ROMAN DIASPORAS
ARCHEOLOGICAL APPROACHES TO MOBILITY AND DIVERSITY IN THE ROMAN EMPIRE

edited by
Hella Eckardt

Contributors:
Identifying immigrants to Imperial Rome using strontium isotope analysis

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Introduction

Imperial Rome was the seat of a colonial force and a major pre-industrial urban center. Scholarship has long been concerned with the dissemination of Roman culture and with identifying Romans and Roman materials in the archaeological record of the provinces. Although there has been interest in Romans as migrants and, more recently, in the dialectic between the colonizer and the colonized in the provinces, the issue of immigrants coming to Rome has been little studied except by historical demographers. Modern theoretical discussions in anthropology, however, conceive of migration as a process in which active agents move within and between both geographic and cultural space. This concept of transnationalism allows us to investigate individual migrants’ lives and identities and to situate them within a contextualized social field of migration. Anthropologists and sociologists have successfully used the concept of transnationalism to discuss identity and ethnicity, processes of incorporation and assimilation, and maintenance of connections to the place of origin. Further, by broadening the understanding of transnational individuals to the group level, it is possible to discuss diasporas of migrants and their formation of polyethnic communities at their destination. Epigraphical, historical and material evidence from Imperial Rome tends to be biased against slaves, the lower classes and the poor, who made up a large percentage of immigrants. One important data source for Roman migration — skeletal remains — has long been overlooked. Osteological analysis of human bones lends itself well to investigating migration as a transnational, social phenomenon because of its ability to identify individual immigrants and to reveal patterns within and between communities. This paper addresses transnationalism as it relates to questions of Roman migration by using chemical analysis to identify immigrants and osteological data to contextualize their lives.

Theorising transnationalism in antiquity

As defined by anthropologist Caroline Brettell, transnationalism is “a social process whereby migrants operate in social fields that transgress geographic, political, and cultural borders”. Transmigrants “develop and maintain multiple relationships — familial, economic, social, organizational, religious, and political — that span [these] borders”. The concept of transnationalism arose in the 1990s as a prominent critique of the historical-structuralist and modernist theories of migration. Modernization theory encompasses a framework in which dichotomies are used to understand migration (rural/urban, city/country, immigrant/citizen) and is focused on the motivations of migrants. The historical-structuralist approach, on the other hand, looks at the global market, combining elements of world-systems theory and core-periphery relations to explain the structure of migrations. As the world became increasingly globalized, social scientists began to debate

1 Brettell 2008, 120.
the future of nation-states and sought to address individual agency in the construction of society. Transnationalism was thus bound up in discussions of postmodernity and postcolonialism, with focuses on both the individual and the structure: “newly created transnational spaces are sites at which new and multiple identities are fashioned and a variety of old and new forms of power or domination are exercised.”

In the 1990s, archaeologists began resurrecting studies of migration, overlooked for decades as a result of diffusionist and functionalist thinking that oversimplified a complex social process. D. Anthony, in an article of 1990 which is still widely cited, noted that:

migration has been avoided because archaeologists lack the theory and methods that might allow them to incorporate migration into the explanation of culture change, not because migration is regarded as unimportant.

Further, he points out that modern migration studies are essential for archaeologists to understand patterned migration in the past and that, although push and pull factors are useful in understanding migration, ideological and cultural factors might be equally relevant. Migration is not a one-way street, and Anthony advocates that archaeologists use all available evidence, including material culture, the literary record and biological remains, to address research questions.

In archaeology, we are now seeing transnationalism adopted as a theoretical background to migration primarily in the form of diaspora studies. Although originally a term that denoted the forced movement of ethnic groups of individuals from their homeland, diaspora has recently been re-conceived as a more metaphorical and inclusive term. R. Sanjek feels that diaspora “occurs when people voluntarily leave their home area for distant regions within or beyond the state in which they reside, and continue to remain in contact in various ways with their point of origin”, a definition that is based on transnational theories about community. Diaspora can be caused by forced movement of individuals, but also by trade, labor and ideology, and often results in heterogeneous communities at the destination, variously termed polyethnic communities, transnational communities, diaspora communities, or diasporic pluralism.

The redefinition of diaspora, and the recognition that modern models of migration can be applied to the past, have caused a veritable paradigm shift in archaeological thought about inter-regional interaction. Yet archaeological studies are still focused on the group level, asking questions about why groups of people migrated and how groups of people assimilated or maintained a group identity. The next step in approaching ancient migration through transnationalism is to attempt to understand the individual migrant, to situate the immigrant and his or her lived experiences within a community and within a culture as a whole. New techniques in bioarchaeology allow us to find the biological remains of individual immigrants, investigate changes at various times in their lives, and

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4 Glick Schiller et al. 1995.
6 Anthony 1990, 895.
8 Sanjek 2003, 323.
9 Brettell 2008, 121.
10 Sanjek 2003; Lilley 2004 and 2006.
11 Appadurai 1996.
view individuals within the context of the community. There is a dialectical quality to this sort of research, as an individual skeleton is interesting for the unique set of information it can yield, but only by placing that individual within a mosaic of individuals can we interpret the patterns, similarities and differences seen. Bioarchaeology, then, allows us to ask and answer questions about migrants at different scales, from the individual to the group to the larger community.

Transnationalism in Imperial Rome

Imperial Rome is a suitable venue to undertake a pilot study of transnationalism in antiquity. Physical mobility has been called a "culturally contingent determinant of what it meant to be 'Roman'", because inter-regional interactions of people created and maintained the empire. The vast literary record means that, even if individual immigrants are few and far between, a great deal is known about the sociopolitical structure that informs questions of transnationalism. The size of Rome under the Empire was unparalleled in Europe until after the Industrial Revolution, and waves of immigrants are known to have flowed into the city. In addition, the change in burial practice to inhumation means that thousands of skeletons are available for statistical and chemical analysis. By the early 1st c. A.D., Rome was the largest pre-industrial city in Europe, but the precise size and composition of the population is still debated. Within the walls, the estimates range from 500,000 to one million inhabitants, with an additional 500,000 to 750,000 living in the suburbium, an extension of the city itself and a liminal area between city and countryside. The Early Empire marked a growth spurt in the population. Slavery, military campaigns, trade and voluntary migration doubtless contributed to the dramatic increase in the city's population. By the 3rd c., the army had built a vast transportation infrastructure that stretched out across Europe, and maritime activities circulated goods and people around the Mediterranean. The image of Roman culture was propagated throughout the empire by means of coinage, building programs and the visual language of art. The infrastructure and ideology of the empire allowed people living far from central Italy to have information about the urban center. The Edict of Caracalla granted Roman citizenship to all free residents of the empire. With many transportation and cultural barriers removed, it is reasonable to suppose that people were immigrating voluntarily to Rome, perhaps drawn by the promise of economic betterment. In his introduction to Foreigners at Rome, D. Noy

12 Buikstra 2006.
13 This paper arises from dissertation research on mobility and migration among the lower classes of Imperial Rome. Using skeletal remains as the data set, three main topics of inquiry were pursued: 1. changes to the fabric of Roman society as a result of migration, integration and heterogeneous communities — which can be studied through strontium, oxygen and statistical analyses; 2. differences in the economic situation for immigrants — which can be studied through carbon and nitrogen isotope analyses reflecting diet choice; and 3. how the environment in terms of health, disease and ecology affected immigrants — which can be studied through analysis of skeletal and dental pathologies. The full data can be found in Killebrew 2010.
15 Catalano 2001; Catalano et al. 2001.
18 Zanker 1990.
19 Noy 2000.
points out that the rôle of immigrants in the composition of the city is barely touched on in texts such as J. E. Stambaugh's *The ancient Roman city.* Scholarship on migration to Rome is mostly the work of historical demographers who debate the systemic causes for Rome's population increase in different time periods. The social causes and results of these immigrations to Rome have traditionally been the field of philologists and epigraphers, but the lack of much information about lower-class and poor immigrants hampers an understanding of the complexities of migration to Rome.

Noy attempted to engage multiple lines of evidence in investigating migration to Rome. The immigrant population in Rome would have been at its highest in the 3rd c. A.D. when, according to him, c.5% of the entire population was composed of free immigrants, both soldiers and civilians of all social classes, as well as men and women, young and old, and families and individuals. Four general types of migration probably existed in the empire:

a) local, which includes rural-to-urban movements within the peninsula;
b) circular, often practiced by agricultural or domestic workers;
c) chain, in which migrants encourage other migrants to move; and
d) career, when a person moves in order to derive long-term economic benefits.

The 'pull factors' of Rome were largely economic and related to work or educational opportunities, while general 'push factors', such as war and famine, could have induced individuals to leave their homelands for Rome. Noy wishes to overcome the problems with identifying individual immigrants in order to understand why they came to Rome, how they constructed their identities, and what their lives were like in the city. He recognizes that literary and epigraphic evidence privileges some groups (soldiers and the wealthy) and excludes others (the poor and illiterate). Of potentially c.50,000 free immigrants at Rome in the High Empire, only a handful would be individually identifiable as immigrants based on a tombstone. Because techniques of chemical analysis in bioarchaeology can identify individuals who moved, they have the potential to find people not represented in the epigraphic record.

Noy is further concerned with ethnic representation and community identity among foreigners at Rome. The problem is that immigrants might have pursued a "strategy of integration": "it is possible to look for signs that foreigners at Rome tried to preserve their separate identity, but much harder to look for signs that they did not". Individuals who integrated with Roman culture would not necessarily be seen in the archaeological record through their form of burial or grave goods, but they might be uncovered by being identified biologically as immigrants while identified culturally as Romans.

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22 Noy 2000 and above in this volume.
24 Ibid. 53-55; after Tilly 1978.
25 Ibid. 85-90.
26 Ibid. x.
27 Ibid. 5.
28 Ibid. 197.
29 Ibid. 10.
30 Ibid. 160.
Identifying and understanding migration to Rome is a multidisciplinary undertaking but one that has the potential to change the way we think of immigration and immigrants in the Roman empire. Here I will lay out the results of a bioarchaeological case study of skeletons from two Rome cemeteries and their contribution to migration studies.

Finding immigrants in Imperial Rome

In this study of migration among Rome’s lower classes, three questions are of primary importance:

- Is there evidence of non-local or immigrant individuals within the population? Because of the lack of archaeological and epigraphical material in lower-class burials, chemical analyses are necessary to identify migrants.
- Is there any patterning by age or sex of individuals identified as non-local? It has been suggested that younger males between the ages of 15 and 30 were more likely to immigrate because of their service in the military.\(^{31}\)
- What kinds of immigration strategies were pursued by migrants: local, circular, chain, career, or a combination?

Bioarchaeologists typically employ non-destructive statistical techniques, destructive chemical analyses, or a combination thereof, on human skeletal and dental remains to answer these kinds of questions.

Materials

In his *de Legibus*,\(^{32}\) Cicero notes that the Twelve Tables specifically forbade both burying and cremating the dead within the city: *hominem mortuum in urbe ne sepelito nece urito*. The Roman *suburbiun* was therefore used for marginal businesses excluded from the city for religious or public safety reasons; they included slaughterhouses, brickmaking facilities, and cemeteries.\(^{33}\) No matter where an inhabitant of Rome lived, that person would almost certainly end up in a cemetery outside the walls, in the periurban or suburban area.

In 2007, I analysed human skeletal remains from over 180 individuals from two sites, Casal Bertone and Castellaccio Europarco, both in Rome’s *suburbiun*, at the laboratory facilities of the Soprintendenza Archeologica di Roma (fig. 9.1).\(^{34}\) Casal Bertone is a modern neighborhood less than 2 km from the city walls. Public works projects since 2000 have revealed a villa, part of a Roman road, a nymphaeum, a cemetery with mausoleum, and a large (1,000 m\(^2\)) industrial complex\(^{35}\) which Italian archaeologists believe is a fullery or tannery of the 2nd-3rd c. A.D. A total of 138 individuals were examined, 38 from a mausoleum and 100 from a necropolis. Sex and age were assessed through standard bioarchaeological methods.\(^{36}\) More male (n=54) than female individuals (n=24) were found. The average age at death of adults is in the 31-40 year-old range.\(^{37}\) Castellaccio Europarco

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31 Paine and Storey 2006, 76.
32 Cic., *de Leg.*, 2.23.58.
33 Toynbee 1971; Purcell 1987; Champlin 1982.
34 For additional information about the lead concentrations and isotope ratios of the Casal Bertone and Castellaccio Europarco populations, see Montgomery *et al.* below in this volume.
35 Musco *et al.* 2008.
37 Killgrove 2010, chapt. 4.
includes a necropolis situated in the suburbium along the via Laurentina. Ongoing excavations since 2004 have brought to light the road, a bridge, two villas and hydraulic works that helped prevent the Tiber from flooding. Masonry technique, artifacts and an inscription dating to A.D. 177 point to three phases at this site: 4th-3rd C. B.C., 2nd-1st C. B.C. and 1st-2nd C. A.D. Skeletons were found in each phase. A total of 45 were examined from the latest period. Among adults, more males (n=24) than females (n=7) were found. The average age at death is in the 31-40 year-old range.

A variety of characteristics reflects the diversity of the individuals buried at these sites. Although their demographic profiles are similar, Castellaccio Europarco has a higher incidence of disease processes such as carious lesions, porotic hyperostosis and cribra orbitalia. Its burials were more diverse in form than those at Casal Bertone, possibly indicating differences in the wealth, status, or origin of the people. Castellaccio Europarco lay at an important crossroads where migrants may have settled. The large industrial complex at Casal Bertone perhaps employed foreigners. All burials at these sites were simple, many in the a cappuccina (tile-covered) style, and nearly all lacked grave goods.

Methods

The most useful chemical methods for studying ancient migration are isotope analyses of the ratios of $^{87}$Sr/$^{86}$Sr and $^{18}$O/$^{16}$O present in the human body. The oxygen isotope ratio of both meteoric and environmental water (rain, snow; rivers, springs, lakes) varies by region in relation to factors such as temperature, humidity, distance from the coast, latitude, rainfall and elevation. Oxygen is incorporated into the body through the ingestion of water and food, as well as the inspiration of air. Strontium isotope ratios, on the other hand, are related to bedrock and the geological peculiarities of a particular region. As bedrock weathers, it releases strontium into groundwater and surrounding soil, and this element is incorporated into the human body during tissue formation. Chemical analysis of human skeletal remains can thus indicate whether an individual moved during his or her lifetime, and potentially even the area from which the person came.

Several isotopic studies have been carried out to investigate migration in antiquity using both oxygen and strontium, but the study by T. Prowse et al. is the only isotope analysis of migration to have been performed in central Italy for the Roman Imperial

38 Buccellato 2007; Buccellato et al. 2008.
39 Craig 1961; Ga1 1996.
40 Dupras et al. 2001; Evans et al. 2006; Prowse et al. 2007.
period. Comparisons in oxygen isotope ratios between paired first and third molars indicated that a large number of migrants came to Portus as children.\textsuperscript{42} It was not possible for the researchers to pinpoint immigrants' places of origin because of the imprecision of isotopic gradients, but there is clear evidence that men, women and children immigrated to Portus in the Imperial period.

Although there are data on the oxygen isotope ratios of meteoric water in Italy, the entirety of the Tyrrenian coast is undifferentiated, meaning it is impossible to tell, using oxygen isotopes alone, if an individual originated at Rome or at any other location along the W coast of Italy.\textsuperscript{43} Whereas oxygen isotope ratios vary roughly E to W, strontium isotope ratios vary roughly N to S owing to the volcanic geology of a large part of the peninsula.\textsuperscript{44} Studying migration in Imperial Rome therefore necessitates both strontium and oxygen isotopes to characterize ancient mobility. In this paper I report on the immigrants identified through strontium isotope analysis and attempt to contextualize their lives. Publication of the entirety of the strontium results combined with an oxygen isotope analysis of a subset of the population is available in my dissertation.\textsuperscript{45}

One non-pathological first molar was extracted from every skeleton at Casal Bertone (n=79) and Castellaccio Europarco (n=26) which possessed at least one of these teeth. Although osseous tissue remodels and regenerates throughout the lifetime of an individual, teeth do not remodel following amelogenesis and eruption — they only wear down. The permanent first molar begins forming shortly after birth, and the crown is complete around the age of three.\textsuperscript{46} The isotope ratio measured from the permanent first molar, then, represents an average over the first three years of an individual’s life. At the Isotope Geochemistry Laboratory of the University of North Carolina, Chapel Hill, dental enamel was extracted from 105 ultrasonically-cleaned, sectioned first molars using a Brasseler handheld dental drill fitted with a round carbide bit. Strontium was extracted from the samples and measured using the protocols and standards given in M. Perry et al.\textsuperscript{47}

Since no other strontium isotope analyses have been performed to date on human skeletal remains from ancient Italy, understanding the bioavailability of strontium at Rome is difficult. Based on strontium isotope analysis of volcanic samples from the Alban Hills complex, the $^{87}{\text{Sr}}/^{86}{\text{Sr}}$ ratio of Rome consists of a range from 0.7090 to 0.7103.\textsuperscript{48} However, Rome was importing a significant portion of its drinking water through aqueducts that tapped springs in the pre-Apennines. Strontium ratios measured at springs in the Monti Simbruini near the source of several ancient aqueducts yield values in the range of 0.7079 to 0.7080.\textsuperscript{49} The strontium ratio (0.7092) of seawater and rainwater probably contributed to the strontium ratios of both humans and animals as well. Based on a mixing model that takes into account the lower strontium isotope values of aqueduct water and the higher

\textsuperscript{42} For a recent discussion of the article by Prowse et al., see C. Bruun’s article in JRA 23 (2010) and my subsequent response.

\textsuperscript{43} Longinelli and Selmo 2003.

\textsuperscript{44} Turi and Taylor 1976.

\textsuperscript{45} Killgrove 2010.

\textsuperscript{46} Hillson 1996.

\textsuperscript{47} Perry et al. 2008, 540-41.

\textsuperscript{48} Ferrara et al. 1985; Federico et al. 1994.

\textsuperscript{49} Barbieri and Sappa 1997.
strontium isotope values of the volcanic geology, a local strontium isotope range for the geology of Rome and the suburbium may be estimated conservatively at .7079 to .7103. Mammals process strontium from both water and food sources, however, meaning that biological strontium ratios can represent a slightly different range than that obtained from geological material. Lacking further data on the bioavailability of strontium with which to refine the strontium isotope range characteristic of Rome and its suburbium, here I take a necessarily conservative approach and identify only clearly anomalous individuals as immigrants.

Of the 105 individuals analysed, 7 were identified as significantly different isotopically from the local range of Rome: 2 (7.7%) from Castellaccio Europarco and 5 (6.3%) from Casal Bertone. These figures are slightly higher than Noy’s estimate of 5% immigration at the height of the empire. A visual presentation is given in the form of a dot histogram of all strontium ratios measured (fig. 9.2). Black dots represent non-local individuals whose strontium ratios are 2 standard deviations (95% CI) from the overall mean. Grey dots represent non-local individuals with strontium ratios 1.645 standard deviations (90% CI) from the mean. Non-local individuals are identified by their skeleton numbers to facilitate further discussion.

Fig. 9.2. Dot histogram of \(^{87}\text{Sr}/^{86}\text{Sr}\) ratios.

<table>
<thead>
<tr>
<th>ID</th>
<th>Sex</th>
<th>Age</th>
<th>Height (cm)</th>
<th>Burial style</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castellaccio Europarco</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET76</td>
<td>M</td>
<td>11-15</td>
<td>170</td>
<td>assente</td>
</tr>
<tr>
<td>ET38</td>
<td>M</td>
<td>41-50</td>
<td></td>
<td>assente</td>
</tr>
<tr>
<td>Casal Bertone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T8</td>
<td>M</td>
<td>7-10</td>
<td>piana</td>
<td></td>
</tr>
<tr>
<td>T36</td>
<td>M</td>
<td>14-16</td>
<td>in anfora</td>
<td></td>
</tr>
<tr>
<td>T15</td>
<td>M</td>
<td>31-40</td>
<td>piana</td>
<td></td>
</tr>
<tr>
<td>T24</td>
<td>M</td>
<td>51-60</td>
<td>piana</td>
<td></td>
</tr>
<tr>
<td>T72</td>
<td>M</td>
<td>11-15</td>
<td>assente</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 9.1 DEMOGRAPHICS OF IMMIGRANTS

Contextualising immigrants

Following the identification of possible immigrants, it becomes possible to investigate migrants in comparison with the population as a whole. By placing individuals in relation

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50 For a full explanation of this model, see Killgrove 2010.
51 Noy 2000.
52 Individual T72 presented a strontium isotope value at the lower border line of the Roman range and is cautiously interpreted here as an immigrant; see Killgrove 2010 for further discussion.
to others in their own community as well as other communities across the empire, we will be able to begin to piece together the lived experiences of immigrants.

**Castellaccio Europarco**

The burials at Castellaccio Europarco were not arranged in a particular cemetery or necropolis context, but were often made at the base of or close to structural features such as walls flanking the *via Laurentina*. Four main burial styles were identified by the excavators:
- *a cappuccina* or *tegola* (a burial covered by vaulted or flat tiles);
- *in anfora* or *in coppa* (a burial in a ceramic vessel);
- *assente* (lack of burial covering); and
- *blocchi basalti* (burials at the base of a wall).

The vast majority were simple, lacking any covering (75%). A handful were tile burials and burials of subadults in amphorae or other pottery vessels.

Based on the strontium results, two outliers represent a lower and a higher strontium value than typically found in Rome. ET76 was a probable male who was about 15 years old at the time of death. This mostly complete skeleton had no noted postcranial pathologies and only a little dental calculus. ET38 was a male in his 40s who stood 170 cm tall, the average for a male in this population. There was evidence of degenerative changes in his mid-back and hips, but these are normal in middle age. His dental health was quite good, with only slight calculus build-up on his anterior teeth and a few ante-mortem chips. He had bilateral rhomboid fossae, indicative of a strong costoclavicular ligament attachment (fig. 9.3). He had probably engaged in repeated and forceful movement of both arms. Both were males who came to Rome some time after three years of age. With only two immigrants identified at Castellaccio Europarco, it is difficult at this point to find patterns in the associated osteological data.

**Casal Bertone**

Casal Bertone consisted of two burial locations: an above-ground mausoleum that housed loculi with multiple skeletons in each, and a nearby necropolis. The mausoleum slighty postdates the necropolis as its foundations were built atop several graves. Within the necropolis, the excavators noted 4 types of burials:
- *a cappuccina* (covered by a vaulted tile structure);
- *piana* (covered by a flat tile structure);
- *assente* (no covering); and
- *in anfora* (burial within an amphora).

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54 Hawkey and Merbs 1995.
The majority of burials (57%) in the necropolis had either a cappuccina or piana style tile-coverings, while 35% lacked a covering and about 8% (only subadults) were found in amphorae.

Based on the strontium results, the 5 anomalous individuals represent three values lower and two higher than Rome. All identified immigrants come from the necropolis of Casal Bertone (5 out of 57, or 9%). No skeleton (0 out of 23) from the mausoleum had an anomalous strontium signature. Individuals in the mausoleum might have been of slightly higher social class than those in the necropolis, possibly even members of a collegium associated with the nearby fullery or tannery. Burials in both mausoleum and necropolis covered all age ranges and both sexes. The non-local individuals consist of three subadults and two adult males.

T36 represents an adolescent of about 14-16 years (sex unknown). Although the teeth were in reasonable condition, there is evidence of healing cribra orbitalia on the skull and of periostitis on the legs, indicating physical stress from a poor diet or disease. Evidence of a strong conoid ligament attachment on the right clavicle indicates that this young adult probably engaged in forceful or vigorous back-and-forth movement of the right arm on a repeated basis (as, e.g., in rowing or swinging a stick to beat cloth). Of all the amphora burials, T36 is the oldest individual; most amphora burials at both Casal Bertone and Castellaccio Europarco are of children under 5 years of age.

T8 was a child of about 7-9 years of age. While this child’s skeletal health was reasonable, there were carious lesions in the baby teeth, a dental abscess that led to loss of another deciduous molar (fig. 9.4), and extensive destruction and remodeling of the alveolar bone.

Fig. 9.4. Abscess and ante-mortem tooth loss of deciduous right maxillary first molar from Casal Bertone, T8.

Fig. 9.5 [right]. Lateral view of left and right fifth metacarpals from Casal Bertone, T24, showing a probable healed fracture on the right.

T72 was an adolescent between 11 and 13 years old at the time of death. The enamel hypoplasias on all four of the canines suggest a systemic physical stress event (possibly dietary or disease-related) around the age of three and a half.

55 Ibid.
T24 was a male in his 50s who stood about 175 cm tall (a little over the male average at this site). He had multiple sites of arthritis in his feet and lower jaw, evidence of a healed fracture in his right hand (fifth metacarpal: fig. 9.5) and signs of possible use of his teeth in a repetitive action. There was considerable ante-mortem tooth loss and a healing dental abscess.

T15, a male in his 30s, has the most divergent strontium ratio. He had quite a few areas of bony deformity as a result of either arthritis or trauma sustained to the left hip and left elbow. His mid- to lower back had bony lipping of the vertebral bodies and Schmorl’s nodes, indicative of possible disc herniation. On his right ulna there was a strong brachialis muscle attachment, indicating repeated elbow flexion (as seen, e.g., in lifting heavy objects with the arms). In his dentition there was evidence of ante-mortem tooth loss, carious lesions, calculus and chipping.

Assessing origins

In order to work out where non-local individuals originated, it is necessary to define the lithologies in the area where an individual obtained his or her food and water. The anomalous strontium ratios in this study are both lower and higher than the local area of Rome. The higher individuals, ET3S and T15, probably lived in an area with older Palaeozoic rock such as granite. This type of rock is sparse in the Italian peninsula, the only large outcappings being found in Calabria and NE Sicily. Older granitic rocks are also found in the Alps of Germany and Switzerland, as well as in a large outcrop on the E coast of Corsica. Based on strontium signatures, all these are possible homelands for individuals ET3S and T15, but oxygen isotope data suggest that a N Italian origin in Liguria or Tuscany is most likely.

The two individuals (ET76 and T8) whose strontium ratios are slightly higher than the local Roman signature probably lived in an area with a geological signature higher than that of the volcanic area of Rome. Published strontium isotope data of the volcanic areas north of Rome (Monte Vico, Monti Sabatini and the Tuscan magmatic area) all give ratios slightly higher than Rome. ET76 and T8 have statistically higher strontium ratios than the individuals identified as local and were probably short-distance immigrants to Rome.

Individuals with a lower strontium ratio than Rome include T36, T72 and T24. A lower strontium ratio means that an individual was obtaining water from younger geology such as volcanic rock or carbonate. The geology of Rome is anomalous, ranging from c. .7090 to .7103, despite its composition of young volcanic rock. Other volcanic areas include Vesuvius, Monte Vulture in south-central Italy, Etna in Sicily and the W coast of Corsica. Pockets of sandstone and limestone, which tend to have lower strontium values, dot the peninsula. Measured strontium isotope ratios from most of these contexts demonstrate lower numbers than the Roman volcanic region. As above, oxygen isotope data for these individuals help narrow down their probable homelands: T24 might have come from the

56 Ibid.
58 Faure and Powell 1972.
59 Killgrove 2010, chapt. 9.
60 Turi and Taylor 1976; Avanzinelli et al. 2008.
Apennines, T72 from a geographical area similar to Calabria, and T36 from a region isotope-ically similar to N Africa.\textsuperscript{62}

Using the criteria established to approximate the strontium range of Rome and its suburbium, 7 out of 105 individuals were found to be non-local. Pinpointing immigrants' homelands using only strontium is difficult since the geology of an area does not necessarily translate directly to the strontium signature of a human tooth. If we make the conservative assumption that most immigrants to Rome came from the Italian peninsula, it is likely that the immigrants identified here came from areas such as Liguria, Tuscany, Lazio, the Apennines, Calabria and Africa.

\textit{Bodies of (migrant) work}

Prowse \textit{et al.}'s oxygen isotope study at Portus found that men, women and children were immigrants. The strontium results from the present study similarly confirm that some men immigrated to Rome after the age of three, and there is evidence of children immigrating to Rome after age three but before the age of majority, but neither Casal Bertone nor Castellaccio Europarco has produced clear evidence of women as immigrants. It is unsurprising that 4 of the 7 individuals with anomalous strontium ratios are men, as men were more mobile due to occupations that forced them to travel (e.g., soldier or merchant). It is unclear if the children came to Rome with their families, as slaves or on their own. As it is impossible visually to determine sex from subadult remains, it is not known if the children were male or female. Most immigrants to the city appear to have come from areas relatively local to Rome in a rural-to-urban move sometimes called centripetal migration,\textsuperscript{63} and at least two individuals in the isotopically-identified immigrant population came from a considerable distance, possibly as career migration.

Although there are no comparative strontium data from ancient Italy, several researchers have published information on pathological conditions in skeletal populations contemporary with those at Casal Bertone and Castellaccio Europarco, namely, from Vallerano,\textsuperscript{64} Quadrella,\textsuperscript{65} Portus,\textsuperscript{66} Lucus Feroniae,\textsuperscript{67} Vagnari,\textsuperscript{68} Herculanum,\textsuperscript{69} Pompeii\textsuperscript{70} and Urbino.\textsuperscript{71} These sites date to the Imperial period but are distributed throughout the peninsula, some being urban settlements, some rural. The most comparative data to come out of these projects include dental pathologies (carious lesions and linear enamel hypoplasia) and cranial pathologies (porotic hyperostosis and cribra orbitalia).\textsuperscript{72} If we contextualise the populations of Casal Bertone and Castellaccio Europarco and their immigrants, for the most part the individuals from Rome appear to be healthier than their counterparts in the peninsula, with lower frequencies of carious lesions and linear enamel hypoplasias, as well

\textsuperscript{62} Killgrove 2010, chapt. 10.
\textsuperscript{63} Scheidel 2004, 14.
\textsuperscript{64} Ricci \textit{et al.} 1997; Cucina \textit{et al.} 2006.
\textsuperscript{66} Prowse 2001.
\textsuperscript{68} Prowse 2008.
\textsuperscript{69} Bisel 1991.
\textsuperscript{70} Henneberg \textit{et al.} 1996.
\textsuperscript{71} Vargiu \textit{et al.} 2007; Paine \textit{et al.} 2009.
\textsuperscript{72} See also Gowland and Garnsey above in this volume.
as lower frequencies of cribra orbitalia. Individuals at both study sites have lower overall frequencies of linear enamel hypoplasias as compared to the other urban sites (Herculaneum, Pompeii, Portus). Based on a few basic osteological indicators of health, it appears that individuals from the two study sites overall were subject to fewer physical and environmental stressors, such as malnutrition and infectious disease, than individuals from around the peninsula. This is possibly the result of good access to clean water in the city and suburbium.

The pathologies of individual immigrants from the study sites, however, tell a slightly different story. Skeletal lesions on T8, T72 and T36 suggest these adolescents were either sick or were not being fed properly over sufficient stretches of time to cause bony and dental lesions. Both adult males (T24 and T15) similarly had poor dental health compared to the remainder of the Casal Bertone population. Three (T36, T24, T15) of the four Casal Bertone immigrants show traumatic injuries and exostoses that indicate they engaged in physical labor throughout much of their lives. Evidence of muscle overuse was found in the upper bodies of these individuals, indicating repeated lifting and swinging motions. As the Casal Bertone cemetery was located near a large industrial area (fullery or tannery), it is possible the men and children worked there.

Discussion

The first step in assessing immigration to Rome — namely, finding individual immigrants — can be accomplished with chemical analyses of human skeletal remains. Further work is planned to characterize the bioavailability of strontium in Rome given the complex geology of the region and heavy reliance on aqueduct water and imported food in the Imperial period, but the preliminary strontium isotope results presented above do show outliers in the data set indicative of non-local individuals. In comparing these non-local individuals to the rest of the population, it appears that immigrants were not as healthy as locals. In addition, evidence was found suggestive of both short- and long-distance movement among subadults and adult males, but not among adult females. Further research questions will be raised as this project progresses in order to understand more fully the phenomenon of migration and the lives of migrants in the Roman empire.

Theories of transnationalism frame my research questions in terms of identity, ethnicity and agency and in ways that can be addressed by looking at the bioarchaeological data from the two study sites and other Roman skeletal populations.

Identity

Transnationalism involves migrants who transgress traditional boundaries and create and maintain relationships that span these borders. In the modern world, anthropologists are interested in migrants’ economic ties to their homeland, in whether they send money to family back home or own property in different nations. Although the pre-industrial world probably did not allow for such events, soldiers and their families stationed away wrote

73 Killgrove 2008 and 2010, chapt. 5.
74 Killgrove 2008.
75 Bradley 2002.
letters home, and people could send and receive money while away from home. Two questions that can be asked of bioarchaeological data include:

- Did the transmigrant move only once, multiple times, or in a cyclical manner away from and then back to his or her homeland?
- Did the transmigrant maintain cultural ties to his or her homeland while living elsewhere?

It is possible to investigate the first question using strontium or oxygen studies of an individual at several points during his or her life by testing teeth that form at different ages. The second question is often approached archaeologically through material culture or burial style, but that method would not pick up an individual who tried, or was made, to assimilate with the host culture. One method of investigating cultural ties is by an analysis of habitual actions (e.g., unique methods of manufacturing an object). The skeleton constantly remodels to accommodate the actions of muscles and joints (whereas it does not remodel dental wear). Specific patterns of movement could indicate retention of traditional methods of, e.g., spinning or leatherworking. Another method of investigating cultural ties is the use of carbon and nitrogen stable isotope ratios that serve as an indicator of an individual’s diet. Lack of evidence of dietary change in a transmigrant could indicate maintenance of traditional foodways and his or her identity. The results of the carbon and nitrogen isotope analysis of the Castellaccio Europarco and Casal Bertone skeletons suggest that some immigrants acculturated to a Roman-style diet after arriving in the city.

**Ethnicity**

Transmigrants operate within a community, and the composition of that community is also of interest anthropologically. Transnational spaces in contemporary anthropology involve areas where transmigrants can construct multiple or situational identities. A Mexican transmigrant to the U.S.A., for example, probably has differing identities in his or her Spanish-speaking home and English-language school. More concretely, transmigrants exist physically within a geographic space or ethnoscape; the ethnic construction of that community is of interest to the anthropologist. We can ask questions such as:

- Did transmigrants from the same homeland live in geographic proximity in homogeneous communities in the host country?
- Did transmigrants live in polyethnic communities, heterogeneous in composition yet still separate from the local inhabitants?
- Were transmigrant communities dispersed throughout the city or were they located on the fringes?

Through a combination of strontium and oxygen isotope studies, we may be able to identify the approximate geographical origin of transmigrants living in polyethnic communities and understand the way individuals in these communities chose to display or conceal their ethnicity.

**Structure and agency**

Finally, transmigrants and polyethnic communities operate within a larger socio-political structure. It is at this level that we can start engaging questions of transmigrant agency:

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76 Bowman 1998, 82.
78 Killgrov 2010, chapt. 11.
79 Appadurai 1996.
• What was the consensus about immigrants in the host culture?
• How did the transmigrant react to the socio-political context — by complete cultural assimilation, by maintenance of traditional ways, or somewhere in between?
• Did female transmigrants react differently than males?
• Were upper- and lower-class transmigrants treated differently?

It is no accident that these questions return us to the experiences of individual transmigrants, for “migrants act and are ‘acted upon’ with reference to their social, cultural, and gendered locations” — that is, there is a dialectic of agency and structure, and both the individual and the structure are important for understanding the social process of transnationalism.

Conclusions

While not a panacea, strontium isotope analysis can begin to provide insights into questions of migration to Imperial Rome. This study has produced clear evidence of migrants to Rome, individuals who moved from another geographic locale after the age of three and were buried in cemeteries near the city. Archaeological context by itself does not permit identification of these individuals, who were buried in a standard, lower-class fashion with no indication that they had been born elsewhere. Evidence from these two cemeteries indicates that most of the migration was short-distance or centripetal, possibly in the form of rural-to-urban movement in search of economic betterment for individuals and their families, or possibly related to slavery. The combination of strontium ratios with osteological data indicates more males than females immigrated to Rome in these two populations but also that children immigrated. Many of the migrants appear to have engaged in manual labor which caused repeated stress injuries to their skeletons, and many were sickly or malnourished compared to the rest of the population. Strontium isotope ratios are precise chemical signatures in teeth, but mapping them to a geographical area is not a perfect science, since the geology of Italy is complex and individuals ingest strontium from a variety of sources. The combination of strontium and oxygen isotope analysis provides a more thorough method of identifying anomalous individuals and their homelands.

Approaching migration in Imperial Rome from a transnational perspective and combining the available evidence are beginning to allow us to see migrants to Rome in a way that has been impossible before. The potential for a study of identity, ethnicity, memory and agency of migrants in Rome is unparalleled because of all the material and historical evidence available to help formulate questions and test hypotheses. Bioarchaeological approaches can provide evidence of the social phenomenon of migration both synchronically and diachronically at multiple levels of interaction: individuals, families, communities, the empire and even within one individual’s lifespan. Transnationalism and diaspora are new ways of conceiving of migration in antiquity and will help give voice to individual migrants as agents within a social structure who helped create, maintain and negotiate their rôle in a polyethnicsociey.

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81 Killgrove 2010, chapt. 10.
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References


Prowse, T. 2001. Isotopic and dental evidence for diet from the necropolis of Isola Sacra (1st-3rd centuries A.D.), Italy (Ph.D. diss., McMaster Univ., Ont.).


Zanker, P. 1990. The power of images in the age of Augustus (Ann Arbor, MI).