Romans, barbarians and *foederati*: a possible region of origin for the "Headless Romans" and other burials from Britain

Kayla D. Crowder [1], Janet Montgomery [1], Kori L. Filipek[1,2], Jane A. Evans [3]

[1] Department of Archaeology, Durham University, South Road, Durham, DH13LE, UK

k.d.crowder@durham.ac.uk, janet.montgomery@durham.ac.uk

[2] Transylvania Bioarchaeology, Durham, UK

k.l.filipek–ogden@durham.ac.uk

[3] British Geological Survey, NERC Isotope Geosciences Laboratory, Nicker Hill, Nottingham, NG125GG, UK

je@bgs.ac.uk

Corresponding Author: Kayla Diane Crowder, Department of Archaeology, Durham University, South Road, Durham, DH13LE, United Kingdom
Email: k.d.crowder@durham.ac.uk Phone: +44(0)7956646698

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Highlights

- Archiud $^{87}Sr/^{86}Sr$ range: 0.70959 to 0.71016
- Archiud $\delta^{18}O_{VSMOW}$ range: 23.9 to 25.5‰
- Archiud $\delta^{13}C_{VPDB}$ range: -10.3 to -6.7‰
- Seven "Headless Romans" and 17 other "non–local" Romano–British individuals have strontium and oxygen isotope value indicating a region of origin similar to the Transylvania Basin.

Abstract

The Archiud "Hânsuri" cemetery in Transylvania, Romania is the burial site of a barbarian population from the Kingdom of the Gepids (4th–7th Cent AD). Previous work examining the dietary isotope life-histories and palaeopathological profiles of the non–adults (<16 years) has been published (Crowder *et al.*, 2019). Strontium, carbon and oxygen isotopes were measured on enamel, dentine, and bone of four individuals from the Archiud cemetery to investigate residential origins. The Archiud individuals had $^{87}Sr/^{86}Sr$ values ranging from 0.70959 to 0.71016, $\delta^{13}C_{VPDB}$ values from -10.3 to -6.7‰ and $\delta^{18}O_{VSMOW}$ values from 23.9 to 25.5‰. All individuals are consistent with the available published data for the Transylvania Basin. The Archiud humans were compared to published Roman period individuals from British cemeteries of unknown origin who have isotope profiles inconsistent with Britain and the Mediterranean. Ten individuals from Driffield Terrace (7 with evidence of decapitation) and 13 individuals from six other Roman cemeteries in Britain have similar isotopic values to the Archiud humans. The data suggest the non–British individuals may have originated from a region of similar geology and climate/latitude to the Transylvania Basin. The results of this research help to fill the gap in the biosphere data from Transylvania, as well as contextualise mobility studies within Transylvania, Europe, and Britain.

1. Introduction

The Archiud (Hânsuri) cemetery in Transylvania, Romania (4^{th}–7^{th} Cent. AD) is located in the northern region of the Transylvania Basin (Figure 1) and was a multi–period complex spanning from the Eneolithic (2500 BC) to the 6^{th}–7^{th} Cent. AD (Gaiu, 1999; Marinescu, 2003). Burial artefacts (jewellery, weapons, pottery) revealed two discrete burial assemblages within the last phase of the site, the first from the 4^{th}–5^{th} centuries AD and the second from 6^{th}–7^{th} centuries AD (Gaiu, 1999; Marinescu, 2003). This population has been associated with a migratory barbarian population, the Kingdom of the Gepids (Dobos, 2013). Currently there is a dearth of direct information for the biosphere and human isotope profiles of Transylvania, particularly strontium, oxygen and carbon isotopes. This region is important in the late Roman Period, not least as a possible homeland for *foederati* (mercenaries contracted by the Roman Empire) who were believed to have Germanic and barbarian origins (Vida, 2009; Ivleva, 2012; Eckardt *et al.*, 2015). Data from the regions surrounding the Transylvania Basin were compiled to establish an extrapolated local range for strontium and oxygen isotopes for individuals buried in the Archiud cemetery. The aims of this paper are to define a proposed baseline biosphere range (Sr and O) for the Transylvanian Basin, to determine whether the Archiud individuals have isotope values consistent with the proposed local range and examine how the data from the Gepids compare with non–local individuals previously identified from Roman Britain.

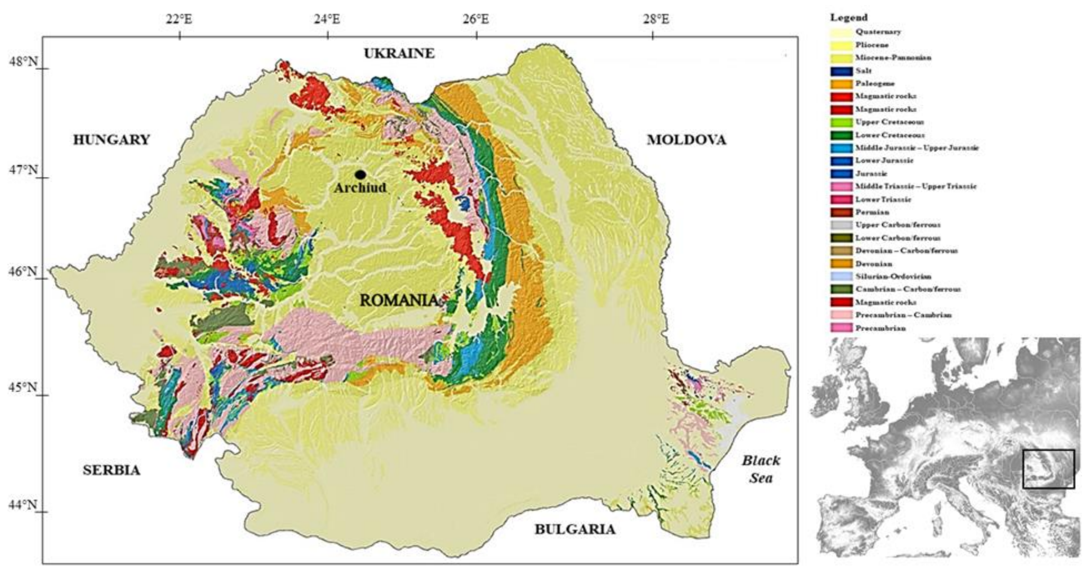

Figure 1. Geological map of Romania indicating the location of the Archiud cemetery (map modified from Tudor, (2012).

1.1 Research Context

Romania was home to high levels of migration, trade, and military campaigns due to its proximity to the Danube River and the Black Sea. Incursions of various tribal populations into the northern border of the Roman Empire (the "crisis of the 3^{rd} Century") resulted in movements of entire populations (Bursche, 2008). The Roman Empire contracted field armies (*comitatenses*) from outside the Empire made up of allies and mercenaries known as *foederati* (Eckardt *et al.*, 2015). In the 370s (AD), Romans enlisted Germanic, Alan and Hun *foederati* to defend Pannonia (Hungary) (Bogucki and Crabtree, 2004). Visigoth tribal leaders on the banks of the Danube River were also offered posts as *foederati* in Moesia (modern Serbia/Bulgaria) to assist Roman troops in the region (Thompson, 1982). After the death of the Hun leader, Attila, and the Battle of Nedao (454-455 AD), the following three decades saw "throngs of half-starved people let loose on the Imperial frontier searching for land," some of which were settled on lands as *foederati* designed to service military purposed (Thompson, 1982, pp. 16). During this time, a peace treaty was agreed between the Roman Empire and the Gepids who controlled Dacia (Romania) (Aillagon, 2008; Ivanišević, 2010). Early Gepid populations were known allies of the Roman Empire and were also believed to be part of the Roman *foederati* (Previté-Orton, 1975; Ivleva, 2012). When the Roman Emperor Constantine III withdrew the Roman legions from Britain, the remaining Roman imperials refused to defend the territory (France and Abels, 2009). *Foederati* were deployed to protect from invasion (barbarians, Picts, Scots), and were allowed to retain their leadership, fighting style and ethnic identity (Hawkes and Dunning, 1961; Esmonde, 1989; Gowland, 2002). Historically, Dacian, Thracian (Bulgaria), and Pannonian subjects were deployed to defend the province of *Britannia* (Ivleva, 2012). These distinct cultural groups are believed to have been found at Romano-British sites in Britain.

Driffield Terrace (1^{st}–4^{th} Cent. AD) is a Romano–British cemetery in Northern England associated with the Roman provincial capital *Eboracum* (now York), and was linked to the Roman military (Müldner *et al.*, 2011). The 80 inhumation burials had various alignments, were mostly young or middle adult males, and 46 individuals were decapitated (head placed by torso or between legs) (Montgomery *et al.*, 2011; Hunter-Mann, 2015). Several of the decapitated individuals from Driffield Terrace had one or more isotope ratios that indicated a non-British, possibly continental European origin (Montgomery, 2010; Montgomery *et al.*, 2011; Müldner *et al.*, 2011).

Previous research undertaken on Roman period burials in Britain, particularly at the Driffield Terrace site in York (UK), have reported a wide variation in isotopic profiles, many of which were inconsistent with origins in Britain or the Mediterranean region (Montgomery, 2010; Montgomery *et al.*, 2011; Müldner *et al.*, 2011). The low oxygen isotope values ($\delta^{18}O$) coupled with evidence of C_4 dietary resources (i.e. millet) at Driffield Terrace led researchers to propose a continental, eastern European origin for some individuals (Müldner *et al.*, 2011). A small number of C_4 consumers have also been reported from other Roman period cemeteries (Leach *et al.*, 2009; Eckardt *et al.*, 2015; Helm, 2017; Montgomery *et al.*, 2017). Millet (a C_4 plant) was present in Britain after the expansion of the Roman Empire, however the consumption and cultivation of millet was unusual in Northern Britain at that time (van der Veen *et al.*, 2008; Müldner *et al.*, 2011; Redfern *et al.*, 2016). Examining strontium and oxygen isotope data with dietary isotope data (C,N) can help differentiate individuals with non-British origins (Müldner, 2013; Pearce *et al.*, 2013). Müldner (2013) analysed Romano-British isotope data and found that some of the "long-distance migrants" had "exotic" childhood diets (C_4) and some adults had an increase in marine consumption (possibly linked with high-status), demonstrating people from across the Roman Empire were in the province.

While Driffield Terrace is exceptional in terms of the number of decapitation burials, it is not unique in terms of varied funerary rites and isotope evidence of non–locals. At Lankhills, a Late Roman cemetery in southern England, nine individuals with "exotic" burials were believed to originate in/near Pannonia (possibly Sarmatian) based on burial rites and artefacts (Clarke and MacDonald, 1979). Evans and colleagues (2006) used isotope analysis and found four individuals (exotic burials) with diverse isotope ratios suggesting non-British origins, and who were presumably not all from the same region. If these exotic burials at Lankhills were linked to *foederati*, these data support the belief that the Roman Empire enlisted subjects from numerous regions to help defend Britain. Scorton (Hollow Banks cemetery) is a Late Roman military site in North Yorkshire (UK) which also had evidence of non–local burials, both in funerary context and isotopes (Eckardt *et al.*, 2015). Catterick (*Cataractonium* in North Yorkshire) is a small Romano–British military outpost with unusual burial positions and evidence of possible migrants (Chenery *et al.*, 2011). Isotope data from Catterick, as well as artefacts (brooches and beads) at this site were found to be Germanic or Danubian in style (Cool, 2002, pp. 42–43), linking this site to the eastern regions of the Roman Empire.

Four additional sites were found to have at least one individual with isotope ratios inconsistent with British origins. Skeleton (SK) 3822 from the Roman site of Rhodaus Town (Canterbury, UK) was wearing a pair of silver buckles associated with 4th Cent. AD central European/Black Sea style, had no evidence of decapitation, and had childhood isotopes consistent with moderate C_4 consumption, suggesting continental Europe origins (Helm *et al*., 2017). There were also two children subjected to decapitation burial rites at Rhodaus Town (Helm *et al*., 2017). Research on the late Roman site, Gravesend (Kent, UK), revealed SK12671 had evidence of childhood C_4 consumption (Pollard *et al.*, 2011). One individual (SK37) from The Railway site in Roman York had oxygen isotopes associated with higher altitude and/or cooler continental climates and authors suggested a possible Central European origin (Leach *et al.*, 2009). The Roman phase of the Walbrook Stream archaeological site outside London revealed three possible migrants, one with evidence of C_4 consumption, and a "probable local" female buried with her skull between her lower limbs (Montgomery *et al.*, 2017). The individuals from these sites were compared with the results of this study of Transylvanian humans to explore whether Continental/Eastern Europe constituted a possible region of origin.

1.2 Strontium and Oxygen Isotopes

Since the 1980s, strontium ($^{87}Sr/^{86}Sr$), and later, oxygen ($\delta^{18}O$) isotope analyses have been utilised to gain knowledge about the migratory practices of past populations (Ericson, 1985; Montgomery, 2010; Evans *et al.*, 2012). When an individual drinks water or consumes resources from their local environment, the strontium and oxygen isotopes are incorporated into the developing skeletal and dental tissues (Graustein, 1989; Sharp, 2007; Montgomery, 2010). The strontium isotope ratio ($^{87}Sr/^{86}Sr$) reflects the underlying geology from which a person sourced their food when that tissue was forming (Evans *et al.*, 2010). Oxygen isotopes in archaeological tissue indicate the climate and water source a person had access to during development (Sharp, 2007; Evans *et al.*, 2012). Combining geological and climatic data helps researchers determine if a person's childhood isotope values (captured during enamel formation) match the region they were buried (Montgomery, 2010; Müldner *et al.*, 2011; Evans *et al.*, 2012).

While migration studies have proven successful in identifying those who were non-local to the region in which they were buried, it is not possible to definitively assign a place of origin for these migrant individuals. The critical limitation to be aware of when interpreting an individual's migratory status is that isotope values can represent multiple regions and/or a large area if the geology and environment is homogeneous (Montgomery, 2010). For example, one type of sedimentary rock of Tertiary age, underlies most of the Eastern European flat lands (the yellow regions in Figure 1). If an individual has childhood values consistent with that of the Eastern European flatlands, it would be unsound to state that person was from a specific site without detailed comparative strontium and oxygen biosphere data specific to that site and even then, the equifinality of the data may render such a firm identification or place of origin impossible. The Archiud Cemetery is in the Carpathian Mountain Basin of Transylvania, Romania and has yet to be mapped for Sr or O-isotope biosphere data. As a result, other sources were gathered to establish a proposed local range, and to explore residential origins.

1.2 Defining biosphere isotope ranges in Transylvania

A geological study of rocks of the Carpathian–Pannonian region of the Northern Transylvania Basin have whole rock $^{87}Sr/^{86}Sr$ values ranging between 0.70881 and 0.70910 (Seghedi *et al.*, 2004). Natural mineral water in Hungary, gives $^{87}Sr/^{86}Sr$ values from 0.70901 to 0.71100 (Voerkelius *et al.*, 2010). The Online Isotope in Precipitation Calculator (OIPC) predicts a $\delta^{18}O$ value of -8.8‰ (V–SMOW, 95% CI ± 0.1‰) based on the longitude, latitude and altitude of Archiud, Romania (Bowen et al., 2018). Archaeological research from Hungary and Western Romania has reported $^{87}Sr/^{86}Sr$ ranging from 0.70779 to 0.71327 (Giblin *et al.*, 2013; Hakenbeck *et al.*, 2017). Hakenbeck and colleagues (2017) analysed human enamel from five sites within Pannonia (5^{th} Cent. AD), at a similar latitude and altitude as the Archiud Cemetery and found large range of $\delta^{18}O_{VSMOW}$ from 21.6 to 26.1‰.

In summary, and based on the data from the surrounding regions, we propose as an initial conservative estimate that individuals from the Transylvania Basin will have $^{87}Sr/^{86}Sr$ values within the range of 0.7078 to 0.7120 reflecting the predominantly Tertiary/Quaternary sediments of the basin bedrock and $\delta^{18}O_{VSMOW}$ 21.9 to 26.1‰.

2. Materials and Methods

2.1 Skeletal Assemblage

In 2012, a collaboration between archaeologists from Transylvania Bioarchaeology, the National Museum of Transylvanian History, and the Bistrita–Nasaud Museum sought to examine the Gepid remains from Archiud in order to build an osteobiographical database and generate further data to examine the lived experiences of the Gepid people buried at this site. Previous agricultural work at the site resulted in high fragmentation and poor preservation of the skeletal remains and therefore only 32 of 61 inhumations were suitable for macroscopic skeletal analysis (Filipek, 2017).

Age at death for the non-adults was estimated using skeletal (Scheuer and Black, 2000) and dental development (AlQahtani *et al.*, 2010). Sampling for destructive analysis followed the British Association of Biological Anthropology and Osteoarchaeology Code of Ethics and Practices (BABAO Working Group for Ethics and Practice, 2010a, 2010b; APABE, 2013). Six non–adult individuals were selected for the original study, four of which were sampled for strontium and oxygen isotope analyses (Table 1). The poor state of the skeletal remains also limited the sample selection for isotope analysis. Two sample types were selected from each individual: the most complete (latest forming) tooth, and one sample of bone or dentine. Bone and dentine are susceptible to trace element diagenetic alteration in the burial environment and so by paired analysis of enamel and primary dentine/bone, an estimation of diagenetic vectors and local labile soil strontium isotopes can be made in order to further constrain the Sr isotope biosphere (Montgomery *et al.*, 2007).

	cemetery (c. AD)	age at death (years)	C_4 diet	burial artefacts
ArchM1	4^{th} –5^{th}	12–14	yes	triple inhumation (male, female, non–adult), iron knife (pelvis), grave floor lined with charcoal, animal remains in grave
ArchM55	6^{th} –7^{th}	3–5	yes	agate bead (chest), gray/red pottery
ArchM73	6^{th} –7^{th}	15–17	yes	no burial inclusions (grave was disturbed)
ArchM76	6^{th} –7^{th}	16–19	unknown*	metal belt buckle, iron knife, small gray vessel (near skull), flint fragments

*Table 1. Summary of the Archiud individuals selected for isotope analyses (Gaiu, 1999; Marinescu, 2003; Filipek, 2017; Crowder et al., 2019). *ArchM76 was not analysed for carbon and nitrogen stable isotope analysis.*

2.2 Methods

A hand–held dental drill, metal dental burr, and diamond blade cutter were used to remove approximately 15 to 20mg of sample. Enamel samples were taken from areas without cracks, caries, discoloration or opacities and all samples were examined under a lighted magnified glass to ensure clean separation and no dentine was included (see Montgomery, 2002). Bone and dentine samples were removed with a diamond blade cutter. The samples were placed in individually sealed containers and transported to the NERC Isotope Geoscience Laboratory (Keyworth, UK). This is a class 100, HEPA–filtered laboratory. Sample processing followed the methodology in Evans *et a*l (2006). The strontium samples were process using a Finnigan Thermal Ionization Mass Spectrometer (TIMS) and normalised to the international standard, NBS987, to ensure accuracy of the equipment.

Enamel samples for oxygen and carbon isotope analysis were prepared using procedures modified from Sharma and Clayton (1965). Approximately 10 to15mg of sample was transferred to glass vials with sealed septa and placed in a Multiprep device. Oxygen ($\delta^{18}O$ ‰) and carbon ($\delta^{13}C$ ‰) isotopes were measured on an IsoPrime dual inlet spectrometer. The Craig correction was applied to account for $\delta^{17}O$ (Craig, 1957). Carbonate values were converted using the equation found in Coplen, (1988) and Chenery *et al,* (2010). Standard reference material (NBS-19, Keyworth Carrera Marble) was placed across the run to correct for drift through the long run time. The average reproducibility for Keyworth Carrera Marble material is 0.05‰ for $\delta^{18}O$ and $\delta^{13}C$.

3. Results and Discussion

3.1 Results

The results of the strontium, oxygen and carbon isotope analyses of the Archiud individuals are in Table 2. The $^{87}Sr/^{86}Sr$ ranges from 0.70959 to 0.71016 (mean: 0.70978, 1σ: 0.00017). The $\delta^{18}O_{VPDB}$ values range from -6.8 to -5.3‰ (mean: -6.0‰, 1σ: ±0.5) and the $\delta^{13}C_{VPDB}$ range from -10.3 to -6.7‰ (mean: -8.7‰, 1σ: ±1.3). The strontium concentrations of enamel range from 77 to 103ppm and bone/dentine range from 222 to 425ppm.

	element	tissue	$^{87}Sr/^{86}Sr$	Sr ppm	$\delta^{18}O_{VPDB}$ ‰	$\delta^{18}O_{VSMOW}$ ‰	$\delta^{13}C_{VPDB}$ ‰
ArchM1	M2	enamel	0.71016	77	-6.8	23.9	-6.7
	M2	dentine	0.70960	222			
ArchM55	M1	enamel	0.70966	103	-5.3	25.5	-10.3
	mandible	bone	0.70964	425			
ArchM73	M3	enamel	0.70988	91	-5.9	24.9	-8.7
	M3	dentine	0.70980	309			
ArchM76	M3	enamel	0.70965	102	-6.0	24.7	-9.0
	os coxa	bone	0.70984	375			

Table 2. Results of the strontium, carbon and oxygen (carbonate) isotope analyses.

3.2 Discussion

ArchM1 was the only individual with a considerable difference, i.e. >0.0002 (Montgomery, 2002), in the $^{87}Sr/^{86}Sr$ values between enamel and bone/dentine. Bone and dentine are susceptible to diagenetic alteration in the burial environment and the reduction in the isotope ratio coupled with the increase in the strontium concentration in the dentine compared to the enamel of ArchM1, indicates the uptake of local labile strontium by the dentine. The convergence of this dentine sample with the isotope ratio obtained for all the other samples in Table 2 strongly suggests labile $^{87}Sr/^{86}Sr$ of c. 0.7096-0.7098 at the cemetery (Montgomery *et al.*, 2007). Based on the results, the proposed conservative local range for Archiud individuals would be $^{87}Sr/^{86}Sr$ between 0.7090 and 0.7110 and $\delta^{18}O_{VSMOW}$ between 23 to 26‰. Although all four individuals fall within the proposed conservative local range for $^{87}Sr/^{86}Sr$, the lower $\delta^{18}O$ value and change in the $^{87}Sr/^{86}Sr$ values between enamel (biogenic) and dentine (diagenetic) suggest individual ArchM1 was from a slightly higher altitude and/or latitude. ArchM1 could have been from a more radiogenic terrain possibly a geological region of Lower Mesozoic and Palaeozoic sediments (Evans *et al.*, 2010) within or around the Transylvania Basin, and that the biosphere strontium isotope range for the Archiud area is narrower than proposed. The isotope data and burial context (earlier burial phase, multiple inhumation, and multiple artefacts) suggest that ArchM1 may have been an incomer to the site or had different socio-economic standing compared to the three other individuals from Archiud however, additional isotope biosphere mapping of Romania is needed to confirm this hypothesis.

As previously mentioned, Dacian subjects were utilised to support the Roman military in Britain (Ivleva, 2012) and may have originally offered their service as *foederati* for the Roman Empire (Pop and Nagler, 2010; Djuvara, 2014). To determine whether this region of eastern Europe could provide a possible homeland for the “headless Romans” and other isotopic non-locals in Roman Britain, the Archiud data were combined with isotopic data from other Romano–British sites in Britain believed to have connections with the eastern borders of the Roman Empire. The data from the Archiud individuals are plotted with the Romano–British data in Figure 2. Data from three sites in Pannonia (Hungary and Western Romania) are also plotted to demonstrate other possible places of origin with geology and climate similar to the Transylvania Basin (Hakenbeck *et al.*, 2017).

Seven decapitated individuals from 6-Driffield Terrace (SK 4, 8, 14, 15, 20, 23, 24) and the young decapitated female from Walbrook Stream (6840) fall within the proposed isotope range for the Transylvania Basin. Individuals 3DRIF-33, 3DRIF-35 and 6DRIF-08 had childhood isotopes on the margin of the proposed Transylvania Basin isotope range and also had skeletal evidence of decapitated. Decapitation is sometimes considered a type of deviant burial (execution/punishment) however, decapitation in the Roman period was often used as a form of honour (Garnsey, 1968). Evidence of careful post-mortem removal of soft tissue prior to decapitation indicates this practice may have been used as a burial rite (Tucker, 2014). A recent discovery of a Romano-British burial site in Suffolk found 34% (17 of 50) of the individuals were decapitated post-mortem (males, females and one non-adult) and was interpreted to signify a careful burial rite linked to a particular group/belief system, which would suggest these were not executed/deviants (Steward, 2019). Müldner et al. (2011) found no distinct patterns between the isotope data (geographic origin) and decapitation which supports the interpretation that the practice was performed on locals and non–locals. There is no distinct pattern when the seven decapitated individuals were analysed by biological sex, age at death, or burial phase. For example, individual 3DRIF–10 and 6DRIF-02 also had isotope values within the proposed Transylvania range and had no evidence of decapitation (Montgomery *et al.*, 2011; Müldner *et al.*, 2011) further supporting the belief that decapitation was not solely reserved for immigrants at Driffield Terrace. Some barbarian leaders were known to adopt the Roman interests and lifestyle once they were contracted by the Empire (Thompson, 1982) which may account for non-locals with Romano-British burial practices.

Despite the links to the military, and evidence of Danubian culture, none of the individuals from Catterick fall within the proposed Transylvania Basin range. However, five individuals have isotope values that match both the Vale of York (UK) and the Transylvania Basin. The $\delta^{13}C$ values do not reflect C_4 consumption which support British origins. These individuals may reflect a second-generation diaspora or *foederati* population who retained the cultural identity of their homeland. Individual SK37 from the Railway site in York was found to have low $\delta^{18}O$ isotope values consistent with continental climates and had isotope values within the proposed isotope range for the Transylvania Basin (Leach *et al.*, 2009). Four individuals from Scorton (SK 5, 6, 7, 10) match the proposed isotopic range for the Transylvania Basin supporting continental Europe as a possible place of origin proposed by Eckardt and colleagues (2015). SK2 from Scorton also had oxygen values within the proposed Transylvania range ($\delta^{18}O_{VSMOW}$ 23.9 ‰) but was not included in the plot because the strontium isotope analysis for this individual failed (Eckardt *et al.*, 2015). Additionally, five of the nine individuals from Lankhills (Sk 63, 81, 322, 351, 426) with “exotic” burials have childhood isotopes similar to the proposed range for the Transylvania Basin, supporting Eastern Europe as a possible region of origin. Of the 23 individuals, 19 (70%) were adult males, which supports the link possible link to the Roman Military (*foederati*).

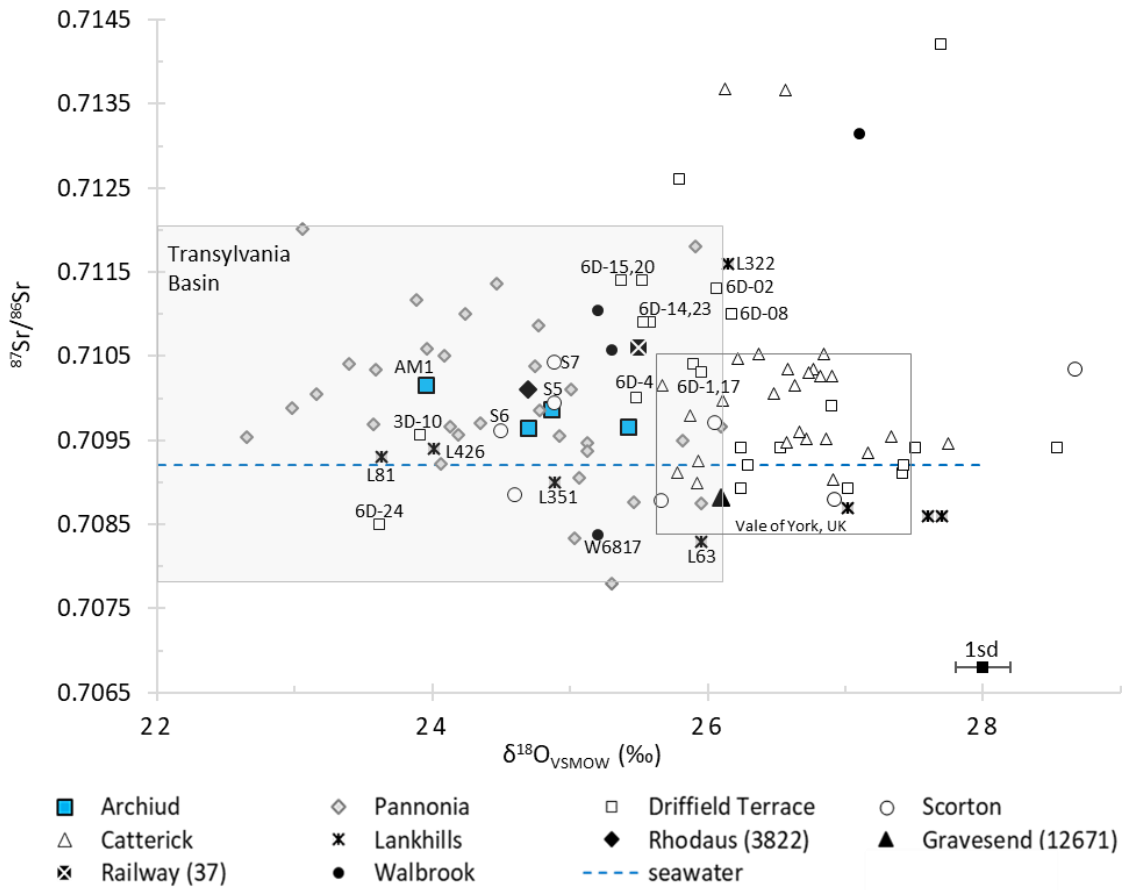

Figure 2. The Archiud individuals plotted with Hungarian sites of similar geology and latitude (Hakenbeck et al., 2017), the individuals from 3 and 6 Driffield Terrace (Montgomery et al., 2011; Müldner et al., 2011), and the individuals from England (Evans et al., 2006; Leach et al., 2009; Chenery et al., 2011; Pollard et al., 2011; Eckardt et al., 2015; Helm, 2017; Montgomery et al., 2017). The shaded area designates the proposed local range for the Transylvania Basin and the open box represents the proposed local range for the Vale of York, UK (Müldner et al., 2011).

Elevated $\delta^{13}C$ values consistent with childhood consumption of C_4 resources were also reported at Romano-British sites. As previously mentioned, millet was present in Britain after the expansion of the Roman Empire but there is no evidence that it was present in sufficient quantities in Britain to be visible in animal or human $\delta^{13}C$ values (van der Veen *et al.*, 2008; Müldner, 2013). Four individuals from Driffield Terrace (6DRIF-1, 6DRIF-9, 3DRIF-35, 3DRIF-10) had $\delta^{13}C$ values which suggest a mixed diet of C_3/C_4 resources during childhood (Müldner *et al.*, 2011). Individual 6DRIF-1 had childhood isotopes which match the Vale of York and the proposed Transylvania isotope range however the possible mixed C_3/C_4 diet suggests continental origins. Individuals SK1 and SK2 from Scorton had elevated $\delta^{13}C_{dentine}$ values (–16.9‰) suggesting possible C_4 consumption which supports Central/Eastern Europe as a possible region of origin (Eckardt *et al.*, 2015). Individuals 6810 and 6840 from Walbrook Stream are believed to be consistent with origins in urban south–eastern Britain as they have high lead levels (Montgomery *et al.*, 2017) and whilst they do fall within the proposed Transylvania range the lack of evidence for C_4 consumption suggests Transylvania is not their homeland. In contrast, SK6817 was consuming C_4 plants during childhood and had unusually high enamel strontium concentrations (c. 250 ppm) for humans from southern Britain which supports Central/Eastern Europe as a possible region of origin (Montgomery *et al.*, 2017). SK12671 from Gravesend fell within the isotope range for the Vale of York and just on the margin of the proposed Transylvania Basin isotope range. It is possible this individual was from Britain, however, the elevated $\delta^{13}C$ values from significant C_4 resources ($\delta^{13}C_{enamel}$ –7.2‰) may be indicative of other Mediterranean regions with similar climate and geology (e.g. Northern Italy) (Pollard *et al.*, 2011). Killgrove and Tykot (2013) found that individuals living outside the walls of Rome (*suburbium*) consumed more millet than those inside the walls. Historical data also reports that millet was used as a supplemental "famine–food" in Eastern Europe (Thompson, 1982), which suggests that socioeconomic status may have influenced the use of millet. Evidence of millet consumption in Romania dates to the Neolithic (Istv, 1990), and is consistent with the $\delta^{15}N$ and $\delta^{13}C$ results from collagen and the $\delta^{13}C$ from enamel (Table 2) from the Archiud individuals (Crowder *et al.*, 2019), further supporting the possibility of Eastern European lowlands as a place of origin for these individuals.

Roman diaspora populations (dispersal either voluntary or by force) were typically permitted to retain the social and spiritual cultural identities of their homelands (Eckardt, 2010). Differences in burial inclusions can help to identify possible incomers to a burial population. The "route of the Goths" was used by the Empire for trade and military between the lower Danube River and the northern shore of the Black Sea, and has been attributed with the spread of the Black Sea culture/fashions across the Roman Empire (Bursche, 2008). Cross-bow brooches and fibulae matching the Rhine Valley and Danubian (Carpathian Basin) typologies associated with barbarian groups have been found at Late Roman sites in Jordan (Eger, 2014) and Serbia (Petkovic, 2011). The cross-bow fibula are believed to be associated with those in service to the Roman Empire (*foederati)* and also acted as status symbols for elites outside the territory of the Roman Empire (Diaconescu, 1999: pg 203-217; Petkovic, 2011: pg 123). Similar burial artefacts have been found at late Roman sites in Britain. Artefacts in the graves of SK6 and SK7 at Scorton help to identify these individuals as 'incomers' to Britain (Eckardt *et al.*, 2015). Dress accessories buried with individual 7 (Figure 3) match typologies found in Danubian provinces dating to the 3rd-4th Cent. AD (Eger, 2014). Both SK6 and SK7 had childhood isotope very similar to the individuals from Archiud indicating these individuals originated from a region near Archiud or a similar region in the Eastern European lowlands.

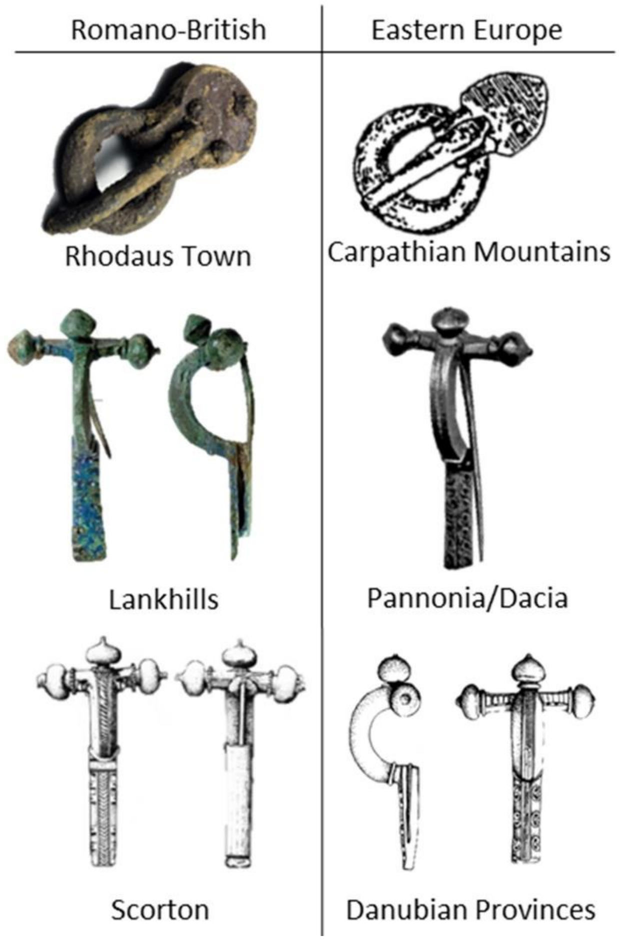

Figure 3. Burial artefacts found in Romano-British "exotic" burials (left) and analogous cultural typologies from burial artefacts in the Carpathian Mountain regions of Eastern Europe (right) (Tejral, 2000; Booth et al., 2010; Petkovic, 2011; Eger, 2014; Eckardt et al., 2015; Helm, 2017).

Additional "exotic" burials have been identified from Roman Britain providing links to the Eastern borders of the Empire. Several individuals at the Lankhills (Booth *et al.*, 2010) were buried with onion-headed cross-bow brooches (Figure 3) analogous with those worn by army and/or barbarians bound by *foedus* to the Roman Empire in Dacia and Moesia during the 4th and 5th Cent AD (Petkovic, 2011). The similarities in the craftsmanship and individuals with isotopes matching the proposed Transylvania range strongly support origins from the Eastern European lowlands. The strontium and oxygen isotope ratios of SK3822 (Rhodaus) also plot closely with the Archiud individuals and had a childhood diet consisting of significant C_4 resources ($\delta^{13}C_{enamel}$ –8.7‰). SK3822 was buried with a pair of silver buckles (Helm *et al.*, 2017) matching the Black Sea styles (Figure 3). The buckles bare strong similarities to the late stages of the Sîntana de Mureş-Chernyajchovo culture associated with the Archiud cemetery, north-western Transylvania and the nearby Carpathian basin (Tejral, 2000). Although origins cannot be assigned using isotopes alone, the direct cultural links to the Archiud cemetery strongly indicate Transylvania or the Carpathian basin as a possible region of origin for SK3822 from Rhodaus Town.

Combining historical, archaeological, and isotopic data helps to narrow the possible region(s) these individuals originated. Due to the fact that strontium and oxygen isotopes can only exclude, not identify, geographic origins, they cannot identify with certainty the geographic origins of the seven "headless Romans" and 17 non–British individuals or say conclusively that they were from the Transylvania Basin. However, if it is clear that the Transylvania Basin cannot be ruled out as a potential homeland and that if they had origins elsewhere it was nonetheless a region of similar climate, geology and latitude (e.g. Central/Eastern European low lands). The possible connection between these individuals and Roman *foederati* is supported given that 70% (19 of 23) of the non-local Romano-British individuals were young/middle adult males.

4. Conclusions

The four individuals from the Archiud cemetery fall within the proposed conservative local isotope ranges of the Transylvania Basin ($^{87}Sr/^{86}Sr$: 0.7078 to 0.7120, $\delta^{18}O_{VSMOW}$: 21.9 to 26.1‰). Seven of the "headless Romans" and 17 additional non–locals from Roman Britain had isotopic values that indicate a place of origin with geology and climate/latitude similar to the Transylvania Basin. The results of this research help to contextualise mobility studies within the Carpathian Mountain basin of Transylvania, Europe and Britain but further work is required to further characterise this important region of Europe.

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