Cerro da Vila: A rural commercial harbour beyond the Pillars of Hercules

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Abstract

In the 20th century, the central area of the *Cerro da Vila* was excavated and known as one of the Roman *maritime villae* in southern Lusitania, producing fish sauces and *salsamenta*. Intensive interdisciplinary research during the last 20 years has changed our picture completely: This Roman settlement belongs to the group of *agglomération secondaire* characterized by a broad differentiated spectrum of working and residential buildings including private and public baths. From a small pioneering settlement of the early Roman Empire a prosperous settlement developed. It expanded further even during the turbulent 3rd century, persisting beyond the Roman rule up to the Visigothic and Islamic periods.

Evidentially, maritime trade, fishing and the processing of marine resources were pursued. The zoological finds and the technical specifications of the production installations show, however, that this was not the common *garum* and salted fish production but an extensive production of seafood delicacies and dyes made from *murex*.

Geo-archaeological research has proved that, since the Bronze Age, man-made erosion in the hinterland led to the continuous silting up of the estuary, known today as *Ribeira de Quarteira*. Some of its palaeo-channels were still accessible from the sea during Roman and early medieval times, one of them reaching directly up to the Roman settlement on the *Cerro da Vila*. When excavating a large area of this shore of the channel in 2007–2008, Roman harbour installations with a wooden pier, a stone quay, related production and storage installations, and seaside “garden” architecture made of fountains, nymphaea and open-air-triclinia could be identified.

Key words: Agglomération secondaire, Roman harbour, quay, maritime economy, seaside “garden” architecture

Resumen

En el siglo XX, la zona central del *Cerro da Vila* fue excavada e identificada como una de las varias villas marítimas romanas del sur de *Lusitania* dedicada a la producción de salsas de pescado y salazones. La investigación interdisciplinaria intensiva de los últimos 20 años ha cambiado completamente la imagen que teníamos hasta ahora. Este asentamiento romano pertenece al grupo de aglomeraciones secundarias caracterizado por un amplio espectro bien diferenciado de edificios industriales y residenciales que incluía además baños privados y públicos. A partir de un pequeño establecimiento pionero del incio de la fase imperial se desarrolló un próspero asentamiento que siguió expandiéndose incluso durante el turbulento siglo III y pervivió más allá de la dominación romana hasta las épocas visigoda e islámica.

Evidentemente, el objetivo era el comercio marítimo, la pesca y la transformación de los recursos marinos. Sin embargo, los hallazgos faunísticos y las características técnicas de las instalaciones de los centros de producción demuestran que la actividad industrial no se limitaba a la producción común de

garum y salazones, sino que abarcaba también la producción de manjares a base de marisco y colorantes elaborados con *murex*.

La investigación geo-arqueológica ha demostrado que la erosión provocada por el hombre en el interior desde la Edad del Bronce originó una continua acumulación de sedimentos en el estuario conocido hoy en día como *Ribeira de Quarteira*. Algunos de los paleocanales aún eran accesibles desde el mar durante las épocas romana y alto-medieval. Uno de ellos llegaba directamente hasta el asentamiento romano en el *Cerro da Vila*. Durante la excavación de una amplia zona de esta orilla del canal en 2007–2008, se pudo identificar la existencia de instalaciones portuarias romanas que incluían un embarcadero de madera, un muelle de piedra, lugares de producción y de almacenamiento conectados entre sí, así como una arquitectura decorativa costera con fuentes, *nymphaea* y un triclinio al aire libre.

Palabras claves: Agglomération secondaire, puerto romano, cais, economia maritime, arquitectura decorative costeira

1. The Roman site and its investigation in the 20th century

The *Barlavento litoral*, a section of the Algarve coast which is exposed to the swell of the Atlantic Ocean, stretches from *Albufeira* to *Faro*. Here, between the *Ribeira de Quarteira* and the *Ribeira de Carcavai*, a distinct cluster of archaeological sites can be observed (Teichner, 2008, 1, 276, fig. 144). Except for the Bronze-Age cemetery of *Vinha do Casão*, these are exclusively Roman monuments, among them the settlement of *Loulé Velho*, located immediately on the Atlantic coast, the villa of *Retorta* in the catchment area of the *Ribeira de Quarteira*, the fishing station of *Marmeleiros* and – the best-known site – the *Cerro da Vila* (Fig. 1).

This area of ruins is situated about 2 kilometres west of the former Portuguese fishing village *Quarteira*. Today, it lies in the middle of the upmarket holiday resort of Vilamoura. The eponymic elevation "*Cerro da Vila*" rises only up to 6 metres above the surrounding former estuary area, the *Ribeira de Quarteira*, which is now silted up. The today artificially reinforced *Ribeira* runs through a reed belt of about 900 metres width that separates the westernmost parts of the known area of ruins (Fig. 1 & 7) from the popular beaches of the *Praia da Falésia*.

The scientific investigation of the *Cerro da Vila* has already lasted for more than a century and can be seen as a case study of the history of Roman and Islamic archaeology in southern Portugal during the 20th century. The site was discovered when agriculture on the fertile soils of the silted-up wetland was being intensified. As early as 1910, Sebastião Philippes Martins Estácio da Veiga, the pioneer of archaeology in the Algarve, found the first signs pointing to a Roman settlement. However, the complete dimensions of the site became only known in 1963 through observations made by José Farrajota. Farrajota undertook the first investigations together with the Lisbon archaeologist Afonso de Paço at a time when building activities increased considerably in this region, in an area that had previously been used only for agriculture (Paço & Farrajota, 1966, 68). Later, the two archaeologists reported that during

their visits in those years they were able to rescue from the shovel of the mechanical digger "... *fragmentos de ânforas, de tégulas, de tijolos, de mármores, de terra sigillata e mesmo de mosaico arrancado nas* últimas *lavras* ... [...fragments of amphorae, Roman roof tiles, bricks, marble, terra sigillata and even mosaics torn out during the last building excavation work...]".

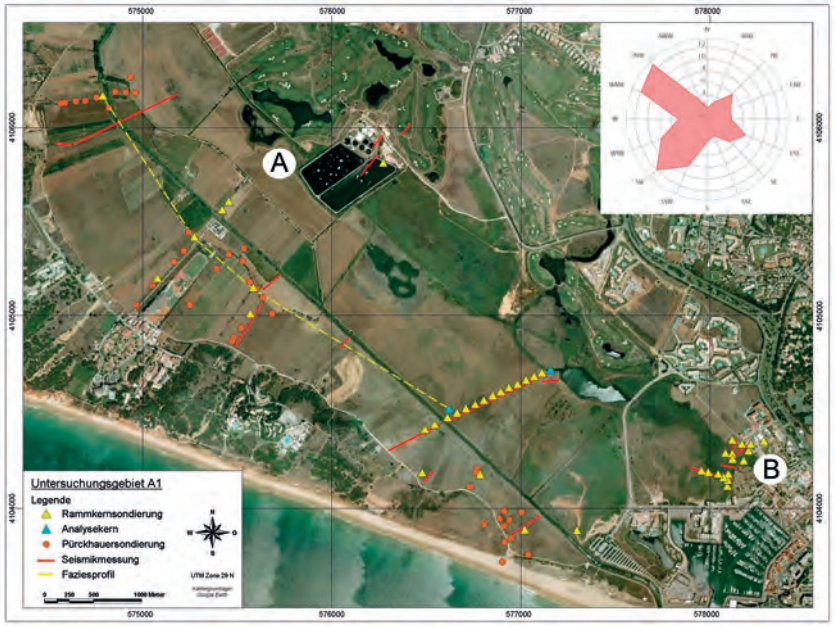

Fig. 1. The silted-up palaeo-estuary of the *Ribeira de Quarteira*, east of the modern holiday resort of Vilamoura (Quarteira, Portugal). The Roman fishing station *Marmeleiros* (A), the seaside village on the *Cerro da Vila* (B), and the different geo-archaeological investigations are marked. Triangles: drillings with a closed corer; dots: drillings with an open corer; lines: geo-seismic surveys (solid line in red) and facies profile (solid line in yellow) (source: Teichner *et alii*, 2014, fig. 10). The wind conditions in the area are indicated as well (reference point: the nearby Almancil, www.windfinder.com).

In total, it was possible to identify an area of more than 3 ha full of surface finds (Fig. 2). In the central area, where two big polychrome mosaic floors (Teichner 2008, 2, pl. 61–63), marble fragments and wall paintings were discovered, the remains seemed to belong to a large residential building assumed to be the *pars urbana* of a *villa rustica* – therefore it was called "*villa*" for some time – which is today known to be the largest residential building of the village (Fig. 3A). The water supply of the Roman site relied upon a canal system that was connected to a contemporaneous dam (Fig. 3P).

Between 1971 and 1991, the Lisbon archaeologist José Luís de Matos was in charge of this important southern Portuguese site. He became the leading investigator of it and had the luck to discover most of the now known structures. With the rapid development of tourism in the 1980s and 1990s, the Vilamoura Resort with its own marina and extended golf facilities experienced its greatest growth and changed the natural topography of the area completely. Only the foundation of an archaeological park on the *Cerro da Vila* (Fig. 2), lying immediately west of the tourist marina, could preserve parts of one of the most significant archaeological monuments of southern Portugal for posterity. Matos managed to excavate and protect several of the western parts of the ancient site, for example a complex of public baths, several residential houses, production and commercial structures besides a necropolis with at least two *mausolea*. Looking at the topography of the area before the construction of the holiday resort of "*Vilamoura*", however, it must be feared that the major part of the archaeological site to the east was destroyed in those years[1]. Nevertheless, it became clear, thanks to Matos' investigations at the time, that the Roman settlement continued to exist until the time of Al-Andalus (Teichner *et alii*, 2017). He

1 The old topographic map from 1951 ("Carta Militar") indicates this, for example, since the toponym "*Cerro da Vila*" refers primarily to the elevation immediately in the area of today's marina. Especially the Islamic-medieval settlement (including the pier we have to assume also for this period) must have lain there.

Fig. 2. Aerial photograph of the *Cerro da Vila*. The position of the following features is indicated: north of the road: the Archaeological Museum (Mu), the residential building with peristyle (A), the public baths (C), the *fabricae* H and J for the processing of marine resources, the temple-like mausoleum K, the turriform mausoleum O, the necropolis (N) and the harbour excavations 2007/2008 (Ex); south of the road: the tourist marina (Ma). (Source: Katja Bieber based on Google Earth.)

discovered a "*forno de cerâmica de época árabe* [a pottery kiln from the Arabic period]" (Matos, 1985, 77), and his studies of the glazed Islamic pottery from the 10th century found and in parts produced at the site had an important impact on the development of Islamic archaeology in Portugal at that time (Matos, 1971, 204; cf. Teichner/Schierl, 2006; Teichner, 2008, 1, 273–274; Teichner, 2017).

Based on the extensive studies of J. L. de Matos, important works on the Roman province of *Lusitania*, for example the study by Maria Luísa Estácio da Veiga Affonso dos Santos on the "*Arqueologia Romana do Algarve* [Roman Archaeology in the Algarve]" (Santos, 1971, 142–147) or several comprehensive studies by Jorge Alarcão, senior professor (*catedrático*) at Coimbra University, were convinced that the *Cerro da Vila* was one of the richest *villae* in Portugal, the residence of a family from *Ossonoba (Faro)* (Alarcão, 1988, 2,3, 206–207), with a settlement history that continued beyond the fall of Rome until the Islamic period.

The economy and wealth of the site seemed to be based – that was common consensus, too – on the production of salted fish and *garum* (Santos, 1971, 143–144). Because of this, everyone expected that this settlement was connected – like so many other fish sauce-producing places in the Algarve (Fabião,

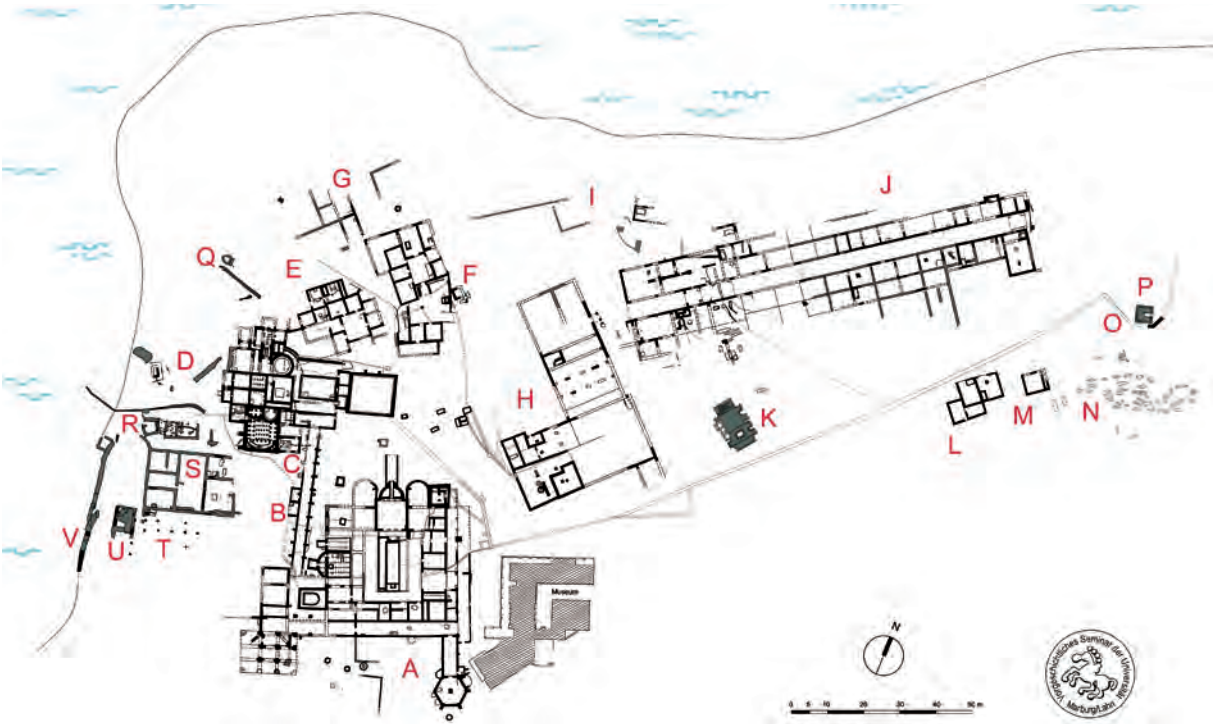

Fig. 3. Archaeological plan of the Roman fishing village on the *Cerro da Vila*, bounded on the north and east by the palaeo-estuary of the *Ribeira da Quarteira*. A: residential building with peristyle (previously known as "villa") – B: portico (*porticus*) – C: public baths – D: garden *triclinium* – E–G and L/M: earlier and later building units and houses with areas for residential and commercial use – H–J: *fabricae* for the processing of marine resources – K: temple-like mausoleum – O: turriform mausoleum – N: necropolis – P: aqueduct – Q and U: *nymphaea* 2 and 3 – R–T: buildings near the harbour (*horrea/fabricae*) – V: quay. (Sources: Teichner, 2008, fig. 147; Teichner, 2017, fig. 5.)

2001; Fabião, 2009; Teichner, 2008, 1, fig. 306) – to the ancient sea trade routes on the Atlantic coast of Hispania. However, it was difficult to find concrete archaeological evidence for this in those days because of the radical changes happening to the *Cerro da Vila* due to the construction of the holiday resort and its marina. Only in September 1991, Jose Luis de Matos and Clementino Amaro, who were trying to focus on this question of the ancient harbour and the connection to the sea, opened a longish sondage of more than 20 metres west of the baths complex C. Between several layers of ancient rubbish and Roman construction material, crossed by small channels, they were able to determine a water basin with a maritime mosaic. It was situated only 3 metres above modern sea level (Fig. 3D & 9A; Teichner, 2008, 1, 343–344) and provided, because of its unusually low construction level (compared to the other buildings) and the surrounding marine sediment layers, a first hint at the ancient shoreline of the *Cerro da Vila*.

2. A new comprehensive view of the *Cerro da Vila* in the 21st century

In 1997–1998, several archaeological trial trenches were dug east of the central building unit A (Fig. 3A) before erecting the current museum building. For the first time, the work on these sondages delivered continuous stratigraphic sequences of the settlement area that reached from the 1st to the 5th century AD (Teichner, 2008, 1, 278, note 448). This was the starting point of a series of new interdisciplinary investigations at the *Cerro da Vila*, continuing up to the present day.

First of all, a new modern archaeological analysis of the site itself and its visible structures was necessary. Therefore, between 1999 and 2003, a German-Portuguese university research project financed by the Fritz Thyssen Foundation in Cologne started with preparatory geophysical surveys in all areas of the *Cerro da Vila* which had not been excavated so far (Teichner, 2005a; Teichner, 2005b; Teichner, 2006a; Teichner, 2006b; Teichner, 2007; Teichner, 2008; Teichner, 2012; Teichner, 2017).

The discovery of the principal structures of an as yet unknown, enormous production building that was 114 metres long (Fig. 3J & Fig. 4) and lay to the east of the then known ruins can be seen as the most spectacular result. However, the 133 archaeological diagnostic trenches distributed across all architectural units known on the *Cerro da Vila* have been more important for understanding the site (Teichner, 2008, 1, fig. 147). As the result of this systematic "re-excavation", it was possible to distinguish and determine 16 buildings in total and to describe their architectural and chronological development (Fig. 3A–P) in the 2008 monograph, the final report of this project. The residential building A was situated in the centre of the preserved part of the site, at the highest point. Since the publications of José Farrajota and Afonso do Paço, this peristyle building had been interpreted as a "*villa*". Today, however, we know that it does not fit in with the typical functions of a *pars urbana* found in a *villa* or a *latifundium*, but that it was the most important and richest building among several other independent housing units, for example E and F. The portico B (*porticus*) included a *latrina* (a public toilet with six seats), a detail never described before by the former excavators, and connected building A in an advanced settlement period to the public baths C. This extended building had surprised the first excavators because of its vast dimensions and was therefore called "*balneário grande*". During its first construction period, it had a symmetrical groundplan; only later an enormous heated *caldarium* was added on its southern side (C17: Teichner 2008, 1, 334–336, fig. 176B).

For understanding the social structure of the population on the *Cerro da Vila*, the existence of several independent houses like the buildings E and F is of special importance. In the case of building F, it was possible to separate a residential part, a storage part and an enclosed yard with its own small *nymphaeum* (Teichner, 2005b; Teichner, 2008, 1, 353–368, fig. 265).

The economical background of the site's luxurious architecture was clearly the harvesting of the maritime resources of the open sea and the estuary. While the residential buildings A, C, E and F were situated on the highest area of the site, they were surrounded by the production and commercial buildings, located clearly nearer to the ancient bank of the estuary. Contrary to the traditional point of view, however, these economic units at the *Cerro da Vila* contain less vats than the *cetariae* of other production centres for fish products in *Lusitania*, for example *Lagos*, *Quinta Marim*, *Ilha de Pessegueiro* and *Tróia*, usually have (Teichner, 2008, 1, 557–565, fig. 305–306). At the same time, the vats in the large production units H–J at the *Cerro da Vila* are also mostly smaller than average vats and none of them are arranged in groups, they are single vats pooled together in large production units that are also known from other Roman sites, for example *Casais Velho* (*Cascais*), *Torreblanca del Sol*, *Fuengirola* and *Mogador* (*Es-Sauria*, Morocco) (Teichner, 2008, 1, 565–570, fig. 307). So the architectural details of the *fabricae* point to a different type of production than the typical *cetariae* for mass-produced salted

products: they point to a highly complex production of more valuable – because produced on a smaller scale – marine specialities, indicating something like the production of dyes, a prestigious industry that needed highly specialized labour.

This deviation from the usual model of processing marine resources with the help of dependent or even slave labour is also reflected in the population structure: a population of specialized crafts- and tradesmen who were clearly socially differentiated can be recognized in the necropolis of the *Cerro da Vila*. Even in 1988, the investigation already focussed on the two tombs east of the central buildings: One of them is the large rectangular mausoleum K with its niches for ten urns in the *columbarium*, the other a tomb with a square groundplan (Fig. 3O). Meanwhile, the careful new reading of the first structure allows its interpretation as a monumental, temple-like mausoleum (K), comparable to similar structures at the nearby villa of *Milreu*, at *Fabara* (*Aragon*) and at *Valentia (Plaza de San Nicolas*) (Teichner, 2008, 1, 512–514, fig. 286; Teichner, 2017, fig. 7). The second, smaller mausoleum O seems to have been built in the form of a tower with a central burial chamber. Unfortunately, a necropolis (Fig. 3N) with incineration and inhumation graves between these two impressive *mausolea* has so far been only partly studied with an anthropological focus (Santos *et alii*, 1992; Santos, 1997).

Furthermore, the constructors of a long aqueduct (P) coming from a Roman dam located in the *Vale de Tesnado*, about 2 km to the northeast, were using the turriform tomb O as an orientation aid. On reaching the site, the aqueduct cut through the necropolis towards the private houses and the public baths complex C. Bringing together these pieces of information on the local necropolis and the aqueduct, we can reconstruct the main access road from this eastern side, too. The road was most likely running parallel to the aqueduct, passing (as usual in Roman times) the necropolis and reaching the main front of building A.

All these different architectural structures together formed a seaside village (and not a *villa maritima* as assumed before). The special characteristics of this *agglomération* can be identified as follows: (1) the great quantity of production units, processing marine resources, (2) the social differentiation between the different building units (of which we can imagine several more in the destroyed eastern part of the settlement) and, finally, (3) the huge, almost oversized *thermae* complex C (public baths) – all these are typical elements of Roman seaside or harbour villages (cf. Lagóstena, 2001, 257–260).

It is difficult to differentiate the occupation phases of the ancient settlement on the *Cerro da Vila* chronologically because – seen from where we stand today – the early excavations of wide stretches of the settlement were inadequately documented at that time. Therefore, important fundamentals for an archaeological periodization of the occupation phases have been lost. Modern stratigraphic observations only exist for the sondages carried out since 1997, thus the relative chronology for the elements excavated before is usually based exclusively on the investigation of the building history. By combining the stratigraphic observations with the analyses of the construction methods, up to seven building phases can be distinguished for certain building units. Now, this finally includes also post-Roman buildings from the Visigothic and Islamic periods (Teichner, 2008, 1, fig. 148; 154; 175; 217).

This is accomplished most clearly for the central building unit A, called "*villa*" in the older literature. It was the largest and most richly furnished building of the settlement on the *Cerro da Vila* (Teichner, 2017, fig. 3). In detail, the following phases can be distinguished: an early compact, fortified farmstead (phase I), the axisymmetrical layout of a peristyle house (phase II), a luxurious extension of this building when a separate private bath (*balneum*) was added (phase IIIa), the extension of the middle Imperial central building including an avant-corps building and a long connecting portico on the southern side (phase IIIb, Fig. 3B), further additions on the eastern front (phase IIIc), the transformation of the building complex by adding a tower (phase IV) and finally a functional reorganization characterized by storage pits and production vats (phase V).

The subsequent synchronization of the building phases of the separate buildings units, however, remains a fundamental problem. The expectedly simultaneous appearance of certain wall-building techniques – Roman concrete (*opus caementicium*), for example, was not introduced before the 3rd century AD – provides important clues regarding this. Nevertheless, the stratified find complexes, for example from an extensive levelling layer of the late Flavian period, and the resulting absolute datings (Teichner, 2008, 2, 99–131, pl. 172–202) were of fundamental importance for the development of a comprehensive settlement history. Moreover, the aqueduct P was an element that connected different building units. It was a prerequisite for the subsequent construction of the public baths C that were characterized by high water consumption. As explained before, the constructors took into account, on the other hand, already existing buildings, for example the mausoleum O, and the necropolis when the aqueduct was built (Fig. 3).

3. The palaeo-estuary of the *Ribeira de Quarteira*

In the end, the correct reconstruction of its palaeo-environment is essential for the understanding of any site related to the maritime economy. In this particular case, the archaeological park of the Roman site of *Cerro da Vila* is today separated from the touristic marina of *Vilamoura* by a secondary road and touristic facilities (Fig. 2 & 6). But in pre-modern times – that was the hypothesis –, an ancient estuary of the *Ribeira de Quarteira*, silted up in later times, granted a direct connection between the Roman settlement and the open sea. At the same time, this estuary offered not only a protected natural harbour and anchoring place, but also a nutrient-rich biotope with an abundant underwater fauna (not only fish, but also shellfish, etc.) that could be harvested for production.

Therefore, a geo-archaeological multi-disciplinary research project financed by the German Research Foundation (DFG) focussed on this hypothesis between 2006 and 2010. The project provided the opportunity to prove this theory and gather as many concrete facts about the palaeo-environment of the site as possible. Traditional archaeological and modern geo-archaeological methods were used to study the changes taking place in several estuaries of the Portuguese Algarve in comparison. In prehistoric and Roman times, these estuaries were still predestined as anchorages, harbours and for establishing fishing villages (Schneider *et alii*, 2010; Trog *et alii*, 2013; Teichner *et alii*, 2014).

As the general result, it has been shown that the main factor in the environmental changes taking place during the late Holocene within the natural estuaries on the southern coast of *Lusitania* was the silting up due to human-caused erosion in the hydrographic catchment areas. For the estuary and the surroundings of the *Cerro da Vila*, the following details can be described: At the end of the Mesolithic and the beginning of the Neolithic, wide river valleys with broad alluvial plains still extended along the *Ribeira de Quarteira*, as was the case on the whole Algarve coast. As a result of the rising sea level, the sea penetrated into the river valleys so that parts of them were continuously flooded. Even in the Copper Age, estuaries like the *Ribeira de Quarteira* continued to be characterized by large open water areas. So at the beginning, these estuaries were still exposed to changes between marine and fluvial influences, but quite soon, the sediment delivery from the hinterland, rapidly increasing due to the human-caused reduction in vegetation, led to a decrease in the marine influence. In addition, the sand spits forming in many places impeded the water exchange with the open sea. It was, however, in those parts of the estuaries furthest away from the sea, where the rivers entered them, that the sedimentation processes started. On a regional scale, the open landscapes – result of animal husbandry and logging – increased to the same extent as the sedimentation in the estuaries advanced. For the Bronze Age – the era for which we can detect human presence in this area with the cemetery of *Vinha do Casão* for the first time with certainty –, the results of geo-archaeological investigations indicate the beginning of the gradual silting up of the flooded marine estuaries not only with marine sediments, but mainly with fluvial sediments.

We can also detect that the influence of the river regarding the sedimentation processes had intensified since the Phoenician period. During the Roman period, large areas of the estuaries on the southern coast of the province of *Lusitania* were gradually filled with sediments. This is also true for the estuary of the *Ribeira de Quarteira* next to the *Cerro da Vila*. As a result, vast estuary areas were already silted up in the Roman period. But at the same time, mainly fluvial water channels remained besides the marshland and the areas of brackish water, with the settlement and economic activities concentrating on these palaeo-channels. For late Antiquity and the so-called Visigothic period, marine sediments were only found in those parts of the palaeo-channels which were influenced by the tide while the documented flood sediments were transported by the rivers from the hinterland into the estuaries. During the time of Al-Andalus, at the end of the first millennium, the estuaries were largely silted up and typical floodplain vegetation established, reflecting a complete separation from any marine influence. Only in very large estuary systems, marshes with glasswort vegetation were still dominant. These marshy areas of the estuaries remained until the late Middle Ages when they were drained in order to use them for agriculture; then, pastures and fields predominated.

It seems evident that these silting-up processes of the palaeo-estuaries – at least in the analyzed estuaries of the western Algarve (*Barlavento*) – had a very strong influence on the region's settlement patterns regarding several aspects, especially in the seaside settlements like harbours, fishing villages, etc. At the beginning of the Imperial Roman period, the palaeo-estuary of the *Ribeira de Quarteira*, where the *Cerro da Vila* was situated, reached still about 5 km into the hinterland and was up to 2 km wide, as is today's river flood plain (Fig. 1). At the shore of this estuary, fishing stations like that of *Marmeleiros* situated about 3 km northwest of the *Cerro da Vila* (Fig. 1A) were still working, meaning access

to the sea was still possible (Teichner, 2008, 1, 413–416). But the increasing silting up, particularly in the especially affected rear areas of the estuaries, forced the inhabitants to give up the early Roman settlement at *Marmeleiros*.

In the case of the *Cerro da Vila*, the palaeo-channel at the southwest front of the archaeological site was located by using selected drillings and seismic refraction measurements as the basis for modelling a transversal transect (fig. 5B–C), while the depositional environment was worked out in sedimentological analyses, especially grain size statistics. A smaller channel to the northwest of the site, that is in front of building J (Fig. 12), was found, too. The remainder of a larger (southwest) channel still existed in the first half of the 20th century, it was mapped as the "*Vala Mestra*" or "*Vala Nova*"[2]. With more than 40 metres width, it has to be imagined as still navigable during the Roman and early medieval periods. Therefore it is understandable that the population and maritime economy of the former palaeo-estuary concentrated more and more on the *Cerro da Vila* with its still open marine access. This is confirmed by a growth of population and a rise in economical activity visible in the archaeological evidence of the *Cerro da Vila*.

Furthermore, the advancing change from marine biotopes to fluvial ones in the estuary, respectively the remaining palaeo-channels, forced the fishermen to adjust. They had to adapt their business to the changing fauna (fish species). Especially the remaining brackish, marshy areas, however, also opened up new work areas, as they are ideal habitats for shellfish and snails.

Besides the overall development of the estuaries of the Algarve, like the one of the *Ribeira de Quarteira*, extraordinary natural marine phenomena have also been of great importance for the development of coastal sediments. Recent geo-archaeological investigations show clearly that several disturbances occurred during the sedimentation processes because of these high energy events, especially storms, but even tsunamis. These led to changes in the conditions for depositing the sediments, having both a strong sudden and direct influence (destruction by tsunami) and an indirect influence (changes to the estuary systems) on the coastal population, affecting their living conditions, their everyday life and their economy (Teichner, 2008; Schneider *et alii*, 2010). In the drillings carried out by the geo-archaeological team at the *Riberia de Quarteira* estuary so far, only the famous Lisbon tsunami of 1755 has been clearly identified and dated. Nevertheless, it is clear that marine sediments documented during the archaeological excavations in production unit J (*fabrica*) indicate another marine high energy event, dated by the stratigraphy (and the related pottery) to the 3rd century (Teichner, 2008, 1, 383).

4. The seaside front of the *Cerro da Vila* and the harbour installations

When the large production complex J north of the residential houses on the *Cerro da Vila* was excavated in 2002 and 2003, its direct orientation towards an ancient branch of the palaeo-estuary northwest of the site – the smaller channel identified in the geological surveys (Fig. 1 & 12) – became evident. The building unit was constructed parallel to the ancient shore. It was about 114 metres long, with a

2 Carta Militar, edition of 1951.

4.5 metres wide road running along its central long axis. At both ends, there was a gate with a double-winged door that could be used to block the road (Fig. 4). The largest building part detected was the double-aisled hall J5 with its 223 square metres, built at the northwest corner of the building unit. A smaller hall (J29) with 53.5 square metres, also supported by two pillars, was situated at the opposite eastern end of the *fabrica*. Between these two storage halls, double lines of rooms were erected on both sides of the central road, all of them containing production units. A few single staircases provide evidence of an upper floor. These ground-floor rooms showed a very regular basic pattern of two rectangular workrooms each that were arranged behind one another. Inside them, single production vats in the form of a long rectangle were found on a regular basis. The vats located in these rooms were used for processing marine resources, as deposits of conches indicate (Teichner, 2008, 1, 377–402, fig. 216). The production vats were between 190 and 245 cm long and 75 to 175 cm wide, with a minimum depth of at least 60 cm according to the excavated features so that we can calculate volumes between 1 and 4 cubic metres for them.

Therefore, a pier for unloading cargo – or rather raw products for this production unit – from the fishermen's ships and for the later shipping of the products has to be imagined (Fig. 4). Unfortunately, however, the property situation at the moment is difficult; the area where the end of the land and the beginning of the palaeo-estuary in Roman times are presumed lies immediately outside the protected

Fig. 4. Suggested reconstruction of the western part of the large *fabrica* J of *Cerro da Vila* during settlement phase C. On the left side (north), one branch of the palaeo-estuary of the *Ribeira de Quarteira* can be seen, in the centre and on the right side, large storage halls and production buildings grouped along an internal road. A gate with a double-winged door spanned the road to control access. In the open yard in the south (front, on the right side), various production vats were used for processing marine resources. (Source: Teichner, 2008, 1, fig. 311.)

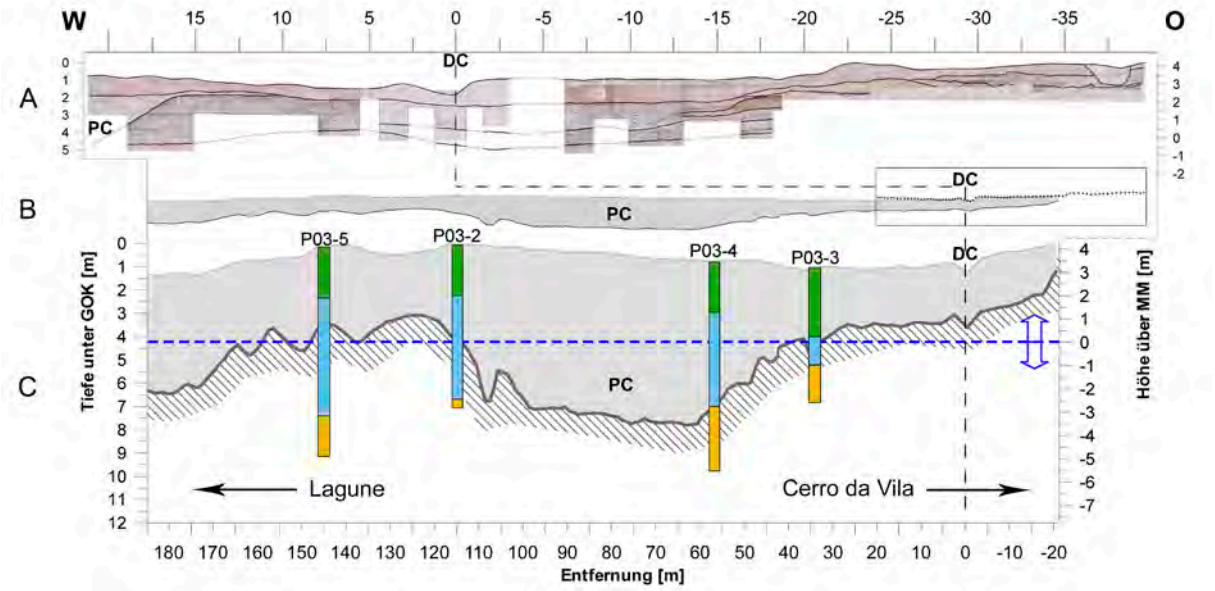

Fig. 5. Modelled profile of the silted-up estuary of the *Ribeira de Quarteira* (B7–8), based on archaeological trenches (A = north profile in trench D, Fig. 6) and geo-seismic surveys (B-C). For the correlation between the three images A–C, the modern drainage canal (DC) and the palaeo-channel (PC) can be used, the Roman settlement is located on the right (east). The grey line (B) indicates the lowest ground limit of the marine sediments (the box shows the position of A in B). The lower profile C represents the drilling cores P03/2–5 with three different levels of sediments (bottom: geological ground sediment; centre: marine sediments; top: fluvial sediments and later fillings). (Source: Katja Bieber and Christoph Salzmann [Marburg/Lahn], based on work by Felix Teichner [Marburg/Lahn] and Christin Hilbich [Zürich].)

zone, in an area designated for the construction of additional tourist apartments. Therefore, it was only possible to detect the ancient coastline in a small trench (Teichner, 2008, 1, fig. 147: sondage 69A), but without having enough space for the identification of any harbour structures.

Completely unexpected, however, it was possible to add to this first piece of evidence for the interaction between the sea and the land during the Roman period in the course of a rescue excavation carried out in 2007 and 2008. The plans to expand the already existing resort of Vilamoura, to construct another holiday resort called "Cidade lacustre" with a second marina in the palaeo-estuary, exactly in front of the archaeological site, demanded this extensive archaeological rescue excavation. This provided the opportunity to excavate the palaeo-channel discovered before by geo-archaeological investigations and the ancient seaside shore west of the settlement on the *Cerro da Vila* (Fig. 6 & 12). Unfortunately, the information remains incomplete because it has so far not been possible to carry out a necessary third and last excavation campaign that would focus on the stratigraphic details and the earliest occupation layer[3].

On the basis of the geo-archaeological information on the palaeo-estuary of the *Ribeira de Quarteira* (Fig. 1), five trial trenches were opened in the relevant area during the first campaign in summer 2007. The aim was to obtain a general idea of the extent to which further archaeological structures should be anticipated and mainly of whether the ancient boundary of the settlement of *Cerro da Vila* could already

3 This is due to the fact that the constructor, the Lusort Corporation, has suspended all work in the excavation area since 2008.

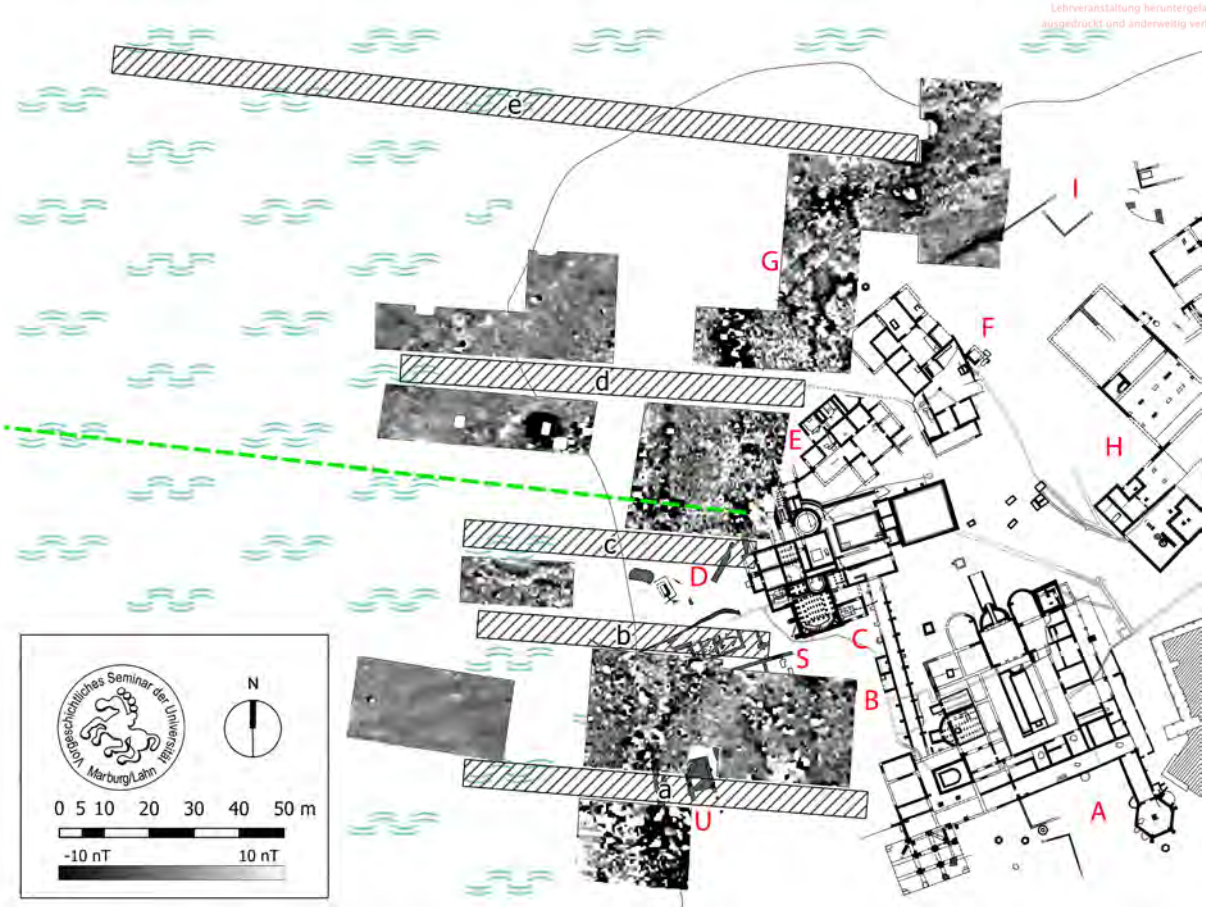

Fig. 6. Map of the archaeological diagnostic sondages (A–E) carried out in 2007, the results of the geo-magnetic surveys carried out in 2008 and the position of the geo-seismic survey shown in Fig. 5A (dashed line). (Source: Teichner, 2008, fig. 149; additions: Katja Bieber.)

be detected (Fig. 6–7). The 6 metres wide trial trenches which were initially planned to be between 30 and 100 metres long had to be shortened because of the instability of the sediment layers in the old estuary system. These trenches were east-west oriented and opened up the possibility to interlink the results of specific archaeological and geo-scientific analyses from the estuary area. At the western edge of the settlement, among modern debris filling, a homogeneous sediment of a fluvial character was found. So by the end of the first campaign, it was possible to verify through concrete stratigraphic observations the assumption that the Roman settlement was founded on a branch of the river course of the *Ribeira de Quarteira* which extended into the slowly silting-up estuary (Fig. 5 top). In these profiles, one palaeo-channel of the *Ribeira de Quarteira* could be exactly identified and georeferenced. Until well into the beginning of the 20th century, this branch, the "*Vala Mestra*" or "*Vala Nova*", ended south of the eponymous *Cerro da Vila* by flowing into the larger "*Vala de Marmeleiros*" which then turned again to the west and joined the major distributary, the *Ribeira de Quarteira*. After this confluence, the *Ribeira de Quarteira* finally issued into the open sea (Dias Diogo, 2001, fig. 5).

Extensive non-invasive geophysical surveys during the winter season 2007/2008 interlinked the trial trenches and then produced the first indications of further building structures parallel to the former riverbank, on the southwest edge of the already known settlement area (Fig. 6). Consequently, an area

Fig. 7. Excavation of the test trenches in 2007 on the western part of the *Cerro da Vila* settlement; view of the trenches A (left), B (centre) and C (right) running from the Roman site (bottom) with its public baths towards the palaeo-estuary (top).

of approximately 1 ha was archaeologically investigated in the following summer 2008, with the excavation covering a larger area along the 150 metres of the western edge of the *Cerro da Vila* (Fig. 9; Teichner and Winkemeier, 2017).

Generally, the first Roman structures and architectural elements were revealed as soon as the modern layers had been removed by mechanical means. Most of the modern layers had been filled in during the construction of the modern touristic marina because the marine sediments excavated out of the marina area had been deposited there (Fig. 5A, top layers). The subsequent manual excavation substantiated the existence of a branch of the estuary (the previously mentioned palaeo-channel) in front of the Roman settlement with its filling of grey sediments which had often preserved organic material in its anaerobic environment. It also confirmed the existence of harbour installations like a quay and an observation deck or tower (Fig. 3V) and a number of production and storage structures (Fig. 3R–T). These architectural elements are especially interesting with regards to the question of the settlement's ancient access to the sea and only they have made an understanding of the site in its entirety possible, particularly regarding its economic function (Fig. 8).

The excavated area as a whole has a high density of buildings, showing the overlapping of constructions from different periods, in many places separated stratigraphically by marine or fluvial sediments.

The orientation and height of the individual features suggest a natural sloping of the terrain towards the west and the silted-up river branch, with a height difference of more than 3 metres between the highest point inside building A on the top of the *Cerro da Vila* and the structures on the shoreline itself.

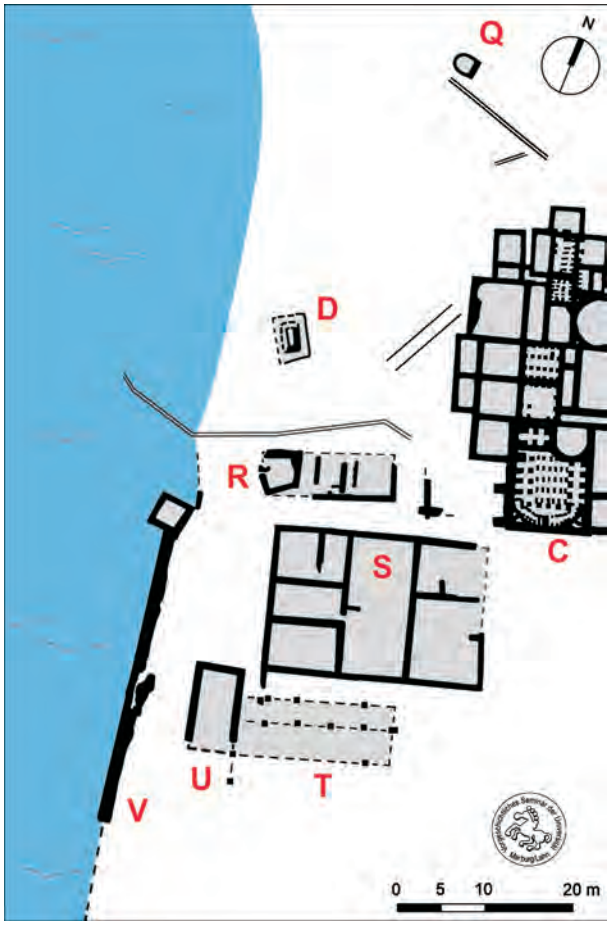

Fig. 8. Western part of the Roman settlement on the *Cerro da Vila* with the seaside "garden" architecture in the north (including *nymphaeum* Q and garden *triclinium* D) and the harbour area in the south, including the baths C, commercial and production buildings R, S and T, another *nymphaeum* U and quay wall V. (Source: Katja Bieber, based on Teichner, 2017, fig. 5.)

This topographic situation of the ancient settlement, with a strong sloping of the terrain towards the shoreline at the western periphery of the site, is especially well visible because of the great concentration of sewage canals (*cloacae*) found during the excavations. More than ten canal lines were running from the east towards west, that is from the settlement at the top of the slope towards the palaeo-channel and the sea. This means that a functioning canalization existed with a sewers system that carried the waste water to the palaeo-estuary. In some cases, it was possible to identify older and younger canal structures (especially UE 48/58), running in the same place but with more than a half metre difference between their ground levels. This is a good piece of archaeological evidence for the continuous adjustments of the Roman settlement to the silting up of the estuary area and its rising water level. The simplest canals were constructed of parallel lines of bricks (Fig. 9b), some of them with a bottom made of a different type of brick, some with a roof made of bricks or irregular quarrystones, others with regular stone slabs (cf. for the typology: Teichner, 2008, 1, 637, fig. 314). A more sophisticated construction technology was used in the case of the main *cloaca* Q (UE 41), where a vault was constructed over the canal out of bricks (Fig. 9c). The construction was composed of two vertical sidewalls made of stone and re-used bricks and a vault that was exclusively made of red bricks. Even an integrated maintenance opening has been identified in one sector of this canal. To understand the dynamics of the palaeo-environment, it is interesting to see that the mouth of this canal was intentionally covered with construction rubble. Evidently this was done to protect the settlement against the rising water level in the silting-up palaeo-channel (due to the successive sedimentation, the canal UE 41[4] lost its original function as a sewer). Most typical of ancient seaside settlements, another canal

4 To indicate these construction elements precisely in the recently excavated shore sector of the *Cerro da Vila*, the excavation numeration (UE = SE = stratigraphical units) is used. For an overall picture, Fig. 8 can be used, it indicates the main architectural units (R–V).

Fig. 9. “Entre tierra y mar”: sewage canals running from the settlement towards the palaeo-channel; a: canal made of re-used amphorae (UE61); b: canal made of bricks and roofed with quarrystones (UE 25, area R); c: canal made of bricks with a vaulted roof (UE 41). (Source: images: Anja Winkemeier, compilation: Katja Bieber.)

Fig. 10. Decorative "garden" architecture on the shore of the *Cerro da Vila*; a: central water basin (with a maritime mosaic) of an open-air *triclinium* (Fig. 8D); b: semicircular fountain or *nymphaeum* (Fig. 8Q); c: brick-built pathway leading from the settlement to the shore (Fig. 8D between C and D). (Source: images: Anja Winkemeier, compilation: Katja Bieber.)

(UE 61) was constructed out of re-used amphorae, originally used for transporting *garum* (Dressel 14/ Beltran II). These amphorae were connected to each other by placing the rim of one amphora into the lower body of the next amphora, thus forming a type of sewage canal. In general, the upper part of the amphorae, i. e. rim, neck and body, was still intact, while the foot had been intentionally knocked off for putting the amphorae together (Fig. 9b).

Another characteristic element of the contact zone between the sea and the land seems to be a special kind of garden architecture related to the "cult" to fresh water. This not only meant using fresh water like, for example, in the public baths complex C, but also to display the abundance of vital fresh water in front of the open salty sea. The small water basin with its maritime mosaic, discovered in 1991, can now be interpreted as the centre of a garden *triclinium* (Teichner, 2008, 1, 487, fig. 275). A small path

of 1.2 metres width and more than 10 metres length later led down from the residential area and the public baths to this romantic place near the estuary. This path was made of fragments of different re-used bricks and roof tiles (*imbrices, tegulae* and bricks for pillars) (Fig. 10c).

Another small *nymphaeum* (Fig. 8Q & 10b; UE 39) was discovered further north. It had an almost oval shape and very deformed walls, irregular due to the missing facing. This complex was built with its long axis east-west oriented, in a later phase reusing stones and bricks for making Roman concrete (*opus caementicium*). Basically, the structure was composed of two different elements, a rectangular block as the eastern wall and a rounded wall element in the west that enclosed an oval basin. In Antiquity, this basin was filled with fresh water via a lead pipe system identified during the rescue excavation.

This seaside garden architecture was dominant in the northern part of the seafront of the Roman *Cerro da Vila*. To the south, the longish building R (5 metres wide and at least 15 metres long) consisted of three separate rooms but it has not yet been possible to identify their function because of the forced preliminary end of the excavation. The southern part of the seafront (i. e. south of building R), on the other hand, was dominated by commercial, production and technical installations. Once again this

Fig. 11. View to the west across the excavations of the Roman harbour of the *Cerro da Vila*. In the front, the grey sediments of the palaeo-estuary can be seen. In the centre of the image, the two-phased quay wall (Fig. 3V) stands out and in the back some commercial buildings (horrea, fabricae) can be distinguished. (Source: Teichner, 2017, fig. 4.)

shows clearly that the residential building A was not the *pars urbana* of a *villa maritima*, by definition oriented towards a nice open estuary. Building A was instead oriented towards the east (Fig. 12), that is further inland, while the access to the estuary itself was blocked by the installations dedicated to the maritime economy.

In addition to the already known buildings on the hill of *Cerro da Vila*, identified by their workstations as *cetariae* for the production of dye and other marine specialities – see H–J and L–M (Fig. 3), there was another large building on this seafront used for production and storage purposes (*fabrica*). It was located within the range of the rescue excavation in the area of the bank of the estuary (Fig. 8S). This technical building with at least two building phases had a rectangular groundplan, an area of nearly 480 square metres and an east-west oriented long axis. The division of the building's interior into three equal parts is discernible. The middle section can be seen as a passage along the whole width of the building, separating the building into two wings according to a nearly symmetrical plan. Both wings were divided into smaller rooms which could be reached through the passage. In parts of the rooms, remains of a tiled floor were found, whereas the floor in the corners of the rooms was intentionally left bare. There, half an amphora was always discovered embedded in the ground, so it was very probably related to the operational procedures in the building. For a simple storage space one would expect several well-preserved storage vessels, but this type of half an amphora is known rather as a collecting basin in the floor area of workrooms, perhaps for the production of fish sauces (cf. Teichner, 2008, 1, 559). Additionally, a square well (UE 57) – with its own bailing system (UE 10) and a small basin (UE 52) – that would have provided an indoor fresh water supply was found inside the southernmost room in the western part of this building.

A portico or rather a columned hall (Fig. 3T) was added to the southern side of the *fabrica* during a later building phase, probably during the middle Imperial period. From its surviving remains of 13 brick columns that rested on small bases, we can reconstruct a three-aisled (north-south) structure that contained at least five aisles along the east-west axis. The portico, however, does not extend to the full length of the southern front of the *fabrica*, although this may be due to the state of preservation of the structure. The columns themselves were built of semi-circular bricks, their exterior faced with mortar. With the addition of this portico, the area south of the *fabrica* was laid out in a new, different way in a second phase.

In contrast to these technical installations, a clearly representative function can be attributed to another structure that was also constructed in a later phase in the plot between the western pillars of the columned hall (portico?) and the main *fabrica* S (Fig. 8U). This feature is made up of a 5.70 m x 7.00 m surface that is enclosed by four substructure walls and covered, at least in some parts, with a greyish marble floor. The alignment of the surface is oriented towards the shoreline and is, furthermore, in line with the alignment of the *fabrica* so that it fits harmoniously into the development near the bank. A pressure pipe, a small piece of which has survived *in situ*, offers evidence for water supply in this area, too. It was probably fed by a hydrotechnical mechanism drawing fresh water from the aqueduct system P in the east. This piece of evidence allows at least a discussion of the area not just as a small fountain, but as a representative *nymphaeum* looking to the west.

The *fabrica* S, the neighbouring building R, the portico T and the *nymphaeum* U, all four of them were oriented towards the west where an impressive quay wall separated the settlement from the open riverbank (Fig. 8V & 11). The quay wall was 100–110 cm wide with a documented length of at least 30 metres, running straight from north to south. The full extent of the feature's dimensions could not yet be determined because the structure extends southward beyond the boundaries of the excavation. The wall is made of natural stones of which some are severely eroded. The small- to medium-sized stones (10–40 cm) were piled up rather compactly, without the use of mortar. During construction, the stones for the wall were stacked directly onto the bank's slope which had probably been cut vertically in preparation for this. The structure had three to four vertical layers and has been preserved at a height of 50 to 60 cm. One extension at the northern end of the quay wall projects westwards into the water. This extension appears to have supported a rectangular structure, forming a platform of approximately 6 square metres. Such a rectangular structure (UE 49) built onto the quay wall could have been the basis of a certain type of observation deck or tower described for fishing stations, used for watching schools of fish (θυννοσχοπεϊον: Strabon V 2, 6. 8; XVII 3,16), and at the same time as a place for a navigational light.

At the front of the quay structure, in the west, it was possible to identify several grey anaerobic sediment layers of fluvial origin. They reached between 1.5 metres and 2 metres below the lower surviving edge of the quay wall.

The ceramic evidence from the related construction layers suggests that the bank reinforcement (quay) was not built before the Flavian era. Furthermore, there is evidence of an additional extension or perhaps renovation: a second stone setting that was 80 cm wide was erected on top of the first wall, separated from the first by a thin sandy layer of marine sediment. A special ramp constructed of *opus caementicium* is attached to this wall on the land side. At that time, re-used architectural material, for example decorative elements (e. g. mouldings) made of grey marble, was incorporated into the construction in this area. This separation of the quay installations into two construction periods, separated by a sediment layer, is of special importance. The time period attributed to this destruction debris by radiocarbon dates is the second half of the 3rd century AD. After some kind of destruction, the quay wall was re-built on a higher level. A comparable chronology has already been attributed by archaeological means to the *hiatus* in *fabrica* J. Therefore, this does not look like a local change in just one building structure that happened during the 3rd century, but rather like a big natural hazard, affecting all the different seaside structures of the Roman settlement on the *Cerro da Vila*.

Finally, for the understanding of the Roman harbour installations, another detail of the structures on the western shore of the *Cerro da Vila* has to be mentioned. In one sondage between the building structures R and V, remains of a construction made of round pine logs were discovered (UE 53). The logs had been put side by side so that they formed a level surface. According to the current state of research, this can be understood as the walking surface of a pier that reached into the sea. The lower height above sea level of this walking surface indicates an earlier construction time than that of the structures described so far. It could be the first mooring structure of the *Cerro da Vila*.

5. Possible synthesis of the development of the settlement on the *Cerro da Vila*

The development of the marine front of the *Cerro da Vila* with its complex architecture and at least three different building phases during the Imperial Roman period fits into the general history of this Lusitanian *agglomération secondaire* (Teichner, 2008; Teichner, 2017).

5.1. Settlement phase A (late Republican to pre-Flavian period)

The natural and environmental conditions in the estuary of a local river on the highly dynamic Atlantic coast again and again forced the local population to adopt their way of life to new, different circumstances. The geo-archaeological investigations in the hinterland of the *Cerro da Vila* have shown that originally, when the estuary was up to 2 km wide and reached about 5 km into the hinterland, it was still influenced by the sea. The silting-up processes of the estuary began during the Bronze Age. It does not surprise that, due to the intensification of land use, these processes reached their peak during the Imperial Roman period. Nevertheless, we have to assume that large parts of the estuary were still navigable at the turn of the eras. The palaeo-channels and -branches which remained during the Imperial period were increasingly fluvially influenced, but, at the same time, arriving by ship in the area of the *Cerro da Vila* was still perfectly possible (Teichner, 2016; Teichner *et alii*, 2014).

If we trust the pottery finds, more precisely some broken pieces of Campanian ware B, the settlement process on the *Cerro da Vila* began already in the late Republican period. The first compact building unit A59[5] (phase I) on the western edge of the eponymous elevation was a simple, but fortified farmstead and belonged to the pioneer generation (Teichner, 2008, 1, fig. 150; Teichner, 2017, fig. 3A). A first harbour construction, most probably a pier made of wood, has been identified on the western shore not far from this pioneer building.

This location, so favourable in terms of the natural environment, was situated in the area of an estuary suitable as an anchoring and harbour site. This also meant that it had rich fishing grounds. In the years to follow, this favourable location should prove extremely advantageous for the further development of the settlement.

A thick levelling course at the eastern front of the younger peristyle house A shows that the settlement of the *Cerro da Vila* had already spread across the entire hilltop by the first half of the 1st century AD. Due to the distribution of finds, settlement and commercial activities are also documented in complexes H and J by the middle of the 1st century AD; the same can be imagined for building unit F. Because of the technical installations (vats) in the commercial building unit L/M, we have to assume the processing of marine resources even for this first settlement phase.

5 These indications are referring to the detailed description of all architectural elements in Teichner, 2008. For general orientation (just the main units A–T), Fig. 3 can be used.

5.2. Settlement phase B (Flavian period to the end of the 2nd century)

The already mentioned levelling course of the second half of the 1st century AD signals a specific restructuring of the settlement area at that time. It seems that the silting up of the estuary was by then so advanced that fishing stations like the one of *Marmeleiros* at the northern end of the estuary had to be abandoned, so their population moved to the *Cerro da Vila*, meaning a concentration process took place. The aqueduct P and the related dam and reservoir in the *Vale de Tesnado* are important prerequisites for the following settlement phase B with its impressive commercial building complexes H, J and S and the considerable public baths complex C. Due to stratigraphic observations, the establishing of a permanent water supply is not to be dated earlier than the beginning of the 2nd century AD. This water supply system allowed the subsequent growth of the so far humble fishing village on the *Cerro da Vila* into a significant natural anchorage and harbour site in the vicinity of the ancient city of *Ossonoba* (Faro).

On the highest point of the elevation, peristyle building A developed, being only evocative of the *pars urbana* of a traditional *villa*. The domus featured a central water basin (*piscina*), a surrounding portico (*porticus*) and a north-oriented rectangular dining room (*biclinium*) (Teichner, 2008, 1, fig. 153A; Teichner, 2017, fig. 3B). Clearly separated from this building, a first public baths complex was erected on the shores of the estuary (Teichner 2008, 1, 325–326, fig. 176A). While the structure of building unit F indicates a mixture of commercial and residential use, suggesting a “multifunctional” building, building unit E seems to have been used exclusively for commercial purposes.

The population paid special attention to the processing of the marine fauna from the open Atlantic and the area of the estuary, producing fish sauces, salted fish and dyes. Instead of the so far rather humble predecessor, the extensive production building units H, J and L (*fabricae*) were erected including halls that had several aisles (Teichner, 2008, 1, fig. 150B). Especially *fabrica* J, which was situated to the east of the residential units and ran parallel to one of the estuary’s palaeo-channels for 114 metres, was an impressive piece of evidence of the settlement’s economic power.

This large-scale production was complemented by smaller technical and commercial units, particularly the pottery (most likely producing the ceramic containers for transporting the local products) that can be assumed in the area of the building unit I. In the northwest of the settlement, semi-permanent harbour installations like wooden piers in a small bay have to be reconstructed (Fig. 4).

The situation on the western slope of the *Cerro da Vila* is better documented. There, more buildings for storage and production (Fig. 3R–S) were situated behind a stone quay (V) that developed from the Flavian period onwards. For the most part, the first quay was built of stones, but the stones were supported by embedded piles made from pine logs in order to guarantee more stability.

5.3. Settlement phase C (3rd to 4th century AD)

In the course of the 2nd century, the seaside and fishermen's village developed more and more into an a thriving *aggglomération secondaire*. The stable trade contacts that became possible on the one hand because of the by then well-ordered Roman road system and on the other hand, maybe the more important factor, because the direct connection to the maritime trade routes through the Pillars of Hercules (the straits) into the western Mediterranean had a lasting beneficial effect in this respect. This is shown by the continuous expansion of and addition to the original architecture and infrastructure in the centuries to follow. The transformation of the already described building A seems an especially remarkable case: the middle Imperial peristyle house (*domus*) was transformed into a representative, fashionable residential building of late Antiquity, with rich polychrome mosaic floors, two impressive polygonal pavilions, luxurious and refreshing water features and its own private bath (*balneum:* Teichner, 2008, 1, fig. 153; Teichner, 2017, fig. 3C).

The extension of the close-by public baths complex C to a floor space of about 1100 square metres is evidence of a growing population and probably also an increase in the number of travellers and seafarers (Teichner 2008, 1, fig. 176B). The new western front made of regular square limestone blocks was visible from afar across the estuary, whereas the spectacular heated *caldarium* characterized the southern front. It was 11 metres wide, covered an impressive 85 square metres and featured two specially built chimneys.

West of the luxurious *thermae* complex, the inhabitants of the *Cerro da Vila* started at that time to fill up the marshy brackish water areas in front of the building and to construct their own luxurious seaside "garden" architecture with *nymphaea* and open-air *triclinia* (Fig. 10). It is especially in this area that the continuous silting up of the estuary and the rising water level could be documented by the elevation of the beds of the sewer canals draining the settlement area (Fig. 9).

The residential quarter which included the building units E, F and G was situated north of the public baths on the shore of the estuary. The densification of residential buildings in this area also points to a growing population and a raised standard of living. In the mostly two-storeyed buildings, polychrome mosaic floors and fountains document this considerable degree of living comfort (Teichner, 2005c; Teichner, 2008, 1, 281, fig. 151A).

By then, the large-scale processing of marine resources, respectively the related fishery, had been completely driven out of this residential quarter and was pooled in the *fabricae* H and J that repeatedly increased their production capacity. In the east of the settlement, the mausoleum K which included a burial chamber for cremation urns had been built on the western edge of the inhumation necropolis N as a counterpart of the older turriform mausoleum O. In a second phase, the mausoleum was extended into an impressive temple-like addition place of worship (Teichner, 2017, fig. 7).

A more detailed description of the settlement's history during the middle and late Imperial period (settlement phases B and C) is not possible anymore due to the described excavation situation. Exten-

sive destructions and a layer of deposited marine sediment have been documented not only inside the *fabrica* J, but also at the quay wall V. These indicate a flood catastrophe, maybe even a tsunami. Not only the found pottery, but also the radiocarbon datings verify this event for the second half of the 3rd century AD. Both buildings, however, were later restored to their former size, in the case of quay, the typical Roman concrete (*opus caementicium*) was then used.

5.4. Settlement phases D–E (5th to 11th century AD)

Only in the 5th century, apparently after further damaging events caused by the sea (floods), profound changes of the settlement structure become visible. The related settlement layers were largely destroyed by the first excavations. The subdividing of larger suites of rooms, the narrowing of doorways and the insertion of solid structural reinforcements in the residential units A, E and F are evidence of an increased need for protection and an ensuing reduction of living standards (so-called squattering). The remnants of the production units H and J, now in a ruinous condition, were converted (Teichner 2008,1, fig. 151B, sections in grey). Partly, humble residential rooms were set up here, too, partly smaller technical installations are evidence of simple craft activities (e. g. non-ferrous metal working) hardly exceeding domestic craft activities.

In this context, the excavation results of house F were very interesting because they revealed that fish and other marine resources were processed at least until the 6th century. It is not possible to tell, however, to what extent the aqueduct P remained functioning in this late settlement phase.

Not only the reduced trade contacts of this transition period, but also the increasing silting up of the estuary prevented a lasting recovery of the former harbour and fishing village. A new necropolis with inhumation graves containing typical “Visigothic” pottery as grave goods now stretched between the Imperial mausoleum K and the former *fabrica* J (Fig. 3). The graves were both west-east and north-south oriented; simple brick-built tombs (Teichner 2017, fig. 10) could be identified besides more elaborate tombs with an *opus signinum* slab as covering (the so-called *mensa* or table tombs). A church building with more than one nave can be assumed on the basis of a row of pillars identified so far; it apparently served as the centre of an early Christian community.

By now, even the last settlement phase E, belonging already to the following Islamic period, can be described in more detail for the area of the building units H and J. Simple one-room houses, partly with adjoining yards, were erected in the ruins of the Roman production halls. Amidst the halls of the former *fabrica* H, a fortified yard with a baking oven, a one-room building, a storage pit (silo) and an inhumation grave of the same period were found.

By contrast, the structures in the area of the former residential building A were located on a clearly raised settlement level above it, and only rarely still oriented along the lines of the previous walls. No indications of a continued use of the former waterfront and its quay during the post-Roman area (Visigothic or Islamic) have been found during recent excavations. As it looks like the silting up of the

palaeo-channel had progressed, we have to suppose that the access to the sea had moved further to the southeast, today into an area destroyed by the touristic marina, therefore an area of which we have no archaeological information.

In the complete *Cerro da Vila* settlement, or rather in the area we know, its western part, the buildings typical of this Islamic period now predominated: they had dry stone walls and storage pits that were dug into the ground. A hoard containing more than 239 silver coins (*dirham*s), mostly minted in the capital of the Emirate of Córdoba and hidden during the second half of the 9th century, gives evidence of the times of unrest the *Cerro da Vila* witnessed. The hoard was found at the bottom of a storage pit (silo J56.7) and has a legible closing date of AD 883–884 (270 AH according to the Islamic calendar), a period of violent unrest in the south of the Umayyad Emirate. It was the time of the uprising of ʿUmar ibn Ḥafṣūn (d. AD 918 / 305 AH), a *muwallad* of Visigothic descent. This time span, especially the 260s and 270s AH (870s to early 890s AD), has produced a number of similar hoards, probably due to the violence (Teichner *et alii*, 2017).

On the other hand, the rich silver hoard can also be seen as evidence that the economy on the *Cerro da Vila* continued to prosper also during the Emiral and Caliphal period because of its contacts with the Mediterranean world. The necessary harbour installations (pier, quay, etc.) that we have to assume have to be reconstructed northeast of the Roman harbour[6]. This is the area where Jose Luis de Matos described structures like a pottery kiln for glazed Islamic pottery in the 1980s, but they were destroyed forever by the marina constructions of the holiday resort.

According to several characteristic pottery finds, the settlement lasted until the end of the 11th century, at most until the beginning of the 12th century. Then, the more than thousand-year-long settlement history of the former harbour and fishermen's village ended.

6. Conclusion

The moment in time when the fishermen's and harbour settlement on the *Cerro da Vila* was founded is predetermined by historical circumstances: It happened shortly before or at the same time as the Augustan creation of the Roman province and the ensuing restructuring of territory. The first settlers selected the settlement area on the *Cerro da Vila* by taking into account that the site was situated in the palaeo-estuary of the *Ribeira de Quarteira*, thereby protected against the bleak and prevailing western winds (Fig. 1). In this early phase, the settlement still consisted of fortified buildings, a special architectural form designed for self-protection. The estuary landscape, eminently suitable as fishing grounds, was the economic basis of the two fishing stations archaeologically documented so far (*Cerro da Vila* und *Marmeleiros*). A change in these environmental conditions, especially the continuous silting up of the estuary, led to a concentration of the population, respectively the labour force, on the *Cerro da Vila* even during the 1st century AD.

6 See note 1.

Fig. 12. The *Cerro da Vila* seafront. Reconstruction of the palaeo-channels in front and on the west of the *Cerro da Vila*, remnants of the large palaeo-estuary of the *Ribeira de Quarteira* that existed in prehistoric times. The position of the residential buildings A and F, the public baths C and the *fabricae* H–J is indicated besides the assumed main road crossing the necropolis (in the back) and the position of the Roman harbour with its quay wall V. (Source: image: Google Earth, alterations: Katja Bieber.)

The settlement continued to be accessible from the open sea by palaeo-channels and experienced a considerable boom during the middle Imperial period. In those times, the extension of the harbour installations took place, at least on the southwest waterfront: the earlier wooden piers were replaced by a solid stone quay wall. This underlines the importance of the maritime economy for the site, since the inhabitants did not use simple reinforcement structures made of wooden posts or amphorae – such as those known, for example, from *Hispalis* (Sevilla) (Ordóñez, 2003, 66; Ordóñez and González, 2011), *Oiasso* (Irún) (Urteaga, 2001; Urteaga, 2003), Cano de Sancti Petri (Cádiz) (Bernal *et alii*, 2005) or *Carteira* (San Roque) (Blánquez *et alii*, 2005) –, but erected, at heavy financial cost, a stone quay wall, later also using *opus caementicium*.

This elaborate bank reinforcement is strongly reminiscent of a similarly functional, but even more complex feature in the provincial capital *Tarraco* (Tarragona). There, commercial buildings (*horrea*) arranged immediately along the quay wall on the shoreline, like building unit S on the *Cerro da Vila*, were detected, too (Remolà and Vilaseca, 1997/98; Adserias *et alii*, 2000; Pociña and Remolà, 2001). Furthermore, the very well documented situation in Tarragona shows clearly how important and typical luxurious public harbour baths were (Macias, 2004).

As a result, our best knowledge of harbour installations in *Lusitania* is not owed to features known from the large urban centres (Blot, 2003; Blot 2005), but rather from a rural harbour village (*agglomération secondaire*). The best comparison is the commercial village of Port-la-Nautique with its simple piers in the lagoon estuary of *Narbo* (étangs de Bages et Sigean: Ginouvez *et alii*, 2016; Sanchez and Jézégou 2014, 77–84). In the case of *Cerro da Vila*, however, the inhabitants settled for such simple moorings piers only at the beginning of the Imperial period; as early as the 2nd century, the western

main waterfront possessed a stone quay wall and a watchtower, structures comparable to, for example, those in the Adriatic villa of St. Simon on the island of *Izola* (Slovenia) where an artificial harbour was constructed with pier, quay wall and additional breakwaters (Groh and Sedelmeyer, 2016).

At the same time, another completely different aspect of interaction between settlement and sea shore could be documented in such distinctness because of the large-scale excavations on the *Cerro da Vila* for the first time in Hispania: a specific garden architecture existed on the seafront during the middle Imperial period. In close vicinity to the public baths (*thermae*) complex, several *nymphaea* were erected, an element also found in the harbour of the capital *Tarraco* (Pociña and Remolà, 2002). They have to be understood not only as symbols of abundance of the live-giving fresh water, but also as a clear sign of worship in order to propitiate the sea deities. Finally, the garden *triclinium* with its own mosaic decoration – showing a trident, the traditional symbol of Neptune (Fig. 10a) – was a typical Mediterranean element, a place of leisure (*otium*) even here in Lusitania, far beyond the Pillars of Hercules.

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