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# Isotopic evidence of diet variation at the transition between classical and post-classical times in Central Italy

Mary Anne Tafuri[a,*], Gwenaëlle Goude[b], Giorgio Manzi[a]

[a] Dipartimento di Biologia Ambientale, Università di Roma 'La Sapienza', Piazzale Aldo Moro, 5, 00185 Roma, Italy
[b] Aix Marseille Université, CNRS, Minist Culture, LAMPEA, Aix-en-Provence, France

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ABSTRACT

This work examines the carbon and nitrogen composition of human and animal collagen from the Roman necropolis of Lucus Feroniae (Rome, 1st–3rd century AD) and the Longobard cemetery of La Selvicciola in northern Latium (Viterbo, 7th century AD), with a special focus on possible dietary variations at the transition between classical and post-classical times. A substantial isotopic difference between the two series reveals distinct dietary practices at the two sites, especially the consumption of cereals and contribution of other foodstuffs to a mainly grain-based diet. We argue that such differences are explained through the social and cultural background of the two populations examined, where the isotopic variance of the Roman data is in line with that of a group of heterogeneous origin and varied dietary practices, while the tight clustering of isotopic signatures for the Longobard people reflects the foodways of a homogeneous group. Intra-site variation shows no significant difference according to the sex of the deceased. Outlying individuals might be explained through cultural practices that call for further insight. Isotopic data have shown to successfully reflect social and cultural phenomena of human groups in a changing world, in a way that other archaeological proxies have sometimes failed to achieve.

## 1. Introduction

There are no isotopic works in Europe focusing on the transition from classical to post-classical times. While most isotopic studies concentrate either on the first period (Chenery et al. 2010; Fuller et al. 2006; Prowse et al. 2005; Prowse et al. 2004) or the latter (Bourbou et al. 2011; Hakenbeck et al. 2010; Müldner and Richards 2005; Reitsema et al. 2010; Richards et al. 2006) a diachronic perspective is still lacking. However, the transition to the post-classical times is one of important changes, which involved a shift in social and economic aspects of everyday life for most populations in the western world. Health status and life conditions changed dramatically and human groups faced periods of instability that, among other aspects, are also testified in population replacement (Amorim et al. 2018). In Italy, in particular, with the fall of the Western Roman Empire (476 CE), the Gothic war and the following Byzantine domination, the contribution of Longobard migration to the Peninsula had a profound impact on the cultural as well as genetic background of the Italian people (Melucco Vaccaro, 1988; Rotili 2010).

Paleobiological data obtained earlier from two skeletal series in the area or Rome (Manzi et al. 1995; Salvadei et al. 1995; Sperduti et al. 1995), prove a clear discontinuity in health status at the transition to the post-classical world. In this perspective a paleodietary investigation, through stable carbon and nitrogen analysis of human bone collagen of the same series, might contribute to understanding the social and economic implication that such a transition entailed.

While this study stems from an earlier project, undertaken during the 1990s (Manzi et al. 1995; Passarello et al. 1993; Salvadei et al. 1995; Sperduti et al. 1995) on archaeological and anthropological evidence of the Longobard occupation in Italy at the end of the Roman Empire, a new season of investigations of Longobard communities in Italy by our group is currently in progress (cf. Micarelli et al. 2018).

This paper aims to identify possible changes in human diet using stable carbon and nitrogen analysis of bone collagen. The populations buried at the two sites, should in fact reflect very different paleodietary stories. Lucus Feroniae, despite being a rural town on the outskirts of Rome was still part of its rich Province between the 1st and 3rd centuries AD. According to various scholars (Garnsey 1989; Gazzetti 1985) the population here was extremely heterogeneous, characterized by slaves, freedmen and veterans. Such heterogeneity might have resulted in a variety of diets practiced at the site, either in relation to access to foods or to the diverse origins and social background of the individuals considered. Furthermore, a selection of resources could have either been produced locally or imported via the many ports that served Rome

* Corresponding author.
*E-mail address:* maryanne.tafuri@uniroma1.it (M.A. Tafuri).

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at the time. Selvicciola, on the other hand, is the cemetery of a Longobard tribe, an allochthonous group occupying a declining territory at the end of the 6th century AD (Incitti 1997), with its own social and economic *habitus*; if some intermixing with the locals might have occurred, this was during a period of severe decline in Italy, where local populations were exiting the long phase of the Gothic War and undergoing a period of general impoverishment and crisis (Christie 1998; Giostra 2011).

Previous paleobiological studies have shown differences between the two sites, mainly in terms of dental health (Manzi et al. 1999; Salvadei et al. 1995). The high frequency of oral pathologies such as caries and enamel hypoplasia at Selvicciola was explained through a substantial poverty in the diet of this population, mainly based on the consumption of large quantities of grains and a limited contribution of proteins coming from meat and animal by-products. Better oral conditions at Lucus Feroniae might have resulted from a more varied diet with a greater contribution of proteins from meat or fish. Such a hypothesis was in line with other studies on the dietary practices of Longobard populations and their differences with the Roman diet (Bedini et al. 1997; Belcastro et al. 2007).

## 2. Evidence of dietary practices at Roman times and later phases

It is a common assumption that Roman diet was based on a 'triad' of foodstuffs: grains (wheat and barley predominately), vines and olives (Foxhall and Forbes 1982; Garnsey 1999; Potter and Mattingly 1999). Legumes were no less important to the diet, while meat seems to have contributed to a lesser extent to the daily intake, with pigs being the main source of animal proteins and sheep and/or goat only occasionally part of the meal. Fish seemed to have been occasionally consumed, with the use of *garum*, a typical fish sauce, frequently reported (Garnsey 1999). Roman diet cannot be fully understood if divorced from a social perspective; what was served on the table of upper class families – that consumed a larger variety of foodstuffs, such as meat, fruit and vegetables, and spices – might have been very different from what was regularly consumed by the plebes – who were probably mostly relying on the grain dole – freedman or slaves. As an example, millet, a crop rarely reported in the daily diet of upper classes is described by Columella in *De Re Rustica* as a rich source of protein, ideal for slaves or workers. Regardless of the status, food in Roman times was likely to be unequally distributed between men and women. Men were considered to be the productive part of society, either for kinship or role, hence they were allocated larger or better portion of foods, while women's diet was strictly regulated (Fuller et al. 2006; Garnsey 1999).

Evidence of the diet of Longobard populations is less extensive. Meat was hardly part of everyday diet although by-products, particularly dairy products, were largely consumed as reported by Paulus Diaconus in his *Historia Longobardorum*. The transformations of part of the Italian territory, together with measures of security, redesigned the urban and rural orders (La Rocca Hudson and Hudson, 1987). The population intensified in the hilly areas and in narrow lowland strips; the diffused settlement pattern of Roman Italy was gradually replaced by fixed settlements that, being related to cultivated zones, led to localized high population densities, thus exposing people to the risks of famine and to the spread of illnesses (Del Panta et al. 1985). A number of skeletal studies, mostly focused in northern Italy, reveal a transition from a strong consumption of meat and animal proteins in the earlier phases of the Longobard occupation to a diet progressively more reliant on grains (Ahumada, 2010; Bedini et al. 1997; Mallegni et al. 1998). Further, it is possible that the precariousness of the alimentary regimens, i.e., phenomena of "marginalization" in the production of food and of progressive degeneration of health conditions (Ginatempo 1987; Montanari 1981), maintained mortality in a high level and life expectancy low.

Despite historical sources, our understanding of food consumption at Roman and post-classical times has seldom been questioned directly through the observation of the archaeological record. One way to do this is through the examination of the dietary practices of these populations via stable carbon and nitrogen isotope analysis of bone collagen. Isotope content in the bone is able to determine the protein contribution to human and animal diet over the period in which bone tissues forms, ca. the last 7–10 years prior to death (Ambrose and Norr 1993; Hedges et al. 2007). Carbon isotope values ($\delta^{13}C$) are able to distinguish between marine ($^{13}C$ enriched) and terrestrial diet ($^{13}C$ depleted); within the latter, they can reveal if the type of plant consumed follows a $C_4$ photosynthetic pathway ($^{13}C$ enriched) as opposed to a $C_3$ one ($^{13}C$ depleted). Nitrogen isotopic values ($\delta^{15}N$) can instead reveal the consumption of certain foodstuffs (particularly meat) as they increase by 3–5‰ according to the trophic level (Hedges and Reynard 2007; Minagawa and Wada 1984; Schoeninger and DeNiro 1984); for the same principle they can reflect consumption of marine and freshwater fish which have high values in the trophic level (Schoeninger et al. 1983). What must be taken into consideration is the tight relation between isotopic composition of food resources, that is linked to the ecosystem, and their eaters, which is not always easily assessed archaeologically (Goude and Fontugne 2016; Hedges and Reynard 2007).

So far only few Roman or post-classical contexts in Italy have been analyzed isotopically for paleodiet (Craig et al. 2009; Iacumin et al. 2014; Killgrove and Tykot 2013; Prowse et al. 2005; Prowse et al. 2004); our study represents a contribution to the new isotopic scenario unveiled.

## 3. Archaeological background

### 3.1. Lucus Feroniae (LFR)

The cemetery of the Via *Capenate*, is linked to the rural center of Lucus Feroniae, about 30 km northeast of Rome (Fig. 1). The town was an ancient commercial and religious center. Excavations undertaken during the 1980s (Gazzetti 1986) unearthed nearly 200 single burials of the type called *a fossa* with a skeletal sample of 166 individuals. Funerary practices and the virtually systematic absence of grave goods led the archaeologist to suggest that the necropolis was assigned to manual laborers of humble origins (slaves, freedmen, war veterans etc.), that lived in the nearby town. No radiocarbon dates are available for the site and chronological attribution was based on archaeological material. Extensive anthropological investigations undertaken between the 1980s and the 1990s (Manzi and Argenti 1988; Manzi et al. 1989; Manzi et al. 1997) seemed to confirm such a hypothesis through the elevated presence of skeletal markers of metabolic stress.

### 3.2. Selvicciola (SLV)

The cemetery of La Selvicciola, located near the town of Ischia di Castro in the province of Viterbo, northern Latium (Fig. 1), was excavated during the 1980s (Gazzetti 1985; Gazzetti 1986). Over a hundred burials were unearthed, with 110 individuals available for detailed anthropological analysis (Manzi et al. 1995; Salvadei et al. 1995; Sperduti et al. 1995). The tombs were carved in local stone and grave goods suggested a Longobard origin of the burials, which often contained > 2 or 3 individuals. As for LFR, no radiocarbon dates are available for the sites, with chronological attribution based on grave goods for most of the tombs. The skeletal sample showed reduced body and dental measurements (i.e., stature and dental area), with the former interpreted as a response to severe nutritional condition and low protein-calorie intake (Salvadei et al. 1995; Sperduti et al. 1995).

## 4. Materials and methods

For the humans, bone samples (approx. 2–5 g) were collected from the rib, while for the animals equal quantities were samples from the shaft of long bones. A total of 66 human (33 from LFR and 33 from SLV)