

GEA IN FRONT OF CRONOS, GEOARCHAEOLOGICAL RESEARCH IN ROMAN CONTEXTS OF ANDALUSIA

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Archaeological knowledge informs us that *Hispania*, especially the province of *Baetica* in the south, was the scene of a major urban development during Roman times. In parallel, a set of territories were organised by and for each of the cities that shaped this province. Traditional archaeological studies of this process focused initially on the archaeology of the ancient cities, addressing issues such as urbanization and its stratigraphic sequences. These studies moved gradually to the countryside, considering it an inseparable part of the city, to understand the urbanization process planning (SANTAPAU 2002-2003; BENDALA and ABAD 2008). This process has been historiographically built around cities, *villae* and the organization of the landscape by centuriations and other agrarian systems. Citing Dr. Gurt, the constitution of the city and the management of its territory would be "... a process of long gestation, largely defined through continuous reconfiguration of urban space, according to the new socio-political models that are happening over time, processes that are also detected in the territory in rural installations dedicated to the economic exploitation of itself, the reason to be of the city "(GURT and Sánchez 2008: 181). The same methodology has also been applied to urban transformation processes that took place from the third century AD in the transition from the classical to the Christian city on the one hand, and to the reforms of the late roman *villae* on the other hand. This is an issue that is currently being investigated by diverse authors. Important works to cite are those presented in the book edited by Fernández Ochoa et al. (2008) and the work of Sanchez and Gurt, who, making an assessment on the methodology of archaeology in Hispanic cities during Late Antiquity, put forth, "... the archaeologist will try to explain a world of that will probably escape many nuances "(GURT and Sánchez 2008: 181).

In parallel, the application of methodological development of the last decades in Earth Sciences to archaeological analysis has been highlighted that there are many processes and activities carried out in the past such as deforestation, erosion, the making of drainage schemes, implementation of crops, and the creation of agrarian systems, all of which can be detected thanks to the possibilities of earth sciences. These actions, even if they had left their mark on the archaeological record, usually become invisible to traditional analysis methods, and are key to understanding the true dimension of the urbanization process, or the scope of the topographical changes of the Late Roman world (BROGIOLO and WARD-PERKINS 1999; RIPOLL and ARCE 2001; ALBA 2005). It is important to assess the impact of anthropogenic activities on the environment that are reflected in the profound changes had in the landscape. The creation of cities and the conditioning of their environment for a more effective installation of the city, or the economic exploitation of the resources of their territory, led to such activities.

Few are the cities and territories of the Roman *Hispania* in which these processes have been identified. *Tarraco*, *Emporiae* and *Barcino*, currently have studies of archeological landscapes that enable a true paleoenvironmental reconstruction and

also integrate the archaeological elements with data relating to the physical environment in a diachronic perspective (ARIÑO et al 2004: 111; PALET and ORENGO 2009). It is our intention to expand this landscape perspective to the territories of southern *Hispania*, which not only extends these studies to an area thus far unexplored from that perspective, but also adds new elements of analysis so far not applied to the archaeological record of the Roman cities of *Hispania*.

The sediment, which acts as a matrix for the archaeological remains, is rarely studied, despite the fact that it was profoundly altered by man and has great informative potential. In this regard, the recent geoarchaeological research has proposed to extend the concept of "archaeological record" to archaeological soils and sediments, because they are a result of human action (GOLDBERG et al 2001; GOLDBERG and MACPHAIL 2006; GOLDBERG and BERNA 2010). Also, a methodological approach for the study of archaeological soils and sediments has been developed, which has led to the birth of a subdiscipline of geoarchaeology, archaeological soil micromorphology, which is related to the study of the soil at a microscopic level, to identify sedimentary components and describe their relationship with the surrounding environment. These data allow us to reconstruct the genesis and the types of processes that cause the formation of deposits (BULLOCK et al 1985; FITZPATRICK 1984; STOOPS 2003). The field of archaeological soil micromorphology allows us to study human behaviour through its impact on sediment (COURTY et al 1989; GOLDBERG and BERNA 2010; MACPHAIL and GOLDBERG 2006). This subdiscipline of geoarchaeology has mostly been applied to prehistorical deposits, especially caves.

This methodological process provides data on:

- *Land use*: Certain human activities related to space management are difficult to detect through archaeological materials. However, they leave recognizable traces in the stratigraphic and geochemical record. Occupation surfaces, the remains of structures built with perishable materials, agriculture and animal husbandry, structures combustion and household waste areas are frequently found both in agricultural or mining centres, as well as urban sites. Some of these activities are difficult to assess in terms of the changes of the Late Roman city.

- *Impact of certain economic activities in the sediment*: The trace elements of heavy metals (Zn, Cu, Fe, Pb etc.) are preserved in the sedimentary record depending on the geomorphological conditions of the environment. Its deposition and preservation on archaeological sites are determined, among other factors, from the degree of mining and metallurgical holding, and the weather conditions, that is to say atmospheric pollution in Antiquity, which allows us to talk about the intensity of the metal production from a diachronic perspective and about the relationship between man and his environment. This same assessment of the impact of economic activities on the surrounding and environment of the settlements could be carried out through the study of ancient economical sites as *figlinae*, where pottery was made; *cetariae*, places of fish processing, as well as *villae* and places of transformation agricultural goods.

- *Weather conditions*: The climate, along with other soil-forming factors (organisms, relief, original material and time), modifies the properties and soil constituents, which are likely to be identified.

-*Geomorphological formation processes of archaeological sites*: We refer to processes of erosion, transport and deposition.

This microstratigraphic approach has yielded excellent results in the context of Roman sites in Europe (MACPHAIL 1994, 1998), which have provided new data, especially for the transition from Late Antiquity to the early medieval city. Historiography has gestated a specific term for a type of deposits commonly founded in the transition of the classical to medieval city in Europe, known as "dark earth", which are homogeneous sedimentary strata that result from the alteration of urban deposits whose formation responds to complex pedological processes. Their study reveals an overlap of activities hardly detectable with traditional excavation methodologies, such as erosion, cultivation, manuring or animal husbandry (MACPHAIL et al. 2003). The interpretive scope of this type of context in the discussion of the processes of transformation of the classical *civitas* and the genesis of the Late Antique city is extraordinary. Soil micromorphology and earth sciences are an excellent approach to these processes, which have left behind a poor materiality, and represent an advance in an issue timidly defined until now by classical historiography under the generic term "ruralisation" of urban structures. Such deposits, so common in late antique European contexts, have not yet been detected in the Iberian Peninsula because this methodology has never been applied to the Roman and Late Roman stratigraphic sequences.

Taking into account this archaeological research background, we present a new project in this work, *Gea in front of Cronos, geoarchaeological research in roman contexts of Andalusia*. This project is funded by the Campus of International Excellence on Heritage, which is coordinated by the University of Jaén. The project, that has just begun, has a research team of archaeologists and soil scientists from the universities of Granada, Seville and Cordoba, together with the Archaeological Research Center of Cástulo (Jaén), and forms the basis of the PhD project of the author of this poster.

This project aims to use the methodologies of Soil Science in archaeological contexts of Roman cities and rural sites in the province *Baetica* in order to integrate them in their natural environment as well as a tool to define land use and space management and their consequences on the environment, from the moment of creation to the abandonment of such structures. An objective is therefore to correlate stratigraphic sequences of a significant selection of cities and rural settlements with archaeological information already available, in order to understand the anthropogenic processes (land use, transformation processes, abandonment, management of natural resources) and natural (climate, geomorphology, paleohidrography), involved in the progressive formation of archaeological sites so far, as we know them today. This will allow us to establish a discourse on space management and the urbanization of the landscape in this province of the Roman Empire, which takes us into the evolution of the phenomenon of the city (*urbs*) and its reflection in the territory (*ager*). It means, therefore, to provide an ecological, landscape and environmental interpretation of urbanization process of cities and territories in southern Spain.