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Identifying migrants in Roman London using lead and strontium stable isotopes

1.0 Introduction

The conquest of Britain by Rome in 43AD initiated the integration of this small territory on the edge of the known Roman world into a vast Empire, whose dominions included much of Europe, the Middle East and North Africa (Mattingly, 2006). Primary sources and archaeological evidence reveal that because of military, slavery and other mercantile activities, many people lived and worked in multiple provinces during their lifetime (Adams and Laurence, 2001; George 2013). In recent years, stable isotope analysis has been used to independently establish the presence of these people and their likely place of origin. These analyses have not only added value to the epigraphic and archaeological evidence, but also enabled scholarship to gain new perspectives on the construction of identity in the funerary record (Cool, 2010a; Eckardt, 2010, Eckardt, et al., 2014; Pearce, 2010).

In Britain, this integrated approach has reinvigorated Roman studies, with new results showing that migrants, whether free or enslaved, lived in urban and rural settlements from the earliest phases of the conquest. Such findings have fundamentally altered our understanding of post-conquest changes in burial practices in addition to underlining the important role that migrants had on the nature and make-up of settlements and communities during this period (Cool, 2010a; Eckardt, et al., 2010, 2014; Pearce, 2010). London (*Londinium*) is ideally placed to investigate these changes, because it was founded in an area without an existing indigenous settlement, and established itself from the outset as the economic hub of the province (Marsden, 1986; Perring, 1991). The primary source evidence and wealth of archaeological and inscription data excavated from the City shows that it was inhabited by people from France, Germany, the Mediterranean and North Africa (Mattingly, 2011; Millett, 1996a, 1996b, 1998). To date, there have only been a limited number of small-scale isotope analysis studies for individuals recovered from Londinium to corroborate this. This study, therefore, represents the first to examine population mobility using strontium and lead stable isotopes from individuals buried in its cemeteries. Twenty individuals were selected, whose burial dates span the beginning and decline of *Londinium* (1^{st} to 5^{th} centuries AD) in order to investigate temporal trends in population origins and the extent to which these trends were expressed in the funerary record, particularly in reference to the model designed by Eckardt, et al. (2014).

1.1 Roman London

There is no pre-Conquest evidence for an indigenous settlement in the location of the City and Greater London area. Rather, archaeological excavations have found evidence for the ritual use of the landscape and River Thames, and some isolated late Iron Age farmsteads. Therefore, it has been suggested that the area was not formally part of a tribal territory

(Marsden, 1986; Sidell, 2008). Recent discoveries have shown that the settlement of *Londinium* was established in c. 48 AD (Hill and Rowsome, 2011). The main settlement was situated on the north bank of the River Thames, but a suburb developed on the south bank, linked by a river crossing at the lowest bridgeable point. Both of these areas were well placed for connecting land, river and sea traffic (Brigham, 1996) and the degree of organization and forethought in the early city planning demonstrates military involvement in the construction of *Londinium*. Archaeological and primary source evidence indicates that from the outset, the growing urban centre functioned primarily as a planned, but unofficial, trading hub (Rowsome, 1996; Wallace, 2010).

The settlement's archaeological record can be divided into five phases, defined by the undulating pattern of growth and decline of the City and reflecting the volatile nature of the Roman Empire during this time. Archaeological evidence from the first phase (Phase I: 48-60 AD) emphasises the mercantile nature of the settlement and the presence of migrant inhabitants, as evidenced by the many houses that had shop-fronts, as well as the number of foodstuffs and material culture that were imported from Europe, particularly the southern and eastern Mediterranean. This evidence confirms the writings of Tacitus, who described the settlement as bustling with traders and a centre of commerce by 60 AD. It was also during this first phase that much of London was burnt and destroyed during the Boudican revolt of 60 AD (Marsden, 1986; Hill and Rowsome, 2011; Wallace, 2010).

After the rebellion (Phase II: 61-200 AD), a programme of major public building work (i.e. a port) was begun and the settlement was rebuilt. Evidence shows that the military were responsible for much of the construction work, as evidenced by timber recovered from the quayside that was stamped 'TRAECAVG', indicating the involvement of a Thracian unit (Bulgaria) (Millett, 1996a, 1996b). By 100 AD, the administrative centre of the province (*Britannia*) had shifted from the original capital at Colchester to *Londinium*, making it the base for Imperial and military activities (Marsden, 1986).

The third phase of the settlement (Phase III: 200-285 AD) marks a period of decline, and in some areas abandonment. This decline was a result of wider-political unrest in the Empire, which eventually led to the secession of Britain and Gaul, which together created the Gallic Empire (259-74 AD), before being reunited with the Roman Empire. Despite brief periods of reprieve, the pattern of decline and abandonment continued from this point until the end of the Roman occupation in Britain in 410 AD.

The continued political problems of the Empire eventually led to another secession of *Britannia* from the Empire from 286-296 AD (Phase IV). As before, the Imperial army was sent back to the province to reunite it with the rest of the Empire, and this resulted in a brief period of renewed Imperial interest in the settlement. It is clear, though, from the number of buildings being purposefully deconstructed during the early part of the 4th century, that interest from Rome was only ephemeral and quickly shifted elsewhere (Perring, 1991).

During the last phase (Phase V: DATES), *Londinium* was given the honorary title of '*Augusta*' in the mid-4th century, and remained the financial hub and administrative centre of

Britannia. Furthermore, archaeological evidence shows that despite significant decline and abandonment, it was still a wealthy settlement. Around A.D. 367, *Britannia* again became a central focus of the Empire due to invading barbarous tribes. Controlling these incursions required the intervention of the Roman military, which heralded a brief period of revitalisation for *Londinium* (Perring, 1991). Very soon afterwards though, the gaze of Rome again shifted elsewhere to Gaul and the east, never to return (Sheppard 1998).

In 410 AD, Roman rule ended in *Britainnia* with the formal withdrawal of the military. In *Londinium*, only the walled settlement on the north bank continued to be occupied, but it seems that only the southeastern area was inhabited and there is evidence for continued wealth, as luxury imports from the Continent have been discovered (Marsden, 1986; Mattingly, 2006; Millett, 1996a, 1996b; Perring, 1991).

1.1.1 The people of Roman London

From its inception, *Londinium* was created and inhabited by people from across the Empire: military and civilian, enslaved and free, local and foreign. Compared to other locales in Britain, *Londinium* has a wealth of epigraphic evidence that provides unique information about the geographic origins of its people. These refer to serving soldiers and army veterans, a sailor, a Galerian Tribe (Spain) member, merchants from Antioch (Turkey) and Athens (Greece). There is also evidence from stable isotope analyses, inscriptions, and recovered material culture for connections to North Africa (Holder, 2007; Millard et al., 2013; Swan, 1993; Wheeler, 1928).

The importance of the settlement as a centre of commerce and administration is also documented in the inscription evidence. An incomplete inscription by *Tiberinius Celerianus,* which dates from the 160s AD, identifies him as being a Roman citizen from northern France and as a *moritix,* a Celtic word for seafarer. A new interpretation of the inscription suggests that he acted as a representative for a collective of Gallic commercial travellers (Dondin-Payre and Loriot, 2008). There also exists a writing tablet requesting the quick sale of a Gaulish slave girl called *Fortunata* – 'Lucky' (Tomlin, 1993). Other examples include the *procurator* Julius Classicianus who is suggested to have been from *Gallia Belgica* near Trier; and Lucius Pompeius Licetus Da(…) from *Arretium* (Pearce, 2010). It is clear from the above that the populace of *Londinium* represented communities from a variety of different geographic areas of the Empire.

Until this present study, isotope analysis-based mobility data for individuals from *Londinium* was sparse. Three small-scale studies identified migrants from North Africa, Europe and other locales in Britain (Budd, no date; Millard, et al., 2013; Montgomery, et al., 2010) using varied combinations of strontium, oxygen, and lead isotope analyses. Eckardt et al. (2010, 2014), Müldner (2013) and Pollard et al. (2011) have also applied dietary isotopes as indicators of mobility elsewhere in Roman Britain. The identification of migrants using dietary isotopes is based on the presence δ Carbon 4 signature plants, such as millet, a cereal eaten by Mediterranean populations (Cool, 2006; van der Veen, et al., 2008). In *Londinium* one person with this dietary signature has been identified (L.Bell, pers.comm; Spurr, 1983).

Additionally, using these same dietary isotopes to identify breastfeeding and weaning practices in *Londinium*, Powell et al. (2014) observed considerable diversity in the female dietary results and have suggested that this may be reflecting differences related to the migrant-status of certain female individuals.

1.2 Using lead and strontium to track mobility in Roman Britain

The use of isotopes in archaeological studies is based on the premise that humans tend to incorporate isotopic compositions that correspond to those of locally sourced resources (Schwarez et al. 2010, 337). Strontium and oxygen isotopes have long been used to identify non-locals based on geological and climatic differences during childhood (Evans et al. 2006a; Evans et al. 2006b; Budd et al. 2004a). However, due to the rise in the anthropogenic use of lead during the Roman period, lead isotope analyses, coupled with strontium isotope analyses, provide a unique opportunity for tracing migration during this period (Montgomery 2002). The rise in anthropogenic lead exposure in Roman Britain is acknowledged as a significant post-Conquest change (Boulakia, 1972; Montgomery, et al., 2010). In the Roman world, the industrial uses of the metal were multiple including plumbing, cooking, dyeing, cosmetics, tableware and coffins (Boulakia, 1972; Durali-Müller, 2005). Its widespread use in the province can be explained by the natural occurrence of the ore in the north and southwest of Britain (Boulakia, 1972).

The increased use of lead in Roman Britain provides a unique investigative tool with which to identify people from this period. In pre-metallurgic societies the lead in the skeleton will reflect the geology from which the lead originated and is present only in small concentrations (c. 0.5 ppm) (Millard, et al., 2014; Montgomery, 2002; Montgomery, et al., 2010). In contrast, in metallurgic societies such as Roman Britain, the naturally occurring lead in the body can become 'swamped' by anthropogenic sources of lead ore, resulting in higher concentrations and a narrower range of isotope ratios (Budd, et al., 2004a). Montgomery et al. (2005) use the term 'cultural focusing' to describe the unique applicability of lead to the study of migration (see also Montgomery 2002; Montgomery et al.; 2010). Cultural focusing refers to the increase in a population's lead burden and the convergence of isotope ratios toward the average signature of a region's ore field (Montgomery et al.; 2010:212). The idea behind this concept is that the use of lead and access to lead ore sources will differ between cultural groups, which will consequently affect the level and isotopic composition of lead exposure for a given group.

Strontium stable isotope studies have also been used to identify migrants in Roman Britain (Chenery, et al., 2010, 2011; Eckardt, et al., 2009, 2014; Evans, et al., 2010; Montgomery, et al., 2011). However, as these and other studies have shown, because of similar geological terrains in both Britain and northern Europe, British biosphere strontium isotope ratios are not sufficiently unique to differentiate between individuals local to Britain and those from the Continent (Budd, et al., 2004b). However, a comparison of strontium and lead isotope ratios may aid in the interpretation of the data.

2.0 Materials and methods

2.1 Human remains

Twenty individuals were selected by the Museum of London to appear in its new Roman gallery, with their osteobiographies guiding visitors through the display. As the sample was chosen to reflect the temporal span of *Londinium*'s history and the gallery's content, it had to include both sexes, all ages, and individuals who spanned all five phases of the settlement. Other considerations included in the sample selection were individuals regarded as unique due to the mode of burial or grave inclusions, as they were central to gallery content (Table 2) (Fig. 1).

The individuals were recorded using the Wellcome Osteological Research Database (WORD) (Powers, 2012). Age-at-death was determined in subadults (≤ 18 years old) using dental eruption and development, long-bone length, and epiphyseal fusion (Scheuer and Black, 2000). In adults (≥ 18 years old), dental wear (Brothwell, 1981), degenerative changes at the sternal rib end (İşçan and Loth, 1986a, 1986b), the auricular surface and pubic symphyseal face (Brooks and Suchey, 1990; Lovejoy, et al., 1985) were employed. Sex determination was limited to those ≥ 18 years old, and was based on morphological differences in the skull and pelvis (Buikstra and Ubelaker, 1994).

The preferred material for analysis of lead and strontium isotopes in archaeological skeletal material is enamel. Tooth enamel is optimal for these analyses, as once formed, the enamel is not remodelled, and therefore represents snap shots of the averaged strontium and lead isotopes incorporated during the mineralization process in childhood (Budd et al., 2000). Importantly, core enamel has shown to be resistant to diagenetic alteration for both lead and strontium isotopes, whereas bone and dentine have not (Chiaradia, et al., 2003; Hoppe, 2004; Trickett, et al., 2003). Furthermore, because teeth form at known ages, it is possible to select teeth in order to examine a particular stage of childhood (Montgomery, 2010). Dental enamel samples were taken from the canine (6 months to 5 years old), first (1.5-6 years old) and second premolars (3-7 years old), first (birth to 3 years old) and second (3 to 7 years old) molars (Smith, 1991). Ante-mortem tooth loss and dental wear prevented the selection of the same tooth across the sample (Table 2).

2.2 Stable isotope analysis

In the context of this study, the lead isotope results of local individuals should fall within the lead isotope ratios ($^{207}Pb/^{206}Pb$ as 0.845-0.849) and concentrations ($^{207}Pb/^{206}Pb$ as 0.24-30ppm) defined for Roman Britain (Millard et al., 2014; Montgomery, et al., 2010). With regard to strontium isotopes, we employ the term 'local' to individuals whose results fall within the biosphere strontium isotope range defined by Evans et al. (2010) for London (see Table 1). An individual will be regarded as local to Britain if they fall within the range of strontium isotope values and concentration determined by Evans et al. (2012); results will also be compared to expected strontium concentrations from Britain (Table 1). People originating from outside of Britain will be identified based on their non-conformity to isotope ranges defined for both London and Britain.

2.2.1 Sample preparation

The methods employed have been tested in multiple studies and have shown to successfully prevent contamination and remove potentially diagenetic material (Budd, et al., 2000; Evans, et al., 2006a, 2006b; Montgomery, 2002). Each tooth crown was abraded from the surface to a depth of approximately 100µm using a tungsten carbide dental bur and prepared using the methodology described by Montgomery (2002). Discoloured, carious, cracked or damaged areas of the enamel were avoided. A slice of dental enamel was removed from the tooth wall longitudinally from the cusp to the cemento-enamel junction and to the depth of the enamel-dentine junction using a flexible diamond-edged rotary dental saw; masses ranged from 22-73 mg. All dentine tools were ultrasconicated in Decon® and rinsed thrice between samples to avoid cross contamination. All samples were free of adhering dentine.

2.2.2 Isotope measurement

The enamel samples for lead (Pb) isotope analysis were measured by a Nu Industries Nu Plasma MC-ICP-MS (multicollector inductively coupled plasma mass spectrometer) and introduced to the instrument via an ESI 50ul/min PFA micro-concentric nebulizer attached to a desolvating unit (Nu DSN 100). The precision and accuracy of the machine was assessed through repeat analysis of a 5ppb NBS981 Pb standard solution spiked with T1. The values were then compared to the known values for this standard (Thirlwall, 2002). The reproducibility of the NBS981 for each isotope is as follows: ^{206}Pb/ 204Pb ± 0.010; ^{207}Pb/^{204}Pb ±0.017; ^{208}Pb/^{204}Pb±0.020; ^{207}Pb/^{206}Pb ± 0.010; ^{208}Pb/^{206}Pb±0.012.

Strontium was collected using Dowex resin columns. Strontium isotope ratios and concentrations were determined by Thermal Ionisation Mass Spectrometry (TIMS) using a Thermo Triton multi-collector mass spectrometer. The prepared samples were loaded onto a single Re filament following the method of Birck (1986). The international standard for ^{87}Sr/^{86}Sr, NBS987, gave a value of 0.710250±0.000006 (n=8, 2s) during the analysis of these samples. Blank values were in the region of 100pg.

3.0 Results

3.1 Lead stable isotope values

The lead isotope results are presented in Table 3. The isotopic ranges are 0.843-0.852 (^{207}Pb/^{206}Pb) and 2.081-2.092 (^{208}Pb/^{206}Pb). All of the sampled individuals fall within the lead concentration range expected for Roman Britain, although one adult male from LOW88 (803.6) does fall at the lower limit of the concentration (Fig. 2). Figure 2 indicates that although there is some diversity in the results, the majority of the individuals fall within the area defined by the stable isotope ratios of humans from southern Britain who have been identified as ‘culturally focused’. This creates a distinct cluster of individuals between 0.24-4.41 ppm. However, six individuals had results which fall outside of this area: four adult males (LOW 88 sks 695.5 and 803.6, SRP98 sk 34245, HOO88 sk 652), one adult female (GDV96 sk 325) and an 8 year old (BGB98 sk 400). One of the adult males (SRP98 34245) and the subadult are distinct outliers from both groups. This group of individuals represents adults and subadults, males and females, but also all phases, as identified in section 1.1, of *Londinium's* history.

3.2 Strontium stable isotope values

The results of both the strontium concentrations and the isotope ratios are presented in Table 4. The total isotopic range for this sample population is 0.70828-0.71236. The mean for the 20 samples is 0.70961±0.000006, with the majority of the individuals falling within the 0.70900-0.71000 range. Strontium concentrations range from 46-268 ppm, with a mean value of 113±0.1 ppm. The majority of results fall between 50-161ppm, with only one adult male (SRP98 34245) having a higher concentration at 268 ± 0.1 ppm (Fig. 5).

There appears to be a notable correlation between the strontium isotope ratios and the corresponding strontium concentration values (r2 value), suggesting that they are from the same or similar ‘culturally focused’ group (Table 4). The individuals who fall outside of this main cluster share similar concentration values to the group, but differ in their strontium ratios (except adult male SRP98 sk 34245). Four individuals, two males (LOW88 sk 803.6, COT88 sk 30), an adult female (MSL87 sk 390) and the eight year old (BGB98 sk 400), all have values outside of the London area. One adult male (SRP98 sk 34245) has a ratio value suggesting that he was not local to Britain, but perhaps from an arid limestone region.

4.0 Discussion

4.1 Comparison with data from Roman Britain and Italy

Data published for elsewhere in Roman Britain and Rome were compared to the *Londinium* data (Table 5). When the data are pooled it is evident that the majority of samples from Roman Britain, including those from *Londinium*, fall well within the boundaries of English lead ore (Fig. 7). The outliers are the adult males from Driffield Terrace, whose origins are most likely to be from the Mediterranean (Montgomery et al., 2011), and the three individuals from Rome whose isotopes fall above the British samples (Montgomery et al., 2010). One male (SRP98 sk 34245) and one female (GDV96 sk 325) from the *Londinium* sample plot in the area defined by the three people from Rome, suggesting that they may have originated from that locale.

Figure 8, with the ‘cultural focussing’ isotope range for Roman Britain and *Londinium* shown, demonstrates that three individuals, two adult males (LOW88 sk 695.5, SRP98 sk 34245) and a subadult (BGB98 sk 400) were non-local to Roman Britain. The majority of the samples from Roman Britain fall within the culturally focussed $^{207}Pb/^{206}Pb$ range including, notably, the samples from Rome. Interestingly, there is greater variety in the range for strontium isotopes with the *Londinium* samples, for the most part, falling within the defined range for London and for southern Britain. The samples from Rome also fall within the British isotope value range, but their strontium concentration values are more variable than the British samples; notably the non-local adult male (SRP98 sk 34245) falls within the same range as the samples sourced from Rome.

However, four people have isotope ratios that plot within Britain, but not within London. The adult male from Cotts House (COT88 sk30) plotted below the London ratio range at 0.70828, but this value would be consistent with strontium ratios from Cretaceous chalk deposits outside of the London area in southeast England, and is most similar to the ratios reported from Lankhills, Winchester (Table 5) (Evans, et al., 2006a, 2012). Three individuals have strontium isotope ratios above those found in the London area. The strontium isotope ratio for the adult female from Mansell Street (MSL87 sk 390), suggests that she was raised in southwest Britain, Wales or Scotland, alternatively, she may have originated from the Continent. One adult male from London Wall (LOW88 sk 803.6) has a strontium ratio that also suggests a childhood spent in the southwest of Britain or the Continent (Evans, et al., 2010, 2012). The 8-year-old (BGB98 sk 400) has strontium and lead isotope ratios that suggest that they came from Scotland or the Continent, with the latter being most likely within a Roman context.

4.2 Geographic origins and cultural affinity

The geographic origins of an individual are not necessarily reflective of a person's cultural affinity. Traditionally, the cultural affinity of an individual is interpreted through the study of the person's grave goods, burial practices, and other material evidence. However, recent studies of the associations between identity and grave-good provisioning has overwhelming found that the cultural construction of identity is not always a true reflection of where a person spent their childhood; instead these data provide a more nuanced perspective on how funerary identities were created and displayed in Roman Britain (Cool, 2010a; Eckardt, 2010; Eckardt, et al., 2009, 2014; Pearce, 2010). Based on their comprehensive analysis of such burials in Roman Britain, Eckardt and colleagues (2014) have devised four groupings which we employ in our discussion: those where both burial rite/grave goods and isotopes suggest a foreign origin, those that appear local archaeologically but are foreign isotopically, those that appear foreign archaeologically but are probably local isotopically, and those that appear to be both local archaeologically and isotopically.

4.2.1 Burial rite/grave goods and isotopes suggest a foreign origin

For many individuals in late Roman Britain, the adoption of Germanic personal ornamentation was a cultural choice rather than one informed by childhood residency, whereby people were affiliating themselves with this community through their familial connections, or because of other social relationships, such as the military (Cool 2010a, 2010b; Eckardt et al., 2014). Two of the *Londinium* sample set were late Roman individuals from Mansell Street (MSL87) who were interred with items traditionally associated with Germanic origins (Pearce, 2010, 2011, 2013). One of these individuals, a 36-45 year old female (MSL87 sk 390), was buried with large disc-like prominent brooches (*tutulus*), used to fix clothing, and a composite triangular antler comb (Barber and Bowsher, 2000). This is a unique burial in Roman London, and in combination with her stable isotope results, strongly suggests that she had actually originated from that province, and worn the brooches to signify that relationship. Analysis of her dietary isotopes indicates a non-local diet (δ^{15}N 8.75, δ^{13}C -20.08), and suggests that she had migrated to *Londinium* shortly before her death (Powell, et al., 2014).

The second individual is the 8-year-old from Bishopsgate (BGB98 sk 400). The isotope ratios suggest that this individual came from either Scotland or the Continent. Additionally, the individual's funerary evidence hints at Mediterranean connections, but not unequivocally so. The subadult had been laid on a bed of chalk-like material in a wooden coffin, with three bronze bracelets and a piece of wire chain placed next to the right ankle (Swift, 2003) (Table 2). The use of wooden coffins and the inclusion of bronze bracelets are often found in subadult and young adult female burials in *Londinium* and elsewhere in Roman Britain, such as Colchester (Barber and Bowsher, 2000; Gowland, 2001; Hamlin, 2007; Pearce, 2011; Swift, 2003). The grave-goods for this individual, therefore, do not strongly suggest a foreign origin when compared to other individuals from Roman London buried with foreign-style burial goods, such as the Spitalfields Lady whose high-status burial contained the only example of a glass phial found north of the Alps (Swain and Roberts, 1999). Nevertheless, Brettell et al.'s (in review) recent examination of burials containing chalk/chalk-like material in *Londinium* and Romano-British burials, has found that many individuals buried in lead coffins or in chalk/chalk-like substances had been embalmed with imported exotic resins. Archaeological and primary source evidence from the Mediterranean, indicates that the use of chalk and/or embalming was a high-status funerary rite, which appears to have originated in North Africa (Brettell, 2013, 2014; Pearce, 2013). Analysis of this subadult failed to find evidence for resins, but it is possible that because the individual was not buried in a stone or lead coffin, the resins may have been destroyed in the burial environment- unlike the imported ones identified in burial of Spitalfields Roman Woman (Brettell, 2013). Consequentially, although the grave goods do not unambiguously point to a foreign origin, the treatment of their body after death may do so (Pearce, 2013).

The evidence for childhood migration to *Londinium* from the Mediterranean is not unknown and has been identified in a cemetery from a suburb in southern *Londinium* (Millard, et al., 2013).There is also increasing evidence for child migrants elsewhere in Roman-Britain, most notably at Vindolanda (Northumberland) (Vindolanda Charitable Trust, 2010; BBC News, 2012) and potentially at Poundbury Camp (Dorset) (Richards, et al., 1998).

The burial of the older adult male (SRP98 sk 34245) from Rome who died between 270-350 AD, shows similar affinities to possible Mediterranean practices suggested by the subadult's burial. The male was buried in a wooden coffin on a bed of chalk/chalk-like substance and was accompanied by five pottery vessels (McKenzie and Thomas, in prep) (Table 2). However it was also negative for resins, again likely because they were not buried in a lead/stone coffin (Brettell, 2013). His presence in *Londinium* supports the epigraphic and material culture evidence for migrants from Rome.

4.2.2 Local archaeologically but are foreign isotopically

One individual in our sample fulfils this criterion: the 2nd century burial of an 18-25 year old female (GDV96 sk 325), interred with a blue glass counter, a hobnail shoe placed on the left side of her pelvis, and with a pre-term infant (28 weeks old) by her right foot (Table 2). No aDNA has been undertaken to establish whether these individuals represent a mother and her infant. Her dietary isotope results ($\delta^{15}N$ 11.45, $\delta^{13}C$ -19.80) show that she had been consuming a local diet (Powell, et al., 2014), suggesting that she had lived in *Londinium* for at least five years prior to her death. The reasons concerning how and why she came to die in *Londinium* are manifold and her story is open to conjecture. The presence of an infant may indicate a fatal premature delivery by the female (Kelmar, et al., 1995), but because of the unusual funerary practices afforded to the youngest age-groups in Roman Britain, this cannot be stated for certain (Gowland, et al., 2014).

4.2.3 Appear foreign archaeologically but are probably local isotopically

The only individual in our sample conforming to this definition is the other individual from *Londinium* (MSL87 sk 163) buried with Germanic grave-goods. MSL87 sk 163 is a male, greater than 46 years of age, who was buried in a wooden coffin and accompanied by a crossbow brooch, belt buckle and other items (Barber and Bowsher, 2000) (Table 2). The belt buckle is chip-carved and appears to be placed by his hand rather than worn (Barber and Bowsher, 2000). The brooch and belt are very distinctive items, crossbow brooches were used to fasten heavy outer garments at the shoulder, and are considered to have formed part of the uniform of a fourth century soldier or state official who had achieved a certain rank. The distribution of these brooch types is biased towards military zones but they have also been found in the burials of women and children (Collins, 2010), though not necessarily worn (Gowland 2002). They are believed to indicate a high social status and may suggest that the wearer spent a period of time in Imperial service, such as a military officer, or were family members of such individuals (Collins, 2010, 2013). At Lankhills Roman cemetery Gowland (2001) found a correlation between belt-sets and older males, indicating that the status was one likely to have been achieved during life, rather than ascribed at birth. The belt buckle was synonymous with Roman soldiers, with primary sources remarking that it enabled them to be identified as a distinctive social group when not dressed in full-armour (Hoss, 2011a, 2011b). Like the brooch, the chip-carved style is considered to have Germanic military connections, and the wearing of belts by veterans may reflect an honourable discharge (Hoss, 2011b). Therefore, it is very interesting that in this instance, because the belt is unworn, it suggests cultural or ancestral connections to Germany and the military, rather than as a place of origin (Barber and Bowsher, 2000; Cool, 2010b; Pearce, 2010; see also, Eckardt, et al., 2014).

4.2.4 Local both archaeologically and isotopically

Thirteen individuals in this study had both isotope ratios and burial goods consistent with a *Londinium* origin, including the high status 18-25 year old female (BAR79 sk 182) who was buried with jewellery and a miniature bronze bell; her burial is unparalleled in Roman

London (Table 2). The burials for the other twelve individuals, however, varied considerably in terms of the presence/absence of coffins and grave goods (Table 2), reflecting the broad variation in London funerary practices. The grave goods of these individuals were poor compared to BAR79 sk 182 and other cemeteries in Roman-Britain, which is considered by some to reflect a migrant population (Barber and Bowsher, 2000; Hall, 1996). However, for these people, it may well be that they are born-and-bred Londoners, rather than migrants from the local region. In the case of BAR79 sk 182,, the wealth of her burial may represent a dowry as it was common for women to be married from the age of 14 years old Gowland (2001) has demonstrated that women around the age of 18-25 years were more likely to be buried with elaborate grave goods and jewellery in Roman Britain, than older women and it could be that this relates to their dowry (Evans Grubb, 2002; Gowland 2001; Harlow and Laurence, 2002; Martin-Kilcher, 2000; Pearce, 2011; Rawson, 1991).

4.2.5 Unusual burials: 150 London Wall (LOW88)

Two of the individuals in our sample did not fall into the groupings proposed by Eckardt et al. (2014) (Table 2). The two individuals in question had only their skulls recovered and were found in a series of pits in an industrial area outside of the city walls. It has been suggested that these individuals represent the disarticulated remains of people who had died in the arena or been head-hunted by the army (Redfern and Bonney, 2014).

The industrial area was in use for approximately 125 years, and one of the earliest internments (40-100 AD) was a 26-35 year old male who, according to the results of this study, was local to London/Britain (LOW88 sk 803.6). The later internment (125-200 AD) was that of a 36-45 year old (sk 695.5) male proposed to be from southwest Britain or of Continental origin. The stable isotope results are important for the interpretation of this site, adding weight to the possibility that live captured enemies or fleshed trophy heads from were brought for execution or display to *Londinium* by the military in order to emphasize to its inhabitants the power and might of the Emperor and his justice (Redfern and Bonney, 2014).

5.0 Conclusions

In our sample of 20 individuals from *Londinum*, we suggest that six people had migrated from outside of *Londinium*, with eleven people either being born in the town or growing up in the London region, and three individuals with inconclusive results. Our results lend further weight to the results of other isotopic studies addressing origin, cultural identity and funerary practice in Roman Britain, where there is not always a direct connection between these variables (Cool, 2010a; Eckardt, 2010, Eckardt, et al., 2014; Pearce, 2010). The ‘anonymous’ burials of many of these migrants and locals (Table 2) raises a multitude of possibilities regarding how these individuals came to *Londinium*. The data for people coming from Germany, Italy and elsewhere on the Continent does correlate to the inscription evidence from the settlement, and reflects what we know about the presence of the military and Imperial administration in the town. The presence of migrant inhabitants throughout its history ensured that the town was a diverse and unique settlement from its foundation until its eventual abandonment in the fifth century.

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7.0 Bibliography

Adams, C., Laurence, R. (Eds.), 2001. Travel and geography in the Roman Empire. Taylor and Francis, London.

Barber, B., Bowsher, D., 2000. The eastern cemetery of Roman London. Excavations 1983-1990. Museum of London Archaeology Monograph 4, London.

BBC News, 2012. Child skeleton at Vindolanda fort 'from Mediterranean'. BBC News Tyne & Wear. http://www.bbc.co.uk/news/uk-england-tyne-19399441 (Accessed 14/7/14).

Bentley, D., Pritchard, F.A., 1982. The Roman cemetery at St. Bartholomew’s Hospital. Transactions of the London and Middlesex Archaeological Society 33, 134-167.

Birck, J.L., 1986. Precision K, Rb Sr isotopic analysis: application to Rb Sr chronology. Chem Geol 56, 73-83.

Birley, A., 1979. The people of Roman Britain, BT Batsford Ltd, London.

Boulakia, J.D.C., 1972. Lead in the Roman world. Am J Arch 36, 36-64.

Brettell, R., 2013. Report on the evidence for resins in Roman London 1. University of Bradford.

Brettell, R., 2014. Report on the evidence for resins in Roman London 2. University of Bradford.

Brigham, T., 1996. The port of Roman London, in Watson, B., (Ed.), Roman London: recent archaeological work. Including papers given at a seminar held at The Museum of London on 16 November 1996. Journal of Roman Archaeology Supplementary Series 24, pp. 23-34.

Brooks, S., Suchey, J.M., 1990. Skeletal age determination based on the os pubis: a comparison of the Acsádi-Nemeskéri and Suchey-Brooks methods. Hum Evol 5, 227-238.

Brothwell, D.R., 1981. Digging up bones. The excavation, treatment and study of human skeletal remains, 3rd ed. Cornell University Press, New York.

Budd, P., no date. Combined O-, Sr- and Pb-isotope analysis of dental tissues from a Neolithic individual from Shepperton and an Iron Age individual from Southwark, London. Archaeotrace Report No.106.

Budd, P., Montgomery, J., Barreiro, B., Thomas, R.G., 2000. Differential diagenesis of strontium in archaeological human dental tissues. Appl Geochem 15, 687-694.

Budd, P., Montgomery, J., Evans, J., Trickett, M., 2004a. Human lead exposure in England from approximately 5500 BP to the 16th century AD. Sci Total Environ 318, 45-58.

Budd, P., Millard, A., Chenery, C., Lucy, S., Roberts, C., 2004b. Investigating population movement by stable isotope analysis: a report from Britain. Antiquity 78, 127-141.

Buikstra, J.E., Ubelaker, D.H., 1994. Standards for data collection from human skeletal remains. Proceedings of a seminar at the Field Museum of Natural History organized by Jonathan Haas. Arkansas Archaeological Survey Research Series No 44, Arkanas.

Chenery, C., Müldner, G., Eckardt, H., Lewis, M., 2010. Strontium and stable isotope evidence for diet and mobility in Roman Gloucester, UK. J Archaeol Sci 37, 150-163.

Chenery, C., Eckardt, H., Müldner, G., 2011. Cosmopolitian Catterick? Isotopic evidence for population mobility on Rome's northern frontier. J Archaeol Sci 38, 1395-1770.

Chiaradia, M., Gallay, A., Todt, W., 2003. Different contamination styles of prehistoric human teeth at a Swiss necropolis (Sion, Valais) inferred from lead and strontium isotopes. Appl Geochem 18, 353-370.

Collins, R., 2010. Brooch use in the 4th-to 5th-century frontier, in: Collins, R., Allason-Jones, L. (Eds.), Finds from the Frontier: material culture in the 4th-5th centuries. CBA, York, pp. 64-77.

Collins, R., 2013. Soldiers to warriors: renegotiating the Roman frontier in the fifth century, in: Hunter, F., Painter, K. (Eds.), Late Roman Silver: the Traprain Treasure in context. Society of Antiquaries of Scotland, Edinburgh, pp. 29-43.

Cool, H.E.M., 2006. Eating and drinking in Roman Britain. Cambridge University Press, Cambridge.

Cool, H.E.M., 2010a. Finding the foreigners, in: Eckardt, H. (Ed.), Roman diasporas: archaeological approaches to mobility and diversity in the Roman Empire. Journal of Roman Archaeology Supplementary Series 78, pp. 27-44.

Cool, H.E.M., 2010b. A different life, in: Collins, R., Allason-Jones, L. (Eds.), Finds from the Frontier. CBA Research Report, York, pp. 1-9.

Dondin-Payre, M., Loriot, X., 2008. Tiberinius Celerianus à Londres : Bellovaque et moritix. L'Antiquité Classique 77, 127-169.

Durali-Müller, S., 2005. Roman lead and copper mining in Germany: their origin and development through time, deduced from lead and copper isotope provenance studies, PhD thesis, Frankfurt am Main.

Eckardt, H., (Ed.), 2010. Roman diasporas: archaeological approaches to mobility and diversity in the Roman Empire. Journal of Roman Archaeology Supplementary Series 78.

Eckardt, H., Booth, P., Chenery, C., Müldner, G., Evans, J.A., Lamb, A., 2009. Isotopic evidence for mobility at the late Roman cemetery at Lankhills, Winchester. J Archaeol Sci 36, 2816-2825.

Eckardt, H., Chenery, C., Leach, S., Lewis, M., Müldner, G., Nimmo, E., 2010. A long way from home: diaspora communities in Roman Britain, in: Eckardt, H. (Ed.). Journal of Roman Archaeology Supplementary Series 78, pp. 99-130.

Eckardt, H., Müldner, G., Lewis, M., 2014. People on the move in Roman Britain. World Archaeology, DOI 10.1080/00438243.2014.931821.

Evans, J., Stoodley, N., Chenery, C., 2006a. A strontium and oxygen isotope assessment of a possible fourth century immigrant population in a Hampshire cemetery, southern England. J Archaeol Sci 33, 365-372.

Evans, J.A., Chenery, C.A., Fitzpatrick, A.P., 2006b. Bronze Age childhood migration of individuals near Stonehenge, revealed by strontium and oxygen isotope tooth enamel analysis. Archaeometry 48, 309-321.

Evans, J., Montgomery, J., Wildman, G., Boulton, N., 2010. Spatial variations in biosphere 87Sr/86Sr in Britain. J Geol Soc London 167, 1-4.

Evans, J., Chenery, C., Montgomery, J., 2012. A summary of strontium and oxygen isotope variation in archaeological human tooth enamel excavated from Britain. J Anal At Spectrom 27, 754-764.

Evans Grubb, J., 2002. Women and the law in the Roman Empire: a sourcebook on marriage, divorce and widowhood. Routledge, London.

George, M. (Ed.), 2013. Roman slavery and Roman material culture. University of Toronto Press, Toronto.

Gowland, R., 2001. Playing dead: implications of mortuary evidence for the social construction of childhood in Roman Britain, in: Davies, G., Gardner, A., Lockyear, K. (Eds.), TRAC 2000. Proceedings of the Tenth Annual Theoretical Roman Archaeology Conference, London 2000. Oxbow Books, Oxford, pp. 152-168.

Gowland, R. 2002. Age as an Aspect of Social Identity in Fourth to Sixth century England: the Osteological and Funerary Evidence. Unpublished PhD thesis, Durham University.

Gowland, R., Chamberlain, A.T., Redfern, R., 2014. On the brink of being: re-evaluating infanticide and infant burial in Roman Britain, in: Carroll, M., Graham, E.-J. (Eds.), Infant health and death in Roman Italy and beyond. Journal of Roman Archaeology Supplementary Series 96, pp. 69-88.

Hall, J., 1996. The cemeteries of Roman London, in: Bird, J., Hassall, M., Sheldon, H. (Eds.), Interpreting Roman London. Papers in memory of Hugh Chapman. Oxbow Monograph 58, Oxford, pp. 57-84.

Hamlin, C., 2007. Material expression of social change: the mortuary correlates of gender and age in late Pre-Roman Iron Age and Roman Dorset. PhD Thesis, University of Wisconsin-Milwaukee, Milwaukee.

Harlow, M., Laurence, R., 2002. Growing up and growing old in ancient Rome: a life course approach. Routledge, London.

Hill, J., Rowsome, P., 2011. Roman London and the Walbrook stream crossing: excavations at 1 Poultry and vicinity, City of London. Museum of London, London.

Holder, N., 2007. Mapping the Roman Inscriptions of London. Britannia 38, 13-34.

Hoppe, K.A., 2004. Late Pleistocene mammoth herd structure, migration patterns, and Clovis hunting strategies inferred from isotopic analyses of multiple death assemblages. Paleobiology 30, 1, 129-145.

Hoss, S., 2011a. A theoretical approach to Roman military belts, in: Sanader, M., Rendić-Miočević, A., Tončinić, D., Radman-Livaja, I. (Eds.), Proceedings of the XVIIth Roman Military Equipment Conference: weapons and military equipment in a funerary context. XVII Roman Military Equipment Conference, Zagreb, 24th-27th May, 2010, pp. 317-326.

Hoss, S., 2011b. The Roman military belt, in: Koefoed, H., Nosch, M.-L. (Eds.), Wearing the cloak. Dressing the soldier in Roman times. Ancient Textile Series, Oxford, pp. 29-44.

İsçan, M., Loth, S., 1986a. Determination of age from the sternal rib in white males: a test of the phase method. J Foren Sci 31, 122-132.

İsçan, M., Loth, S., 1986b. Determination of age from the sternal rib in white females: a test of the phase method. J Foren Sci 31, 990-999.

Kelmar, C.J.H., Harvey, D., Simpson, C., 1995. The sick newborn baby, 3rd ed. Bailliere Tindall, London.

Leach, S., Lewis, M.E., Chenery, C., Müldner, G.H., Eckardt, H., 2009. Migration and diversity in Roman Britain: a multidisciplinary approach to immigrants in Roman York, England. Am J Phys Anthropol, 140, 546-556.

Lovejoy, C.O., Meindl, R.S., Pryzbeck, T.R., Mensforth, R.P., 1985. Chronological metamorphosis of the auricular surface of the ilium: a new method for the determination of age at death. Am J Phys Anthropol 68, 15-28.

MacKenzie, M. Thomas, C., (Eds.), in prep. The Roman cemetery at St Mary Spital, London, Museum of London Archaeology Monograph, London.

Marsden, P., 1986. Roman London, 3rd ed. Thames and Hudson, London.

Martin-Kilcher, S., 2000. 'Mors immatura' in the Roman world: a mirror of society and tradition, in: Pearce, J. (Ed.), Burial, society and context in the Roman World. Oxbow Book, Oxford, pp. 78-84.

Mattingly, D., 2006. An imperial possession: Britain in the Roman Empire. Penguin Books Ltd, London.

Mattingly, D., 2011. Urbanism, epigraphy and identity in the towns of Britain under Roman rule, in: Schellenberg, H.M., Hirschmann, V.E., Krieckhaus, A. (Eds.), A Roman miscellany: essays in honour of Anthony R. Birley on his seventieth birthday. Akanthina Monograph Series 3, Gdansk, Poland, pp. 53-71.

Millard, A.R., Johnson L. Gröcke, D. 2013. Isotopic investigation of diet and mobility, in Ridgeway, V., Leary K., Sudds, B. (Ed.), Roman burials from Southwark. Excavations at 52-65 Lant Street and 56 Southwark Bridge Road, London SE1. London, PCA Monograph 17, pp 65-70.

Millard, A., Montgomery, J., Trickett, M., Beaumont, J., Evans, J., Chenery, S., 2014. Childhood Lead Exposure in the British Isles during the Industrial Revolution, Modern Environments and Human Health. John Wiley & Sons, Inc, New York, pp. 279-299.

Millett, M., 1996a. Characterizing Roman London, in: Bird, J., Hassall, M., Sheldon, H. (Eds.), Interpreting Roman London. Papers in memory of Hugh Chapman. Oxbow Books, Oxford, pp. 33-38.

Millett, M., 1996b. Introduction: London as capital? Journal of Roman Archaeology Supplementary Series 24, 7-12.

Montgomery, J., 2002. Lead and Strontium Isotope Compositions of Human Dental Tissues as an Indicator of Ancient Exposure and Population Dynamics. Dept. of Archaeological Sciences, University of Bradford, Bradford.

Montgomery, J., 2010. Passports from the past: investigating human dispersals using strontium isotope analysis of tooth enamel. Ann Hum Biol 37, 325-346.

Montgomery, J., Evans, J.A., Powlesland, D., Roberts, C.A., 2005. Continuity or colonization in Anglo-Saxon England? Isotope evidence for mobility, subsistence practice, and status at West Heslerton. Am J Phys Anthropol 126, 123-138.

Montgomery, J., Evans, J.A., Chenery, S.R., Pashley, V., Killgrove, K., 2010. 'Gleaming, white and deadly': the use of lead to track human exposure and geographic origins in the Roman period in Britain, in Eckardt, H., (Ed.), 2010. Roman diasporas: archaeological approaches to mobility and diversity in the Roman Empire. Journal of Roman Archaeology Supplementary Series 78, pp 199-126.

Montgomery, J., Knüsel, C.J., Tucker, K., 2011. Identifying the origins of decapitated male skeletons from 3 Driffield Terrace, York, through isotope analysis. Reflections of the cosmopolitan nature of Roman York in the time of Caracalla, in: Bonogofsky, M. (Ed.), The bioarchaeology of the human head: decapitation, decoration, and deformation. University of Florida Press, Florida, pp. 141-178.

Müldner, G., 2013. Stable isotopes and diet: their contribution to Romano-British research. Antiquity 87, 137-149.

Müldner, G.H., Chenery, C., Eckardt, H., 2011. The 'Headless Romans': multi-isotope investigations of an unusual burial ground from Roman Britain. J Archaeol Sci 38, 280-290.

Pearce, J., 2010. Burial, identity and migrations in the Roman world, in: Eckardt, H. (Ed.), Roman diasporas: archaeological approaches to mobility and diversity in the Roman Empire. Journal of Roman Archaeology Supplementary Series 78, pp. 79-98.

Pearce, J., 2011. Representations and realities: cemeteries as evidence for women in Roman Britain. Medicina nei Secoli 23, 227-254.

Pearce, J., 2013. Beyond the grave. Excavating the dead in the late Roman provinces. Late Antique Archaeology 9, 441-482.

Perring, D., 1991. Roman London. Seaby, London.

Pollard, A.M., Ditchfield, P., McCollagh, J.S.O., Allen, T.G., Gibson, M., Boston, C., Clough, S., Marquez-Grant, N., Nicholson, R.A., 2011. ‘‘These Boots Were Made For Walking’’: The Isotopic Analysis of a C4 Roman Inhumation From Gravesend, Kent, UK. Am J Phys Anthropol 146, 446-456.

Powell, L.A., Redfern, R.C., Millard, A.R., 2014. Infant feeding practices in Roman London: the isotopic evidence in: Carroll, P.M., Graham, E.-J. (Eds.), Infant health and death in Roman Italy and beyond. Journal of Roman Archaeology Supplementary Series 96, pp. 89-110.

Powers, N., 2012. Human osteology method statement. Museum of London, London. http://archive.museumoflondon.org.uk/NR/rdonlyres/3A7B0C25-FD36-4D43-863E-B2FDC5A86FB7/0/OsteologyMethodStatementrevised2012.pdf (Accessed 16/7/14).

Rawson, B., 1991. Adult-child relationships in Roman society, in: Rawson, B. (Ed.), Marriage, divorce, and children in Ancient Rome. Clarendon Press, Oxford, pp. 7-30.

Redfern, R., Bonney, H., 2014. Headhunting and amphitheatre combat in Roman London, England: new evidence from the Walbrook Valley. J Archaeol Sci 43, 214-226.

Richards, M.P., Molleson, T.L., Vogel, J.C., Hedges, R.E.M., 1998. Stable isotope analysis reveals variations in human diet at the Poundbury Camp cemetery site. J Archaeol Sci 25, 1247-1252.

Rowsome, P., 1996. The development of the town plan of early Roman London, in Watson, B., (Ed.), Roman London: recent archaeological work. Including papers given at a seminar held at The Museum of London on 16 November 1996. Journal of Roman Archaeology Supplementary Series 24, pp. 35-46.

Scheuer, L., Black, S., 2000. Developmental juvenile osteology. Academic Press, London.

Schofield, J., Maloney, C., (Eds.), 1998. Archaeology in the City of London, 1907-1991: a guide to records of excavations by the Museum of London and its predecessors. The Archaeological Gazetteer Series, Volume 1. Museum of London, London.

Sidell, J., 2008. Londinium's landscape, in: Clark, J., Cotton, J., Hall, J., Sherris, R., Swain, H. (Eds.), Londinium and beyond. Essays on Roman London and its hinterland for Harvey Sheldon. CBA, York, pp. 62-68.

Smith, B.H., 1991. Standards of human tooth formation and dental age assessment, in: Kelly, M.A., Larsen, C.S. (Eds.), Advances in dental anthropology. Wiley-Liss, New York, pp. 143-168.

Spurr, M.S., 1983. The cultivation of millet in Roman Italy. Papers of the British School at Rome 51, 1-15.

Swain, H., Roberts, M., 1999. The Spitalfields Roman. Museum of London, London.

Swan, V., 1993. Legio VI and its men: African legionaries in Britain. Journal of Roman Pottery Studies 5, 1-34.

Swift, D., 2003. Roman burials, medieval tenements and suburban growth: 201 Bishopsgate, City of London. MoLAS Archaeology Studies Series 10, London.

Thirlwall, M., 2002. Multicollector ICP-MS analysis of Pb isotopes, using a (207) Pb-(204) Pb double spike, demonstrates up to 400ppm/amu systematic errors in T1 normalization. Chem Geol 184, 255-279.

Tomlin, R.S.O., 1993. 'The girl in question': a new text from Roman London. Britannia 34, 41-51.

Trickett, M.A., Budd, P., Montgomery, J., Evans, J., 2003. An assessment of solubility profiling as a decontamination procedure for the sup87/sup Sr/sup 86/sup Sr analysis of archaeological human skeletal tissue. Appl Geochem 18, 653-658.

van der Veen, M., Livarda, A., Hill, A., 2008. New plant foods in Roman Britain: dispersal and social access. Environmental Archaeology 13, 11-36.

Vindolanda Charitable Trust, 2010. Excavation news 2010. www.vindolanda.com/LiteratureRetrieve.aspx?ID=41685 (Accessed 14/7/14).

Wallace, L., 2010. From foundation to destruction. An archaeology of early Roman London to AD 61. PhD Thesis, Cambridge University.

Wheeler, R.E.M., 1928. An inventory of the Historical Monuments in London. Volume 3: Roman London. Royal Commission on the Ancient and Historical Monuments and Constructions of England, London.