

10. STRONTIUM ISOTOPE ANALYSIS

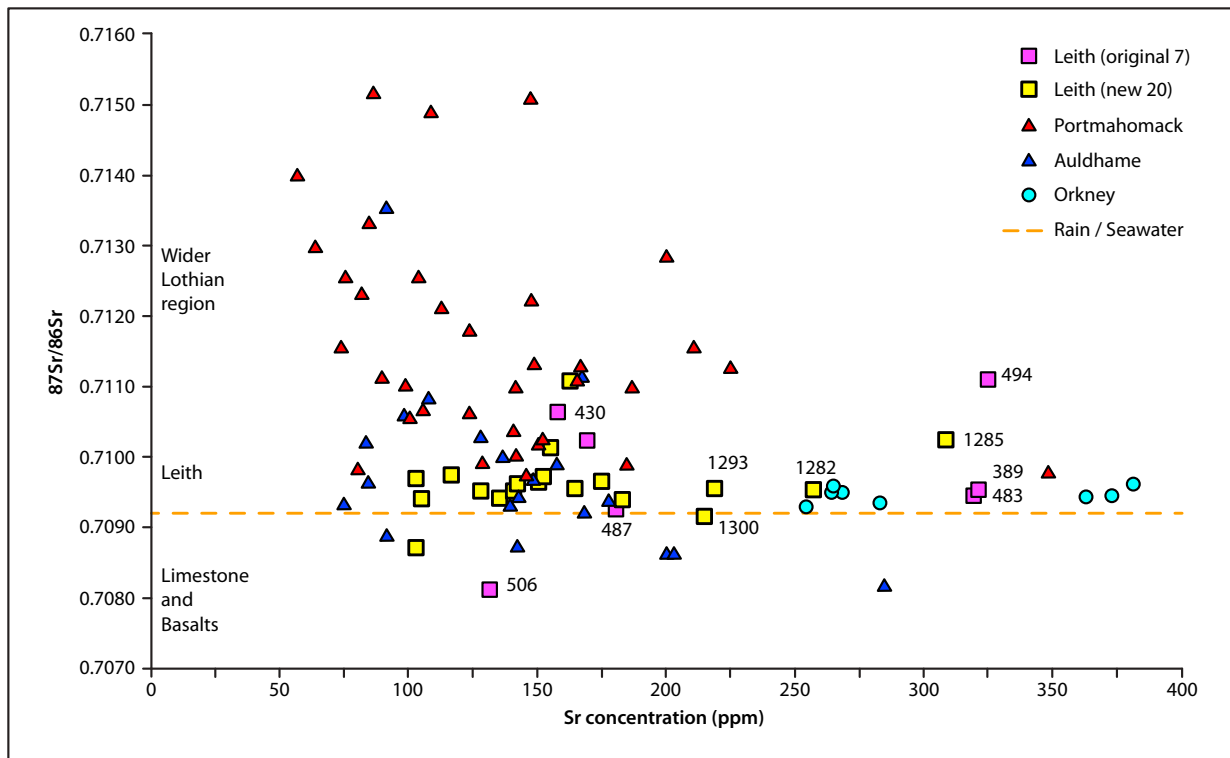
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A total of 27 primary or secondary maxillary and mandibular molars were used for the strontium isotopic analysis (Sample Nos 710–16, 1281–1300). Leith is located in a region of Palaeozoic sandstones, mudstones, silts of the Strathclyde group (bottom) overlain by marine sands and gravels. In the wider Lothian region however, the geology is heterogeneous, with basalts, lavas and limestones and sandstones of Devonian/Silurian age. Many of these rocks are overlain by Quaternary Diamacton till and glacial sands and gravels. The predicted Sr isotope biosphere range for Leith is 0.7090–0.710 (Evans et al 2010). However, within the wider Lothian region Sr biosphere values range from 0.7080 up to 0.7130. In the Highlands, there is a greater range of Sr biosphere values as a result of the Tertiary volcanic province on the west coast and older and granitic terrains, so the range here may vary from ~0.7060 to 0.7200.

The majority of those from Leith fall within, or very close to, the biosphere range for the site

(Illus 18). Those which do not are: Sk430, Sk494, Sk506, Sk127 (No. 1281) and Sk493 (No. 1295). Of these, two have a low Sr isotope ratio characteristic of origins in a region of limestone and three have higher Sr isotopes which can also be found in the wider Lothian region. The majority of the values cluster closely with those obtained from Auldham, which provides additional evidence that they are consistent with local origins (Lamb et al 2012).

The data for Leith is compared to another east coast medieval population from Portmahomack on the Moray Firth (Carver et al 2016). As would be expected for a site close to the Highlands, individuals at Portmahomack have a much wider range of Sr isotopes than at Leith, with none below 0.7092, and are likely to include those from inland regions of the Highlands, where values above 0.7130 are found; this interpretation is also possible for one individual from Auldham. It should also be noted that a combination of Sr isotope ratios of around 0.7092 and just above and a high Sr concentration above c 200 ppm, observed in individuals Sk389, Sk483, Sk494, Sk279 (No. 1282), Sk409 (No. 1285), Sk483 (No. 1293) and Sk532 (No. 1300), are not characteristic of east coast or inland populations,



Illus 18 Strontium analysis © Wardell Armstrong LLP

although high concentrations are more often found in Scotland than England.

Data for medieval individuals from St Thomas' Kirk, Orkney has been included in Illus 18 to illustrate the similarity of Sk389, Sk483, Sk279 (No. 1282), Sk409 (No. 1285), Sk483 (No. 1293) and Sk532 (No. 1300) to coastal or island-dwelling populations in the Northern Isles and the western seaboard of Britain (Toolis 2008). High strontium ppm is not commonly seen in inland and east coast dwellers. Individual Sk494 has a highly unusual combination of ratio and ppm; there are not currently any directly comparable populations in Britain and only a few isolated published individuals with a similar combination, including an Early Bronze Age burial from West Heslerton (Montgomery et al 2005; Parker Pearson et al (forthcoming)) and a Viking-period burial from Masham (Buckberry et al 2014), which are both in Yorkshire. However, there is very limited data for individuals from the inland areas of the Scottish Highlands and this lack of comparative human values may simply be an artefact arising from sampling bias.

To conclude, none of the individuals have the high Sr isotopes that would be indicative of origins in the Highlands and would rule out origins in Lothian. However, it should be acknowledged that the geology and thus range of biosphere Sr isotopes of the Highlands is highly variable. It is therefore possible that individuals from the Highlands may have similar values to those from Lothian. The majority of individuals are consistent with origins in Leith. Individuals Sk506 and Sk127 are consistent with origins in a region of limestone or basalt and individuals Sk430 and Sk493 are consistent with origins in a region of the Palaeozoic rocks, all of which occur in the Lothian region. Several individuals (particularly Sk389, Sk483, Sk279) have an isotopic profile that is characteristic of individuals inhabiting the Northern and Western Isles or western seaboard of Britain, but post-depositional uptake of strontium must be considered. Sk494, a 35–40-year-old woman, falls outside expected values for Lothian and the east coast of Scotland, with only two comparable Sr profiles published to date in Yorkshire, England.

The strontium isotopic data has revealed that it was highly likely that this cemetery population was

overwhelmingly derived from local inhabitants but some individuals have an isotopic signature that falls outside Leith, including the western seaboard of Britain and Yorkshire. Regional trade and/or marriage are perhaps responsible for the presence of these individuals in this cemetery population.

It is of considerable importance to note that this cemetery population has a number of Catholic individuals who are local to Leith, including Sk389, Sk441, Sk483, Sk512 and Sk525. The population of Leith signed the National Covenant in 1638, which was both anti-Laudian Anglicanism and anti-Catholic in sentiment (Henderson 1937: 167). Any individual with a Catholic affiliation was taking a considerable risk living in the South Leith parish. If their affiliation was discovered, the consequences ranged from fines to flogging and imprisonment (Miller 2010: 243). If that individual was seen to be actively promoting Catholicism, their actions were potentially punishable by death. According to Miller (ibid: 236), Scottish society in the 17th century was fuelled by anxiety and fear, which is hardly surprising when the population was faced with disease, starvation, religious persecution, war and socio-political upheaval.

Attitudes surrounding fearful religious views and the pestilence are recorded in a poem written by a teacher named Hercules Rollock during the 1585 plague outbreak in Edinburgh. He depicts a once virtuous and prosperous city which has been struck down by divine fury at the foul deeds of the citizens and their exposure to a contagious evil (Jillings 2014: 1). Rollock's interpretation of the plague outbreak as an act incurring the 'wrath of God' was a belief unquestioned in the 17th century. People believed that contagion was a manifestation of evil that would taint citizens both physically and spiritually, corrupting both the body and the soul. Religious views concerning physical and moral corruption are also evident in the writings of Gilbert Skene in *Breve Descriptioun*, in which the author records many figures fleeing the city, including many religious figures and clergymen (ibid: 3). Their act of fleeing exhibited an un-Christian character and charity; they denied the sick and dying both the practical assistance and the spiritual sustenance necessary to avoid a fearful and lonely death (ibid: 3).