

Strontium isotopes (Sr) in archaeology

Human mobility across space and time has fundamentally influenced contemporary genetic patterns. Factors such as shifts in economic systems, increasing social complexity, and landscape modifications can drive large-scale population migration. Consequently, understanding the migratory behaviors of past civilizations is crucial for elucidating the mechanisms underlying cultural transfer and transformation. Strontium isotopic geochemistry ($^{87}\text{Sr}/^{86}\text{Sr}$) has emerged as a powerful methodological tool to investigate historical mobility, as it enables the reconstruction of human movements and interactions with their environments. The strontium isotopic signature that remains in human and animal tissues, like tooth enamel, dentin, and bone, reflects the geological features of the local environment of origin. Since strontium is incorporated into various environmental matrices, including dietary sources, with minimal isotopic fractionation, the isotopic composition of human remains allows for the assessment of whether individuals resided and consumed strontium from specific regions. Hence, strontium isotopic signatures are valuable indicators for determining places of origin and detecting potential movements at individual and population levels. Comparing isotopic signatures between individuals and their environment facilitates the reconstruction of migration routes and interactions between distant communities.

The necropolis of Piazza d'Armi, Spoleto

The use of strontium (Sr) isotopes in the investigation of the Piazza d'Armi tomb in Spoleto represents an innovative and essential method for gaining a deeper understanding of human mobility during the pre-Roman period in central Italy. Within the context of this necropolis, characterized by tombs with distinctive grave goods and a high prevalence of children, strontium isotopic analysis can help distinguish between local and non-local individuals, thereby revealing potential migratory flows or contacts between different communities. Specifically, variations in Sr isotopic ratios in dental enamel and bones reflect the geochemical characteristics of the environments where individuals spent the early stages of life and lived during adulthood, respectively, enabling the identification of temporary or permanent relocations. The presence of numerous children's burials can also be interpreted in relation to their geographic origins and patterns of community mobility. This analysis allows for the investigation of whether these children were natives of the same area or originated from different regions, thereby shedding light on possible exchange networks, marriage alliances, or group migrations.

The Isotope Laboratory

Isotopic analyses were carried out at the Radiogenic Isotope Laboratory of the Institute of Environmental Geology and Geoengineering (IGAG-CN), Rome Unit, at the Department of Earth Sciences, Sapienza University of Rome (<https://www.igag.cnr.it/it/laboratori/spettrometria-di-massa/>), under the scientific supervision of Prof. Francesca Castorina. The analyses adhered to established protocols and were interpreted within a framework consistent with the latest research developments in the field of isotopic geochemistry.