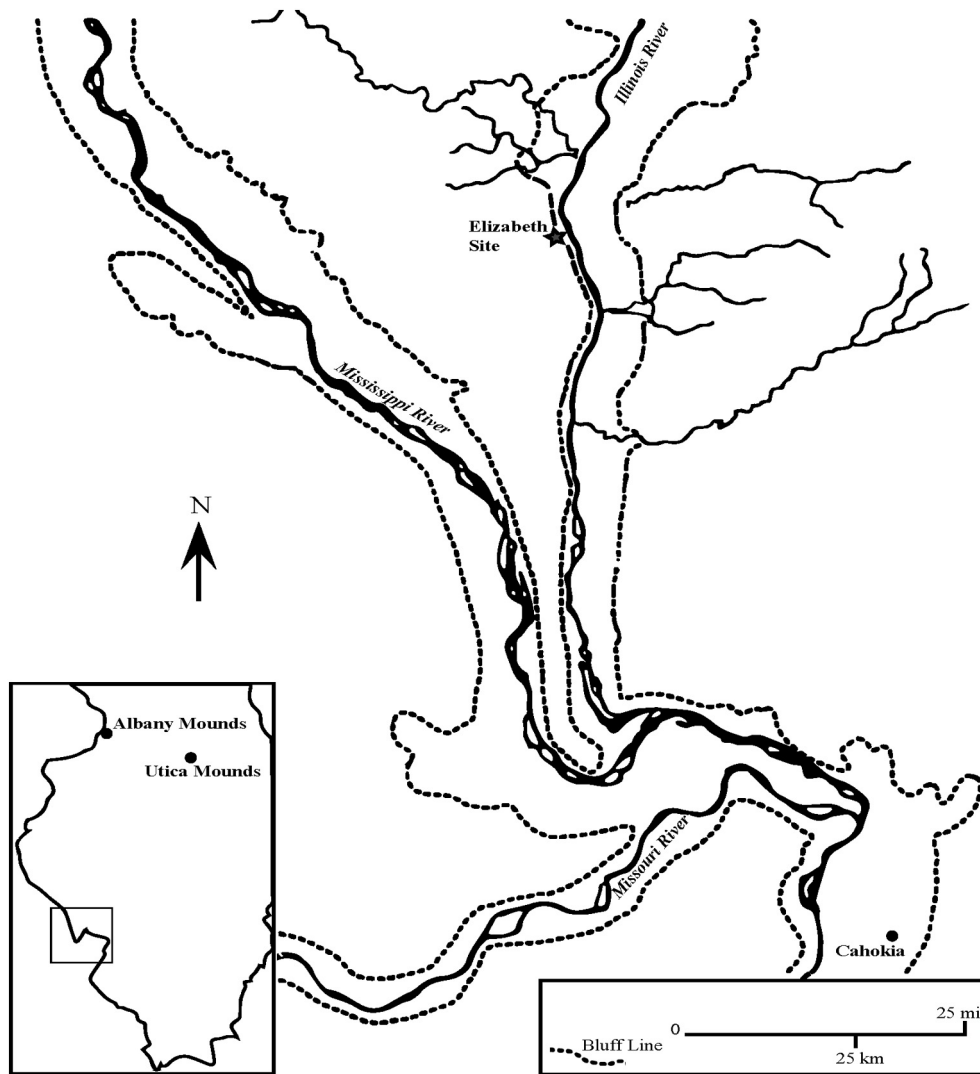


Fig. 1. Map of the LIV region, with the Elizabeth site and nearby reference sites indicated.

One question that has gone largely unaddressed in previous research involves resettlement of regions, such as the LIV, following abandonment. In this case, the LIV was apparently abandoned during the Early Woodland Period (ca. 2250–2100 BP). A relatively small feature in Mound 3 at the Elizabeth site, a multi-mound mortuary site associated with the Middle Woodland Period (ca. 2100–1700 BP) located on a bluff-top knoll, provides a basis for considering this question. Here researchers uncovered a slot-trench beneath the earthen apron that blanketed the central portion of the burial mound. Enclosed inside were six isolated skulls that had been aligned neatly and interred with a wooden cover over the top; such a cache of skulls has never been observed in any of the numerous excavated sites throughout the lower valley (Bullington, 1988; Charles et al., 1988; Leigh et al., 1988). These individuals are thus interred in a unique fashion, representing a minority of secondary interments at the site. Their life histories, social identities, and residential origins hold potential for understanding larger issues reflecting Middle Woodland population dynamics in the LIV and elsewhere in the ancient Midwest.

This study presents the results of a multi-isotopic analysis of individuals ( $n = 15$ ) interred in Mound 3 of the Elizabeth site. Isotopic values of strontium ( $^{87}\text{Sr}/^{86}\text{Sr}$ ) and lead ( $^{206}\text{Pb}/^{204}\text{Pb}$ ,  $^{207}\text{Pb}/^{204}\text{Pb}$ ,  $^{208}\text{Pb}/^{204}\text{Pb}$ ; herein referred to as  $^{20n}\text{Pb}/^{204}\text{Pb}$  for brevity) from tooth enamel are characterized to estimate the residential origin and variation therein among both individuals with more typical mortuary styles and the six individuals interred as isolated skulls.

Since permanent tooth enamel is formed during childhood and is metabolically inert once formed, isotope ratios reflect the geochemistry of an individual's locale during dental crown formation. Accordingly, characterizing isotope values in skeletal remains permits the differentiation between geologically "local" versus "nonlocal" individuals. This study therefore infers aspects of identity among these individuals through estimating their residential origin and interpreting these estimates within the context of their mortuary status.

As the Elizabeth site is spatially and temporally associated with re-occupation of the valley area following a period of human absence, and because the interment of the six skulls is a unique occurrence, assessing the life history of the individuals represented by the six skulls is critical to conceptualizing prehistoric life in the region. Moreover, existing isotopic research in the lower Illinois River region has largely been limited to investigations of diet, sometimes in combination with analyses of trace element concentrations (Buikstra, 1988, 2008). Recently, strontium isotope analysis has been used in the broader region to study residential mobility, at the Mississippian site of Cahokia and related sites in northern Illinois (Slater et al., 2014), and the Hopewell Mound Group in Ohio (Beehr, 2011). However, this study is the first to utilize multiple isotopic variables to investigate demographic diversity and mobility in the LIV, and is thereby foundational for building comparative framework in which to assess residential origin, potential mobility, and aspects of identity in skeletal populations throughout the broader region.

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