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## EDITORIAL

*What distinguishes the third number of PCA are two important additions: first the subtitle (European Journal of PCA) which aims to confirm the journal's international character and second Martin Carver's recent nomination to the Advisory Board, another step in its internationalization process and a path we intend to travel in the coming years with other new additions. We are convinced, in fact, that the journal's success is linked to its zest, energy and capacity to propose new ideas and experiences.*

*The research monograph section is dedicated this year to isotopic analyses applicable to a multiplicity of materials (from bones to plant remains). Some of the papers are the result of a seminar organized in Padua in Mai 2012 entitled "New research on early medieval cemeteries", others have been added. Stable isotopes can be used for a plurality of aims from the reconstruction of ancient economy and environment (Marina Vohberger, Gisela Grupe) to people's movement, a topic considered crucial for many historic periods as some of the contributions show: Kristina Killgrove regarding a Roman cemetery in the Republican era, Sarah Inskip with regard to a south Iberian cemetery in Ecija in between the Visigothic and Islamic worlds, Susanne Hackenbek concerning migrations in the Middle Ages, Maurizio Marinato focusing on research projects in Italy. Among other things, these studies integrate isotopic data with other information inferrable from a cemetery context (from grave goods to demography and composition of type and age) and underline, thus, the need for a transdisciplinary approach involving osteology, archeobotany, and material culture.*

*The greater part of the contributions in the 'Beyond the theme' section are also based on sophisticated scientific analyses which are changing how we study archeology and extend immeasurably the information available to archaeologists. A peculiarity of the environmental transformation concerns the formation of the Dark Earths, analyzed in relationship*

to different medieval European contexts by Cristiano Nicosia, Yannick Devos, and Quentin Borderie, who emphasize the links with climatic and geomorphological instability characterizing the transition between the Late Antiquity and the Middle Ages. Elisabetta Castiglioni and Mauro Rotoli present a synthesis of data regarding the cultivation of grains in Northern Italy during the Middle Ages. With respect to the Roman era, characterized by more specialized production, multi-crop farming of 6-8 different grains became commonplace. Different hypotheses (linked to survival strategies or environmental, social/fiscal factors) have been proposed to explain that mutation which influenced production systems and peoples' diets. This is a topic which can, in turn, now avail itself of a plurality of research avenues: from new remote sensing techniques such as LiDAR and radar to environmental investigations. We have already given space in the first two numbers to these topics just as we have in this one which examines it from different points of view: Giovanni De Venuto dealing with archaeozoological data in southeastern Italy, Antonio Rotolo and José M. Martín Civantos regarding the social management of agrarian spaces (on the Trapani Mountains during the Islamic period). Another aspect concerns mining landscapes, reconstructed by Mara Migliavacca, Filippo Carraro, Anna Ferrarese in the Alpine area of Agno-Leogra. Landscapes, thus, as a container of a plurality of anthropic elements (roads and irrigation systems, agrarian systems and uncultivated spaces, sites, places of worship, fortifications), which are to be studied in their interconnectedness over long periods of time. In the project section Letty Ten Harkel (University of Oxford) presents "English Landscapes and Identities" (commonly known as 'EngLald') a five-year project (2011- 2016), funded by the European Research Council which aims to reconstruct the history of the English Landscape from 1500 B.C. to A.D. 1086. Spatial Data Analysis GIS tools, to which we dedicated the monograph in the journal's last number concerning historic cities, is used this time to study the relationship between roads and settlements in Valdorcia and Valdarbia in Southern Tuscany by Stefano Bertoldi.

German research on medieval archaeology occupies the Retrospect section in a synthesis by Barbara Scholkmann.

After the general dossier in the last issue about Public Archaeology in Europe, this issue concentrates on a very recent Italian discussion which originated by the recent outlawing of archaeological excavations on privately held land by the Italian Cultural Goods and Activities General Director, a decision (though it was later revoked) which concerns the much wider issue of the protection of the archaeological heritage and its relationship with scientific research. The problem is apparently specific to Italy. In the current economic situation, it is of paramount importance that protection of archaeological heritage and research progress towards the future in conjunction with each other, to protect the value of our discipline within society and consequently to ensure its survival.

# Past, present and future perspectives in stable isotope analysis: capabilities and constraints

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The author gives an introduction to stable isotope analysis in general and an overview of the most commonly used stable isotopic systems (hydrogen, carbon, nitrogen, oxygen, sulphur, strontium) in bioarchaeology, prehistoric and historical research, and their application to different materials. The focus of the article is on the most important possible materials for examination, such as bone and tooth enamel. For each isotopic system, basic principles, application examples and possible constraints are given.

**Keywords:** stable isotopes, bioarchaeology, bone, enamel

*Questo articolo è una introduzione alle analisi degli isotopi stabili in generale, con una panoramica dei principali isotopi stabili (idrogeno, carbonio, azoto, ossigeno, zolfo e stronzio) e delle loro applicazioni in bioarcheologia, ricerca storica e preistorica. Il contributo mette a fuoco inoltre i possibili materiali di analisi, come osso e smalto dentario. Per ogni sistema isotopico sono forniti principi basilari, esempi applicativi e limiti.*

**Parole chiave:** isotopi stabili, bioarcheologia, osso, smalto

## 1. Introduction

Information on individual and collective life histories is stored in the substance of skeletons, which need to be deciphered.

Fossil vertebrates have been studied since the late 1970s for their stable isotope composition. These isotopic data are sometimes used as proxies for environmental factors, such as precipitation or temperature. Research on biological issues like diet, thermoregulatory physiology, habitat preference and migration, was pushed by paleoanthropologists studying ancient humans and their ancestors (van der Merwe 1982; DeNiro 1987; Ambrose, Krigbaum 2003).