Anthropology and provenance analysis of human cremations from Iron Age North-Rhine-Westphalia

Sidney Sebald
Dr. Manuel Zeiler
Prof. Dr. Gisela Grupe

1 Ludwig-Maximilian University of Munich
2 Landschaftsverband Westfalen-Lippe

Background

The Siegeland, characterized by a low mountain range landscape, has its economic importance in rich ore deposits like copper and silver. Since the second half of the 4th century BC a large-scale mining industry has eventually been developed there. This results in a potential “pull factor” which highly likely attracted people and technology. Additionally, parallels to archaeological finds and grave sites in Hesse leads to:

Hypothesis: Migration to the Siegeland

In such cases stable strontium isotope analysis is performed. The strontium gets through the food cycle into the human tissue. Statistical development and research is built into bones and teeth. While teeth only reflect values from the childhood, bones show ratios of the last 10 to 20 years of an individual.

Objective: Anthropological examination and systematic strontium analysis to proof definite migration into the Siegeland

Material & Methods

Overall 61 human cremations, 60 from Netphen-Deuz and one no. 2 from Neunkirchen-Zeppelin were available for analysis. All cremations were investigated osteologically, according to standard criteria. This includes sex and age determination as well as dating of fragmentation and temperature exposure. Because of high degree of fragmentation, all individuals were examined histologically for age-at-death determination. Therefore, one piece of compact femur or humerus per individual was chosen and embedded into epoxy resin. For age-at-death appraisal, qualitative traits and quantitative regression formulas were used.

For strontium isotope analyses 29 dentin and 15 bone samples were chosen and proceeded after Toncool et al. (2017).

Results

As expected for Iron Age burials, the preservation of the cremations was relatively poor, resulting in an average weight of 360.3 g only. Additionally, the fragment size with variability between 15 and 35 mm was very small. With the highest burning grade possible, the color of the finds was indicative of heat exposure over 100°C. The strontium isotope analysis was conducted successfully as expected (Snoeck et al. 2015).

Strontium isotopic ratios in our study varied between 0.70997 and 0.7146 (difference 0.00663) and are sorted in figure 3. In the diagram, two plateau phases can be seen. The first one emerges between 0.7098 and 0.7118, which is congruent with literature data for the Wetteraus in Hesse. Therefore, it seems to be a possible region of origin. The second plateau includes ratios between 0.7122 and 0.7136. By using the Isotop software, no outliers are detected if the conventional twofold standard deviation is set. However, with a standard deviation of 1.47 most of the data fall into a range between 0.71186 and 0.71916. This result matches the expected isotopic data for the local foodb. Special emphasis lies on the individuals Deuz 36 and Deuz 56, since both dentin and bone samples were analyzed. While the strontium ratios from Deuz 56 differ only slightly (0.00877), the difference between the values of Deuz 36 are striking. Also, this is true for other individuals (Deuz 34, Deuz 10) did not match with one of the two phases. The strontium isotopic ratio of the individual from Zeppelin falls within the range of the second plateau.

Interpretation

The results of this systematic stable strontium isotope analysis confirm the existence of migration patterns of some individuals. Unfortunately, there are no data on bioavailable strontium isotopic ratios in the Siegeland, therefore, there is no proof that individuals with isotopic values between 0.71186 and 0.71916 were really native to the site of Netphen-Deuz. But, as a rule of the thumb, the majority of individuals on a burial site that share similar strontium ratios are considered local which is also the most parsimonious interpretation (“Local’s rule”). For the Wetteraus region, otherwise, isotopic ratios of archaeological skeletons are reported by Knipper et al. (2014) and also Bentley and Knipper (2005). The respective values of 14 individuals are between strontium isotopic ratios between 0.709 and 0.712 to coincide with the literature values. This supports not only the hypothesis of migration to the Siegeland, which was postulated before, but also states the Wetteraus in Hesse as the most probable place of origin of the non-locals. Next to individual Deuz 36, the individuals Deuz 34 and 10 spent their childhood neither in the Siegeland nor Wetteraus but at an unknown third place of origin. Likewise, individual Deuz 46 could have originated from another unknown region with higher strontium values.

Since the strontium values of sin no. 2 from Zeppelin emits a signal, similar to the values of the Siegeland, does it mean that this individual is local? It is entirely possible, but its grave goods show parallels to the region of Dinsburg (also Hesse) that has similar bedrock like the Siegeland, resulting in a similar signal. Hence, origin of this individual remains uncertain.

Conclusion

- approximately 1/4 of individuals in this study were non-locals
- individual from Neunkirchen-Zeppelin potentially non-local
- most likely place of origin: Wetteraus region.
- Siegeland having a potential “pull factor” leading to migration is emphasized
- confirmed cremated bones are suitable for provenance analysis by use of stable strontium isotopes

In prospects: stable strontium isotope analysis of archaeological animal bones will be analyzed to define a more specific range of the local ratio spectrum.

Litterature:


