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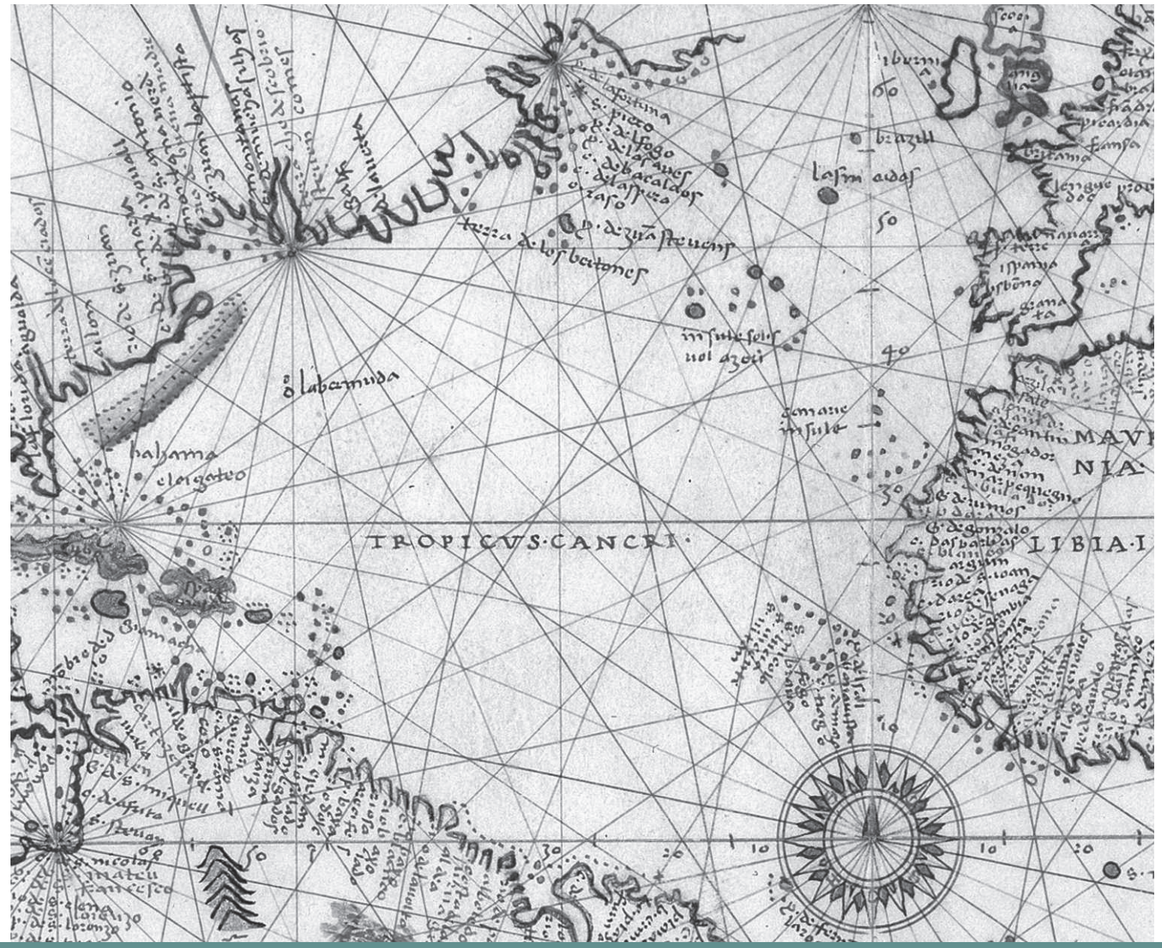

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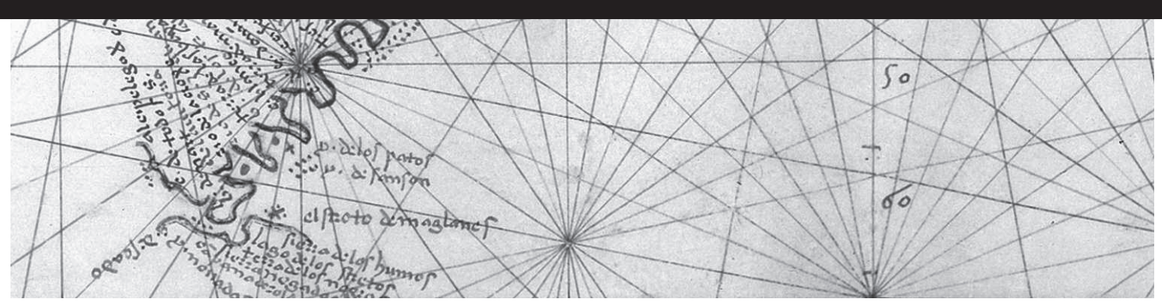

A
Pau Verrié
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In Memoriam

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SOCIAL AND CULTURAL DETERMINANTS OF COMMUNITY WELFARE IN THE WESTERN ROMAN EMPIRE: ANALYSIS AND INTERPRETATION OF VITAMIN D DEFICIENCY

TECHNICAL DESCRIPTION

· Social and Cultural Determinants of Community Welfare in the Western Roman Empire: Analysis and Interpretation of Vitamin D Deficiency, is a project using recent developments in paleopathology to learn more about life for individuals living across the Roman Empire. Led by Professor Megan Brickley of McMaster University, Canada the SSHRC funded project brought together a team of specialists from Canada and the UK.

Principal investigator

· Dr. Megan Brickley, Tier One Canada Research Chair in the Bioarchaeology of Human Disease, Department of Anthropology, McMaster University, Hamilton, Canada.

Research Team

· Dr. Tracy Prowse, Department of Anthropology, McMaster University, Hamilton, Canada.
· Dr. Michele George, Department of Classics, McMaster University, Hamilton, Canada.
· Dr. Simon Mays, Historic England, Fort Cumberland, Portsmouth, Hampshire, UK.

Period of realization

· 1st April 2013 – 31st March 2018.

Funding

· Social Science and Humanities Research Council of Canada, Insight Grant 435-2013-1006.

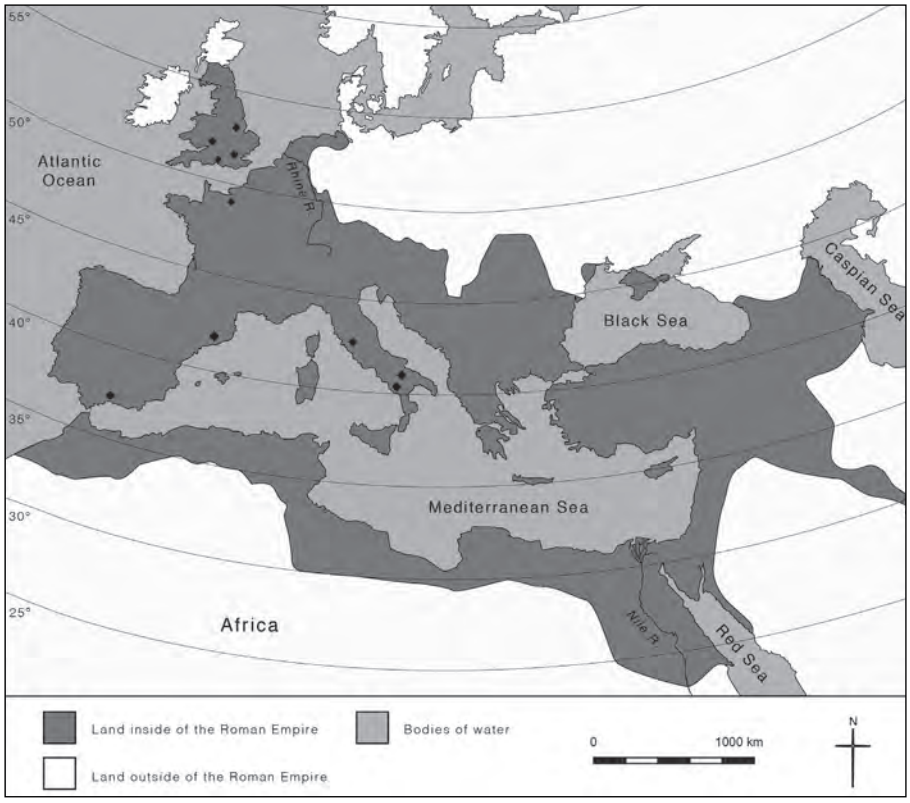

Figure 1
Location of sites used in the project on vitamin D deficiency in the Roman Empire. Some markers indicate the location of multiple sites.
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Symptoms of vitamin D deficiency in the Roman era are identified in the medical writings of Soranus of Ephesus and Galen (both 2nd c. CE), but the extent of the problem has never before been pursued. This project represents the first large-scale study of vitamin D deficiency in diverse Roman populations throughout Western Europe. In healthy humans vitamin D is synthesised in the skin when it is exposed to natural light - UVB radiation (Jones 2000) - with higher levels available at lower latitudes (closer to the equator). It can also be acquired from a small number of dietary sources. Prior to the widespread atmospheric pollution of the Industrial Revolution, time spent indoors, clothing, and to a lesser extent diet would have been the major determinants of individual vitamin D status (Henderson, 2005; Meltzer, 2007). Adequate levels are required for the formation and maintenance of healthy bones, and severe vitamin D deficiency results in skeletal deformity. The term rickets is often used for pathological changes in juveniles, while in paleopathology changes in adults are known as osteomalacia. An assessment of vitamin D deficiency can provide information about a number of important aspects of Roman life, such as attitudes to health, child-care practices, and inequalities based on gender, status, and age. Through the integration of skeletal and funerary evidence, this project offers new insights into the health of Roman populations from diverse geographic contexts, and contributes to emerging debates about the causes and consequences of vitamin D deficiency through time.

Recording of collections of archaeological human remains, associated artifacts and contextual information was undertaken between January 2014 and July 2016. With the assistance of a team of nine students, data was gathered from 3530 skeletons. Recent developments in paleopathological analysis of vitamin D deficiency by the team members were used (Mays *et alii*, 2006; Brickley*et alii* 2007). The sample was derived from 15 Roman settlements of various sizes, from small villas and farmsteads to major urban centres, from a range of latitudes between 37°N-53°N across the UK, France, Italy and Spain (fig. 1). Included in the sample were archaeological skeletons from four sites curated by MUHBA Museu d'Història de Barcelona: Vila de Madrid, Santa Caterina, Drassanes and Carrer Ample I. Individuals buried at these sites would have lived in Barcino, the port city established in 14BC by the Emperor Augustus that went on to become Barcelona (located at 41°N). Recording of the MUHBA collections was undertaken in the summer of 2015 by McMaster graduate students Sarah Timmins and Lisa Semchuk with Tracy Prowse accompanying the students at the start of their recording and Megan Brickley visiting towards the end of the research trip to review the possible cases of vitamin

D deficiency identified. Clear cases of vitamin D deficiency were found in the skeletal material recorded in the MUHBA collections and included an active case of rickets in a 1-1.5-year-old child from Vila de Madrid (fig. 2) and a possible case of deficiency in a young adult female from Santa Caterina. There was also an individual who probably had recovered from childhood rickets buried at Carrer Ample I. Analysis of the data gathered is currently at a relatively early stage, but it is apparent that although latitude is the strongest factor in the occurrence of vitamin D deficiency, there are likely to be some cultural determinants of deficiency. Simon Mays is leading the statistical analysis and work is currently underway on classifying the sites analysed in terms of access to outdoor space and the range of craft and industrial work that would have been undertaken in shaded or indoor settings. Relatively high prevalences of deficiency were found, for example, in individuals buried at Isola Sacra, Italy, another port city located at 41°N.
Even at the early stage of analysis it is apparent that age-at-death is the key determinant of whether evidence of vitamin D deficiency will be found during skeletal analysis. Rapid skeletal growth during infancy and early childhood is the main reason that rickets is most often seen clinically in these age groups. Recent clinical work in Europe has demonstrated that although cases of rickets are most frequently reported in younger children, levels of deficiency measured by serum 25(OH)D levels are in fact highest in girls aged 11-18 years (Spiro, Buttriss, 2014: 328). Skeletal changes linked to vitamin D deficiency develop most slowly in adults where growth has ceased; structurally weak bone formed in states of deficiency accumulates slowly as the skeleton remodels (older areas of bone are removed and replaced gradually). The lowest prevalence of deficiency was found in adult individuals. The project will be written up in the summer of 2017 and age-at-death of individuals relative to whether they had an active or healed case of deficiency will be explored to allow the long-term health consequences of deficiency to be considered. The information produced by the current project will go a long way to enabling researchers to access 'the everyday' of lives in the past.

Figure 2
Anterior bowing of the left and right femur (thigh bone) of an infant from Vila de Madrid, aged 1-1.5 years old at death. Bowing is caused by softening of the bone due to an accumulation of osteoid the organic precursor to bone.
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