

Conclusions and prospects

This monograph has presented a case study of a productive settlement from Hispanic antiquity. In the first part, the approach of the work began by addressing questions that are common across our research, such as the conditioning factors and values of the natural environment, the origin, development and evolution up to recent periods of settlement patterns in the territory, and finally the organisation and structure that were given to the region within the framework of the principles established by Rome. In the second part, however, the case of Torregarcía has been used as a model for archaeological recording and research through the application of new techniques and advanced instruments, a perspective that we consider to be part of the present and imminent future of our humanistic disciplines.

The study of the settlement was based on both positive and negative factors. Among the former are the exceptional state of conservation of the site and the preservation of large areas that are still unexcavated and remain protected by its privileged location in the protected environment of the Cabo de Gata-Níjar Natural Park. On the negative side, despite being a well-known site, it was still often absent from historiography, with important gaps in critical elements such as its chronology, which was loosely dated to the Roman period in general. Finally, its precise function we consider to be misinterpreted, since it has been classified mostly as a factory for salting fish and food preservation.

The objectives and results of the monograph include an exhaustive state of the art on the site, digital and three-dimensional documentation, the analysis of excavated elements and its current topography, together with areas that still preserve the entire stratigraphy.

Although it has yet to be fully described, the work carried out at the site has already shown that its extension is much larger than the area currently visible, expanding in zones on the periphery of the known archaeological complex. The fact that the excavated buildings are surprising in terms of their size and degree of preservation may lead us to interpret partially instead of the whole. Nevertheless, the research required contextualising the site within the framework of Roman urban and territorial order principles. In this sense, Torregarcía should be considered a productive and highly specialised area, linked to the exploitation of marine resources and more precisely dedicated to the exploitation of dyed molluscs. In consequence, it must have been part of the *territorium* of a city, which must have been none other than the *Municipium Urcitanus*. It must have corresponded to one of the legal categories that in Roman culture contributed to expressing the order of the *civitas*

over the territory, a category that, in our opinion, could correspond to a *vicus*. Thus, the installations recorded would have been part of a productive *vicus*, specialised in producing maritime purple and its textile application, belonging to the *civitas* of *Urci*.

However, the development of the explorations allows us to affirm that we are not dealing with a single, unique establishment. On the contrary, it would have been a productive installation representative of other similar installations arranged along this rich coastal strip, of which we have evidence but which have not yet been fully identified and characterised. This circumstance adds value and historical complexity to the segment of the maritime economy of the ancient Almería coastline; in this case specialising and generating a relevant *lucrum*, as we are dealing with *officinae purpurariae*, specialised in obtaining purple, and *officinae infectoriae*, i.e. artisanal spaces suitable for purple dyeing.

The historiography on these issues in classical antiquity, especially on purple, is secular. Moreover, the archaeological literature, limited to *Hispania*, is abundant and growing. Even though progress has been made on some of the most critical questions on the subject, in other aspects, our understanding and the historical questions have changed little from those raised by the scholars and historians of the nineteenth century, and still poorly explored.

Thus, for example, Maurice Besnier's entry for the term *purpura* in the *Dictionnaire des Antiquités grecques et romaines*, one of the great nineteenth-century European antiquarian encyclopaedias, published from 1877 to 1919, is remarkable. Here, the author set out and developed what he considered to be the most important historical aspects of this subject: the definition, characterisation and properties of *purpura*; the etymologies of the word in Latin and Greek; the singular cases of its use in antiquity; the identification and description of the molluscs that provide it; its fishing according to the classical authors, abounding in the arts, times of capture and fishing grounds; the shell fishers and fishermen specialised in its collection, as well as its denomination in the sources (*murileguli, conchylioleguli...*); its organisation into *collegia* and *familiae*; the fiscal conditions to which it was subject; the *ars purpuraria* as knowledge of purple production; the meaning and nuances between terms such as *purpurarius, conchyliarius, blattarius*; the characterisation of the *officinae purpurariae*, and of the *baphia* in the late period; in relation to this later historical phase, elements such as the *ratio purpuraria*, the *comites largitionum* and *procuratores baphiarum* or the *praepositus baphiis*.

Besnier also wrote about the characterisation of purple as an organic material, the first attempts at “experimental archaeology” in his time concerning purple, the ancient processes of extraction, and the shells as vestiges of production, the types of dyes, dyeing and fabrics dyed with purple, the geography of production from Phoenician times and the East, trade, legislation and uses.

Furthermore, the question is how much progress have we made since then in the historical questions about activities surrounding purple in general and about its manifestations in the territory of *Hispania*? Beyond the archaeological descriptions of the productive contexts, there is much room for progress in historical knowledge, *stricto sensu*, of the economy and society related to *purpura* on the peninsular and insular coasts of *Hispania*. To a large extent, taking up these questions for our territory is part of our short-term prospects.

As we have indicated, an essential part of our research has involved the application of new techniques of non-invasive historical-archaeological documentation and study, and important conclusions can be drawn from the results.

Although all the techniques employed are documentary, some stand out as advanced resources for the creation of virtual, three-dimensional, high-precision documentation of the historical and landscape elements present in the study area, and these elements can be differentiated into macro and semi-micro scales, each having more appropriate, but not mutually exclusive, tools. Ultimately, they provide us with quasi-real models of the archaeological remains and the topographical base of the study area.

The aerial LiDAR technique has been used to analyse, on a macro scale, the remains of the Torregarcía paleo-landscape as a basis for defining changes over time. The precision topography that was generated provided a base on which to model, thanks to the capacity of this methodology to isolate the terrain from other natural elements, such as trees and shrub vegetation, or anthropic elements, such as buildings, greenhouses and transport infrastructures. One major contribution is that it has been possible to verify the changing topography of the environment, mainly due to the erosive and depositional effect of the Rambla de las Amoladeras beach. The specific results of the site's contact with the coastline show a coastline drift, especially where the geological substratum allows it, caused mainly by erosive actions but also related to maritime influence. Tracing the change diachronically back to Roman times is complex, as we have seen that the space has been dramatically transformed in two hundred years of history. However, the topographical base has been built on which to integrate future studies.

On the other hand, the use of laser scan or terrestrial LiDAR, supported by aerial data, on a semi-micro scale and on the remains of the *officina purpuraria* structures has allowed us to obtain a complete and highly accurate three-dimensional model of the archaeological remains

of Torregarcía. This is very useful in performing all kinds of building, constructive and architectural analyses in the laboratory. We have also tested modelling methods that previously have been little explored; we have demonstrated the suitability of the combination of terrestrial LiDAR and photogrammetry, both aerial and terrestrial, which complement each other and make up for the shortcomings of each of these digital survey techniques.

From the digital models generated, we are able to extract a large number of products and information of high historical-archaeological value, such as the building sections of the structures, orthoimages from different perspectives, but also volume calculations, high-precision measurements, planimetry, which are beneficial resources for the investigation of the site from a specialised productive space point of view.

The digital model of Torregarcía also provides a reliable basis for the management of the property, for its intervention and conservation, and, if necessary, for proposing anastylosis and more or less virtual reconstructions of the structures.

Thus, the different LiDAR sensors we have been able to use have built and modelled the cartographic, topographic and archaeological base of the site and its surroundings, allowing us to virtualise and transfer the objects of our study to the laboratory.

The combined application of geophysical techniques to the site has been very important, and the historical and experimental conclusions have been valuable, making Torregarcía a case study and example of methodological innovation in this respect.

The use of GPR and magnetometry techniques have provided important information on the geological substratum where the enclave is located, thus contributing information that may be integrated into territorial modelling in the study of the landscape and the coastline on a macro scale. It also provides information on the original topography of the settlement and can contribute to the explanation of the architectural complex and its construction. Magnetometry has made it possible to characterise the magnetic response of this space. It has also made it possible to propose the existence of anomalies of a natural origin and, in addition, probably others of an anthropic nature, which enrich our knowledge of the complex. Moreover, it has been carried out over a wide surface area so that future actions will be able, as in the case of the GPR, to provide feedback for the interpretation of the magnetograms obtained to date.

On the other hand, GPR has been applied more selectively to the open spaces inside and in the vicinity of the archaeological complex. Many of these explorations coincide with the areas where the magnetometer was applied, and therefore constitute a case study of combined techniques.

GPR has made it possible to characterise the stratigraphic layout of the site and has provided considerable information on the geological base and substratum and its behaviour with natural depositional processes. It also suggests the presence of anthropogenic elements that broaden the overall knowledge of the site. As in the case of the magnetometer, it will support future interventions, and the reading of the geophysical anomalies detected will feed back into the results of future projects. Among the contributions to the detection of new constructive structures, some related to water management have also allowed progress to be made in the chronostratigraphic knowledge of the settlement.

The application of GPR on the large Torregarcía shell midden has been unique. Combined with other non-invasive methods and techniques, it has involved the preliminary study of areas of dumping that should be considered waste from purple production. The geophysical study of the shell midden is related to an interesting line of research that aims to obtain information for a quantitative economic history, with analyses in which our team is a pioneer and has successfully applied in other productive contexts of antiquity, such as the dumps in the amphora-producing *figlinae*. For the moment, without great possibilities of comparison with other contexts, the volumetric data of the waste will allow us to extract data on the capacity, importance and productive continuity of the installation, in the same way that the digital modelling of the *lacus* and productive environments of the *officina* will help us to understand the processes and capacities of the *purpuraria* and the *infectoria*, where appropriate.

We cannot conclude this assessment of the techniques without insisting that they all feed back on each other. For example, the artificial creation of the shell midden provides an anthropic element differentiated from the geological one and contributes to the interpretation of the geophysical results.

Nevertheless, even though there is still an enormous amount of data to be recorded, these works have contributed to a better archaeological characterisation of the *ars purpuraria* on the Almerian coast, where the exploitation of the mollusc *Hexaplex trunculus* (which provides a high-quality dye) is dominant, as can be seen in the analysis of the malacofauna.

At this point, we should ask: what are the main questions about the purple economy in Hispanic antiquity that should guide our future research?

Pursuing recommendations from previous historiographical research and assessing the current state of research in Spain, we would highlight some aspects that need to be studied to advance our knowledge of the subject.

Thus, it is essential to investigate the remote origin and development of purple activity on the Iberian peninsula coastline within the framework of antiquity, as well as the

transformation of the productive models that took place in the different stages that are identified. In this sense, several very important issues affect this coastline. For example, it is necessary to advance the knowledge of the initial chronologies of production and the role played by the Phoenician-Punic space. This is a similar problem to those affecting other activities in the maritime economy, such as saltworks, food preservation and vessel traps.

As far as the Roman period is concerned, it is imperative to determine the chronologies of production to correlate archaeological and literary information more accurately, and especially to connect the archaeological contexts with the historical context determined by the evolution of Rome's legislative regulations on *purpura*.

Another important question concerns knowledge of the geography of production, as we still do not have a fully representative map of the areas where *purpura* was obtained in *Hispania*. Furthermore, there is even less cartography to represent the chronological organisation of this activity. For this reason, it is necessary to review the known contexts that are roughly related to ancient fish-preserving activity in order to identify, individualise and characterise purple production areas, especially in comparison with the so-called salting factories. The probability is high that, as in this case, areas linked to purple production may have been interpreted as having a preservation functionality, or no purple activity at all may have been detected in them, as suggested for Lusitanian contexts.

Although we are aware of the limitations of the documentary and epigraphic sources, given the economic, political and social importance of *purpura* activities, it is essential to adopt a socio-economic analytic perspective, as they must have been important to segments of Hispano-Roman society that owned and controlled these production spaces. This approach requires a review of the preserved epigraphy related to the communities where we have evidence that they exploited these marine resources. It is worth investigating the interweaving of the production of purple with other activities and economic sectors that may have been related or necessary, such as fishing and food preservation, the production of textiles of animal origin, dyeing, sheep farming and maritime saltworks. In this sense, it is necessary to extend our analysis of the epigraphic and literary record to sectors such as the *purpurarii*, *infectores*, *vestiarii*, *sericarii*, *salsamentarii* and *piscinarii*. Identifying the individuals involved in these activities would advance our knowledge of the socio-economic mechanisms underpinning them.

Among the most significant aspects relating to the exploitation of *purpura* in antiquity is that it was subject to an extensive corpus of regulations and legislation. For long periods, the *ars purpura* was likely an activity that was regulated by the public authorities. It is essential to carry out a diachronic evaluation of these normative conditioning factors to apply them to the case studies of specific production environments.

The existence of control mechanisms exercised by the authorities over the uses of *purpura* is connected with its symbolic and, therefore, political value and, in this sense, there is a succession of provisions that affected it in Rome since archaic times and that persist even in late Roman times. These regulations may be characterised as sumptuary, restrictive, punitive, and moralising legislation. Regulation undoubtedly affected the sphere of production, and it is therefore necessary to historically link this diachronic regulation with the information provided by the productive spaces. Such critical cartography is essential in order to represent the productive and chronological geography of *purpura* exploitation on the coast of the Iberian Peninsula. In the current state of geographical and chronological knowledge, it is difficult to link the development of the activity with the legal regulations in each case. However, it is undoubtedly an approach of great importance for the advancement of historical knowledge.

A final aspect of analysis seems to be of great interest, and that is the cultural and productive landscape connected with the history of the maritime economy in general and of *purpura* in particular. To this end, we must consider the great importance of literary sources written by naturalists in transmitting information on purple production. The biological cycle of *purpura* molluscs, the different ecosystems where they are found, and the regional varieties are all dealt with by authors such as Aristotle, Vitruvius, Pliny, and Oppian. All these authors show an underlying perception of the environment and the natural landscape based on a specific Aristotelian and Stoic worldview that is a cultural background in these descriptions, as in many others that we find in Latin technical literature, where explanations are offered, for example, for the diversity of dyes and species according to geography and even cosmology through the regional influence of the stars. This brings us closer to the necessary understanding of the vision of the natural world in classical thought, providing support from a cultural angle for the historical analysis of sources dealing with *purpura* and its exploitation.

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