

Recent Discoveries at the Harbour of the Greek City of Emporion (L'Escala, Catalonia, Spain) and in its Surrounding Area (Quarries and Iron Workshops)

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Introduction

ALMOST NINETY YEARS HAVE ELAPSED between the appearance of the article in which J. Puig i Cadafalch published the results of the first year of excavations at Emporion (1908), and the first modern studies of Emporitan urbanism in the Greek and Hellenistic periods (Marcet and Sanmartí-Grego 1989; Sanmartí-Grego *et al.* 1988, 1990 and 1991; Mar and Ruiz de Arbulo 1993). The vast area excavated in the first quarter of this century, together with the subsequent political and military crises suffered by Catalonia, may have been the reasons for the long delay in publishing the results. This has not helped the wider image of a site, which is unique in Spanish archaeology (Junyent 1981).

It must be said that all recent works suffer from a limited perspective, in which attention is focused upon that part of the town between the city wall and the interior of the urban nucleus. This approach is shortsighted since it largely ignores the dialectical relationship between the populated nucleus and its zones of influence. In the nearest of these, the city transformed a substantial part of its resources into manufactured objects, while in the intermediate and further zones, primary productive activity ensured the well-being of their sources of subsistence (Sanmartí-Grego forthcoming a). It is from this perspective that one can criticise the most recent of the works on Hellenistic and Roman Emporion (Mar and Ruiz de Arbulo 1993) which, as its ambitious subtitle suggests, aims to be exhaustive. To give just one example, it does not devote a single line to the topographical and urbanistic problems generated by the inter-relationship between the

town and the artisanal or agricultural settlements which had grown up around it over the centuries.

Consequently, instead of discussing the extent of the urban area, the relationship of monuments to the town as a whole, or even the layout of houses, this paper 'goes outside' the urban nucleus and attempts to present something novel. It analyses the results of a long campaign of survey carried out by the writer during 1993 on the surrounding areas of Emporion, particularly on that part of the coast between the town of L'Escala and the village of Sant Martí d'Empúries (Figure 1).

Three aspects of this work will be presented. In the first place the paper will focus upon the exploitation of stone for building, a necessity for any populated urban nucleus in the Classical period. Secondly it offers a preliminary study of the remains of metallurgical workshops found in the area. Unfortunately, the results of metallurgical analyses carried out by Dr Salvador Rovira Llorens, are not yet available. Thirdly, some attention is paid to the problems presented by the monumentality of the so-called 'Greek Wharf', its use, its relationship to the town itself and, finally, its chronology.

The quarries of the Emporitan coast

There were three common types of stone used in Emporion: local Mesozoic limestone was used from the foundation of the Greek town onwards; dark-coloured sandstone from consolidated dunes (eolianites) and limestone were employed in the Hellenistic and Roman Republican periods; while Miocene sandstone with a crumbly texture and golden colour was utilized in Roman Imperial times. The last two kinds of stone were obviously imported to Emporion. The first kind, however, is local and is found all over the rocky promontories upon which the modern town of L'Escala is situated, as well as in the site of the Graeco-Roman town and was used to construct its public and private buildings.

Location

Once it was decided to look for the ancient quarries, two hypotheses were suggested. First, it was assumed that to avoid transporting stone long distances the quarries would not be far from the town. The second hypothesis was based on the same general assumption: logically, quarries would be near the sea, in order to facilitate transporting the stone to the place where it was to be used (Sanmartí-Grego forthcoming b).

A visual inspection of certain coastal outcrops allowed a series of quarries to be identified on the sea-shore. From a morphological and



Figure 1. Aerial view of Emporion and the section of coast between L'Escala, to the left, and Sant Martí d'Empúries, to the right.

topographical point of view these quarries, with the exception of one in Sant Martí d'Empúries, appear at geographical features known as 'puntes' on the Catalan coast. These are rocky promontories which jut into the sea and which can be of two types, either small capes, or rocks joined to the coast by a sandy isthmus. The reason why these quarries have not hitherto been identified is that as the stone is so hard it does not show the character-

istic extraction marks usually present when a softer stone is cut. Archaeologists have thus not been able to find the technical evidence which would have helped identification of quarries (some examples among many others may be found in: Bessac 1986; Batista-Noguera *et al.* 1990; Blanch *et al.* 1993).

Three of the identified quarries are found within the urban nucleus of L'Escala, while the other three are to be found along the coast between L'Escala and the village of Sant Martí d'Empúries, the site of the *Palaiapolis*. The quarries at L'Escala are located at the 'Punta de l'Olla', which is on the southern boundary of the small cove 'Port d'en Perris', at 'La Punta', and at 'La Punta de la Mar d'en Manassa'. These promontories delimit the ancient fishing port of L'Escala (Figures 1 and 2, nos. 1, 2 and 3).

The three quarries along the Emporitan coast are found in the northern section of 'La Platja del Rec del Molí'; a beach located in the southern section of the promontory 'Les Coves'; at 'Les Muscleres Grans' situated right in the front of the Greek town; and at the foot of Sant Martí d'Empúries. The location known as 'Les Muscleres Petites', which is the northern boundary of the 'Portitxol' cove, does not seem to have been exploited for its stone in ancient times: however the evidence may lie beneath the sand (Figure 1, nos. 4-6 and 8).

Techniques of exploitation

The extraction of the stone was achieved by two different methods. Firstly, using a technique which may be called the 'vertical-horizontal-extensive' method. This consisted of obtaining the stone by separating it along the natural lines of breakage, thus forming layers of extraction delimited by small vertical marks. This technique is clearly visible in 'La Platja del Rec del Molí', at the 'Punta de l'Olla', 'Les Coves', and 'Les Muscleres Grans', and at Sant Martí d'Empúries. Secondly, where the rocks were sheer, a method called 'the vertical front' was used. This consisted in prising off chunks of rock and letting them fall to the bottom of the cliff, where the largest blocks were then cut up before being transported to the place where they were to be used. This can be seen quite clearly in the quarry at 'Mar d'en Manassa', at the bottom of which there is still an enormous abandoned block divided into several parts, in which the shafts corresponding to the perforations made before its separation can be made out (Figure 3). It is not too much to suggest that it was from this type of quarry that the huge blocks destined for the town's defences came. The stone employed in the city walls may have been obtained from the quarry of 'Les Coves' which was one of the nearest to the town where this technique of extraction has been identified.

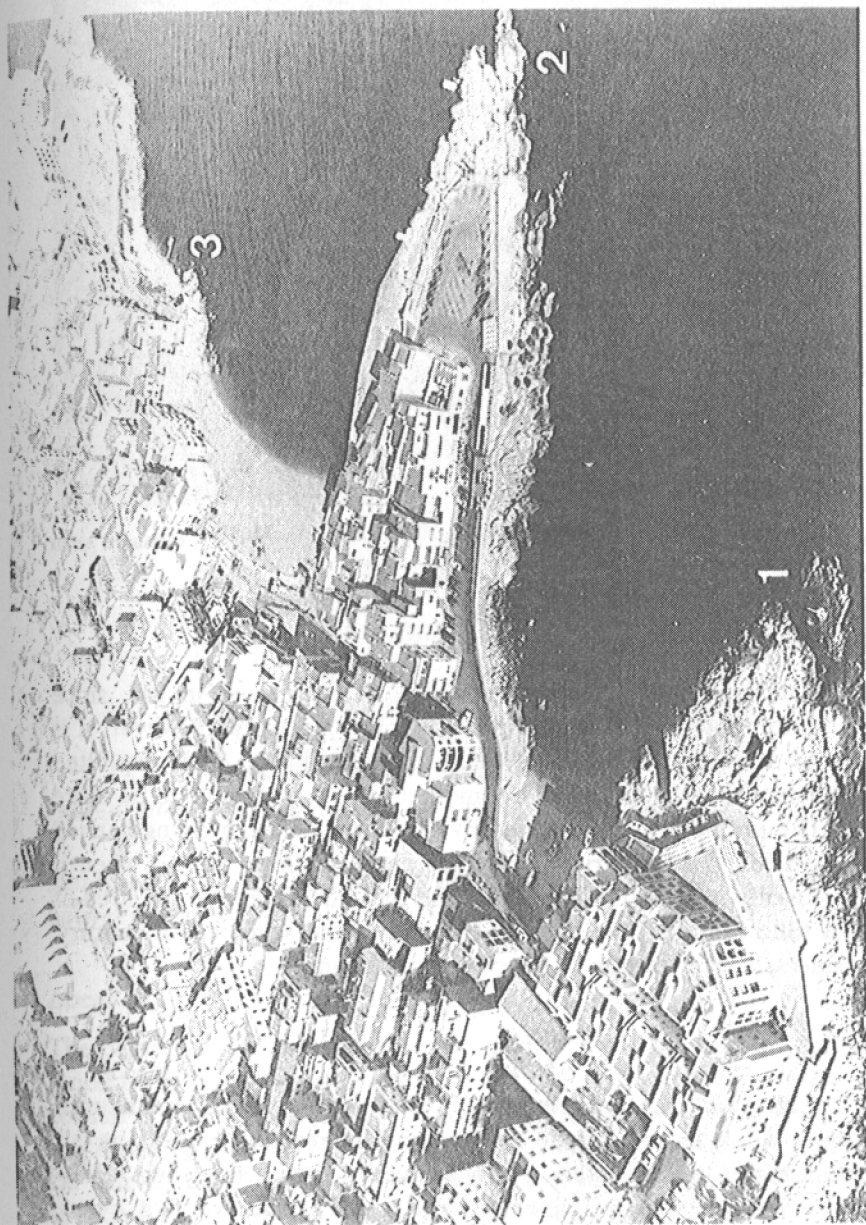


Figure 2. Aerial view from the east, of the town of L'Escola, in which the geographical features where the remains of quarries and metallurgical furnaces are located: 1 'La Punta de L'Olla', 2 'La Punta', 3 'La Mar d'En Manassa'.



Figure 3. A split block of stone at the foot of the quarry at 'La Mar d'En Manassa' seen from the south.

Chronology

It is difficult to know exactly when these quarries were in use, since there is nothing with which to date them archaeologically. However, it is reasonable to suggest that the newly discovered quarries were exploited during ancient times, although at the moment it is not possible to be more precise. The problem is complicated by the fact that the building carried out in Sant Martí d'Empúries during the early medieval period when it was the County (*Comtat*) of Empúries and that undertaken in the area of L'Escala following its foundation at the end of the seventeenth century, used stone salvaged from the Graeco-Roman town.

The bloomeries

There is little doubt that the discovery of the remains of ancient metallurgical activity has been one of the most significant recent advances in our understanding of the exploitation of resources in the ancient town. Hitherto, evidence was sparse. It included: E. Gandia's discovery of ovens, possibly metallurgical, at the centre of the Greek town (Ruiz de Arbulo 1989); that of an oven complex just to the south of the Greek city (Sanmartí-Grego *et al.* 1984) in the early 1980's; and the 'low' ovens

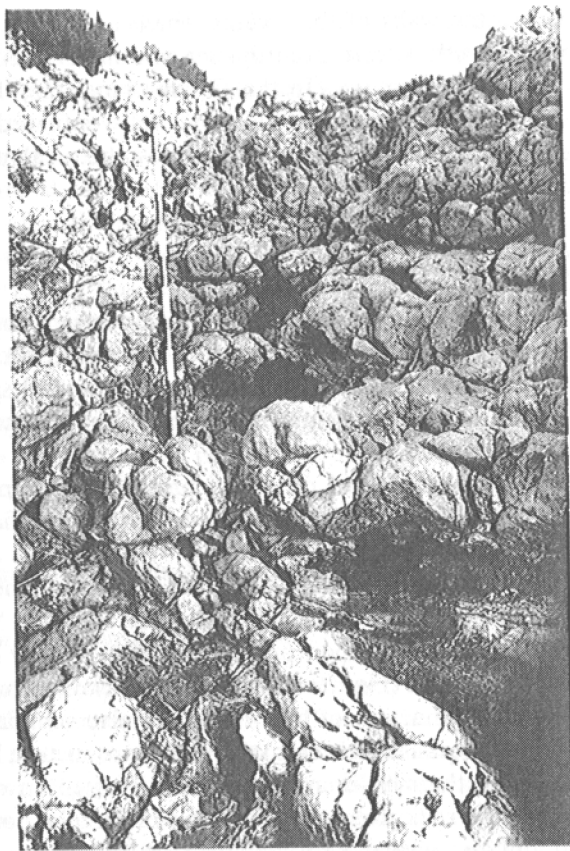


Figure 4. Domed-furnaces situated in the southern sector of 'Les Coves'.

identified in the excavations of the southern sector of the Greek town between 1985 and 1990.

Location

The centres of metallurgical activity at Emporion were found some distance from the urban agglomeration. A detailed inspection of the rocky coastal coves extending from Sant Martí d'Empúries to the beach called 'La Platja del Rec del Molí' has revealed numerous remains of metallurgical activity at all of them. The best preserved and most abundant were found on the promontory of 'Les Coves' (Figure 4) and amongst the rocks at the foot of the 'Greek Wharf' (Figure 7).

The most important group is, without doubt, that at 'Les Coves', where furnaces were found along the entire sea-facing side of the promontory.

Slag still adhered to the walls of their vents which led down to the sea. These outlets are perfectly visible from the sea and have given the name of 'Les Coves' to the promontory. (In the Catalan language, 'Les Coves' means 'the Caves'.) The choice of this high and well-ventilated place was certainly deliberate: it would have been selected by the ancients to facilitate the efficient functioning of the furnaces.

Nature of the remains

The metallurgical evidence is derived from the remains of the furnaces themselves, as well as the solidified slags which appear in their vicinity, filling in cracks, vents and channels in the natural rock, and spilling out towards the sea. Mounds of dross mixed with charcoal and burnt earth are also common.

The furnaces are always found on rocky promontories and use the rocks in such a way that natural features needed little modification. As far as one can deduce from the impressions left by their bases and in the preparation of the rock on which they are placed, many of the furnaces belong to the most ancient of the known types — the so-called 'bowl' and 'domed' furnaces (Cleere 1972). Their presence is suggested by horizontal cavities excavated in the rock (Figures 4 and 8), or by oval or lentil-shaped platforms reddened by the action of fire. There are also remains of shaft furnaces, identified not because elements of their superstructure have been recovered, but because their bases survive. There is often an outflow of slag in places where the rock not only adopts a semicircular form with a rear vertical wall, but also where there are channels drilled into the bases, designed to introduce air to enhance combustion. It must also be noted that many of these furnaces, as in the case of the one which was excavated in the Phoenician 'factory' of Toscanos, are found on the edge of slopes thus using gravity to help in the extraction of the melted dross (Keesman *et al.* 1989, 99–102) (Figure 4).

The nature of the dross indicates that the furnaces served as bloomeries. In this process iron ore is converted, well under its melting point of 1535°C, into iron blooms whose impurities were later eliminated by heating and hammering. The presence of a mass of iron-oxide with silica, and spongy dross, are characteristic of this type of iron production (Tylecote 1963, 182–5; Healy 1978, 182–3; Mohen 1992, 168–70).

Chronology

As with the quarries, it is almost impossible to date accurately the active life of these metallurgical workshops. The only available evidence comes

from those found at 'Les Coves' and near the 'Greek Wharf'. Near the furnaces at 'Les Coves' the only pottery to be found dated to the Republican period, which suggests that they were active in the second and the first half of the first centuries BC. The dating from the 'Greek Wharf' is essentially relative. As we shall see later, it is based on the premise that one part of the metallurgical complex in its immediate vicinity was functioning after the monument was built, since traces of its activity affect the eastern surface of its wall, after it had been eroded by the action of the sea (Figure 7). As this 'Wharf' was probably built in the second century BC this would suggest that the metallurgical activity was taking place here during or after this period. It should, however, be stressed that, despite the fact that the tenuous dates show that metallurgical activity was taking place during the second century BC, the remains of furnaces along the coast are so frequent that it is possible that some may also have functioned before and after this date.

New evidence concerning the so-called 'Greek Wharf'

Situation and structural characteristics

This ancient structure, located on the beach of Empúries, is traditionally known by the name of 'Greek Wharf'. Even today, defying the passage of time, it is a dramatic witness to the bygone splendour of the ancient colonial town (Figure 5). Its function, until now, has been unclear, although it must have served the port in some capacity. That Professor M. Almagro, in the first edition of his guide-book to Empúries, called it a dyke, a wharf



Figure 5. View of the Empúries breakwater from the west.



Figure 6. View of the western face of the breakwater showing how it was built, with an interior core of concrete faced by limestone blocks.

and a breakwater, in the brief space of two pages, illustrates the difficulty this monument has always presented when trying to establish its nature and function (Almagro 1951, 50–1).

The construction, oriented south-east to north-west, is situated in such a way as to prevent the sea from reaching the land, and is built on a rocky promontory which served as a solid foundation. The rock is preserved all along the eastern side (Figure 7), thus acting as a natural breakwater to protect the construction, and also along the southern, northern and the western sides. The structure measures 79.40 m in length, 4.80 m in height, and 5.30 m in width. It was built of *opus caementicium*, a strong concrete made of lime, sand and stones forming the core, with a facing of *opus siliceum* blocks (Figure 6). Once the builders had levelled the rocky promontory and retained displaced stone for later re-use, they placed the foun-

dation blocks of the wall in parallel lines and poured the concrete into the space between them (Figure 6). This same operation was repeated until the desired height was reached. The structure created was so solid that it has survived natural erosion and also the damage inflicted by various attempts at dismantling it for re-use of the stones, even the use of explosive charges. All the evidence shows that it was built in one piece, and at one moment in time, contrary to the suggestion that an upper section was added later to improve the port's protection from the buffeting of the sea (Mar and Ruiz de Arbulo 1993, 183-4).

The function of the monument

In order to understand the function of this structure, a fundamental question which has not yet been satisfactorily resolved, it is necessary to provide the answers to some others first. In the first place one must reflect upon the present appearance of the monument. How close is it to its original state, or how far has it been altered in shape and size by natural or human agency? In other words, one must decide whether or not the 'Greek Wharf' was originally longer, and if so, whether it could have extended across the mouth of the port in conjunction with another hypothetical stretch running southwards from Sant Martí d'Empúries.

In second place one must ask why the monument is situated where it is. This question is also important to resolve if one is to determine its function. In fact, both are aspects of the same question. Either the wall was a true wharf, and in this case it would mean that it was originally built at sea-level, allowing boats to come alongside it, or it was built on dry land as a breakwater, rather than a wharf.

With regard to the first of these questions, careful observation suggests that its length has remained unchanged. This contradicts the suggestion by Mar and Ruiz de Arbulo (1993, 184) that 'the length of this wall would have been quite, or a lot, longer, extending towards S. Martí'.

It is clear that its northern extremity has always ended where it terminates today. There is no evidence of a break and the end was designed to be semicircular in plan, as is defined by a number of the end blocks still preserved *in situ*, embedded in the concrete core. The evidence of this face is corroborated by the fact that on the better preserved western side, the wall of the monument is not a continuous straight line but in the last northern third turns towards this final rounded end. Thus, all the reconstructions of the monument which show it as being prolonged towards Sant Martí d'Empúries in order to shut off the port, together with another stretch running westwards, are simple speculation without foundation in fact (Mar and Ruiz de Arbulo 1993, 246-7).

Detailed observation also suggests that the southern face of the monument would have ended at the same place as it ends today. If one supposes that this were not the case, and that it had originally extended southwards, then it follows that the rocky promontory must have been levelled or altered, to achieve an horizontal base upon which to start the first layer of building. This is not the case: the promontory shows no traces of having been transformed in this way. Nor is there any evidence to suggest that the monument was built on the rock without it first having been prepared. If it had been, remains of concrete would be visible in the many deep crannies. Moreover, on the rocky mass beyond the monument, where any hypothetical continuation of the wall would have passed, there are the remains of metallurgical furnaces. Their presence necessarily rules out the possibility of there having been a construction there.

As to the second of my questions concerning the 'dry' location of the monument, this immediately raises the problem of the height of the sea-level in Graeco-Roman times. Observations by the writer suggest that the variation in the sea-level has been minimal and that the present situation of the monument is largely unchanged. This coincides with Gayraud's (1981, 57) hypothesis that the coast of Narbonne at around 100 BC was the same as it is today, but differs from that of Marquès and Julià (1983, 161-2) and Mar and Ruiz de Arbulo (1993, 111) who suggest that the 'wharf' implies a lowering of the sea-level or a tectonic rising of the coast. Together the evidence leads one to deduce that the monument is a breakwater, rather than a wharf, designed to protect ships beached behind it and the nearby port installations from the eastern storms. But how can this interpretation be confirmed?

In the first place there is the fact that the quarries and the metallurgical furnaces in the vicinity of the breakwater are often situated by the side of the sea on surfaces upon which it would have been impossible to work if the sea had been higher than its current level. Also, the metallurgical furnaces lying at the foot of the breakwater (Figure 7), at the 'Muscleres Grans' and at the northern extreme of the 'Platja del Rec del Moll' beach (Figure 8), have been beaten by the waves. This suggests that in classical times these furnaces must have been functioning at a time when the sea-level was even lower, since if it had been at its present level it would have interfered with, if not impeded, the activity taking place there.

In second place there are the remains of buildings to the west of the monument, which have been largely covered by a large dune between the excavated part of the Greek town and the sea. They are only visible intermittently, dependent upon the whims of the northern wind, the Tramontana, which either completely covers them with sand or exposes them for a while. These walls, which run from east to west and which were built

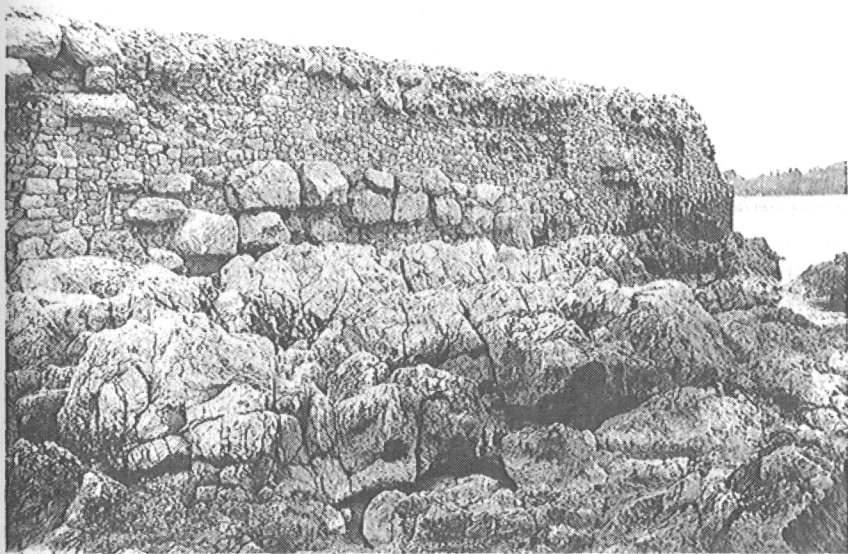


Figure 7. View of the breakwater and the rocky promontory on which it was built, taken from the east. In the foreground the remains of a metallurgical furnace can be seen.

using rough stone joined with lime, seem to be contemporary to the breakwater and their function is unmistakably related to port activities. However, what interests us here is not so much their function as the presence of a ground-level that is less than a metre above the present sea-level: had the sea-level been higher, these constructions could not have functioned.

Conclusions

The evidence presented so far shows that there is no evidence that the structure was a wharf. On the contrary, it seems quite clear that it was, in fact, a breakwater, a great wall designed to protect part of the eastern sector of the city from any possible damage that the sea could have inflicted during the strong easterly storms that often punish this part of the Mediterranean coast in autumn and winter. On stormy days today one can directly verify the true effectiveness of this construction. The rocky promontory which continues further south is sufficiently wide and raised to act as an effective breakwater and, thus, to protect the port zone behind it. This would explain why the breakwater did not continue further southwards.

Two points emerge. The first is that the breakwater was raised with the aim of protecting the port installations situated to its west, as well as



Figure 8. View of the metallurgical furnace found at the northern extremity of the 'Rec del Molí' beach. Note its proximity to the sea.

to providing a well-protected zone where ships could be beached to shelter them from the buffeting of the sea. The second is that the breakwater seems to be separated artificially from the urban nucleus by barriers (road, footpath, dune) created by man and nature. This gives the impression that it is unrelated to the city. But in fact the port breakwater of Emporion was an important element in the urban-fabric, the same fabric that during the two last centuries BC helped the Phokaian town to enjoy what may have been the most splendid era of its long commercial history in its last period of autonomy.

Chronology

There is very little evidence with which to date precisely the construction of the breakwater. Nobody, except M. Almagro (1962) who dated it between 195 and 150 BC, has ever offered a precise chronology, for the reason that it is located upon an exposed rock and, thus, is not readily susceptible to excavation as a means of obtaining stratigraphic data. According to his own informative note, published on the occasion of some

consolidation carried out at the beginning of the 60's by the Spanish 'Ministerio de Obras Públicas', Almagro recovered archaeological material from the inside of the monument. His finds included necks of Italic amphorae and Campanian Black-glaze pottery, which allowed him to suggest a chronology in the first half of the second century BC (Almagro 1962). The writer attempted to follow his example, but unfortunately was less successful discovering only a hand-sized portion of *opus signinum* flooring made with fragments of Italic amphora, and a handful of small amorphous pottery sherds, amongst which fragments of Italic amphora of Roman Republican date (Graeco-Italic and Dressel I), Massaliote and Iberian amphorae were identified. This evidence was not chronologically specific. However it is clear that the breakwater must have been built in the Roman Republican period, since no Roman Imperial material has yet been found in its mass of internal concrete. It is, thus, likely that its construction could have coincided with the period of great economic euphoria which generated the boom of commerce with Italy after the arrival of the Romans (Sanmartí-Grego 1978; Ruiz de Arbulo 1993). Therefore, it is possible that a broad date in the middle of the second century, is most appropriate for the breakwater, bearing in mind that it was during this century that the topography of the city was changed by the building of the southern rampart (Sanmartí-Grego *et al.* 1990 and 1991), the new sanctuary of Aesculapius (Marcet and Sanmartí-Grego 1989; Sanmartí-Grego *et al.* 1990) and the town agora with its adjacent areas (Mar and Ruiz de Arbulo 1993), providing a monumental aspect which it had previously lacked.

Epilogue

At the end of this brief review of coastal activities, it is worth stressing that these were not arbitrary, but on the contrary, were motivated by the existence of Emporion. This may seem obvious but it is not so, if one takes into account the problems of the relationship between the Greek and indigenous communities, reported by the historical sources. For example, the Greeks were unable to leave the town safely unless they went in large groups — no less than one third of the total number of citizens who had been on guard on the walls the night before (Livy XXXIX.19). If one accepts as true Livy's account, which exemplifies the ill-will and distrust between the Greek and indigenous people, then one must imagine that as many of the remains were located at some distance from the colony, they reflect activities carried out by the indigenous people before the arrival of the Roman army in 218 BC. If so, it would only have been after 218, and as a result of the repressive action of the consul Marcus Porcius Cato at the beginning of the second century, that it would have

been possible for the Greeks to have been in any way responsible for these activities.

The writer is sceptical about the perpetual confrontation between the Greeks and the Iberian people (Sanmartí-Grego 1978 and 1989; and see also Bosch-Gimpera and Aguado Bleye 1935, 60), preferring to believe that the passage from Livy, inspired by 'The Origins' of Cato, merely reflects the state of insecurity in which the Emporitan region found itself at the time of the consul's arrival in 195 BC, as a result of the great indigenous uprising two years before. Thus, the writer and colleagues at Empúries have been postulating that an ethno-cultural duality in Emporion would have disappeared in the first half of the fourth century. This would have coincided with the synoecism documented by Strabo (III,4,8), which we believe amalgamated the Emporitans of Greek origin and the neighbours of indigenous lineage into one political group (Sanmartí-Grego *et al.* 1986; Marcet and Sanmartí-Grego 1989). If so we may deduce that many of the economic activities detected along the coast could well have been carried out by the inhabitants of Emporion in the centuries prior to the arrival of the Romans.

The new data discussed here, show quite clearly that it is still possible to find remains of the extractive and metallurgical activities which took place outside the urban area of Emporion. However, the task of identifying them is an urgent necessity given the massive building activity that is being generated by the growth of a tourist town such as L'Escala which has been so great over the last few years that practically all the evidence from the Riells-La Clota area, to the south of the town, has been destroyed. I hope that these words act as an incentive for this work to be carried out as soon as possible.

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ENRIC SANMARTÍ-GREGO*Museu Monogràfic d'Empúries, L'Escala, (Alt Empordà Girona)***Recent discoveries at the harbour of the Greek city of Emporion (L'Escala, Catalonia, Spain) and in its surrounding area (quarries and iron workshops)**

Traditionally, knowledge of the Greek city of Emporion has been limited to the study of its urban nucleus, without the immediate hinterland being considered. The paper reviews the material remains of stone extraction and metallurgy found in the Emporitan coast, between the neighbouring town of L'Escala to the south and the hamlet of Sant Martí d'Empúries to the north. These remains consist of quarries from which stone used in the ancient city was extracted, and of metallurgical workshops for the production of iron, which were probably active in the first and second centuries BC. In addition, the paper studies the so-called 'Greek Wharf', located on the beach of Empúries, from a structural and functional point of view, leading to the conclusion that it was a breakwater and was probably also built in the Roman-Republican period.

Descubrimientos recientes en el puerto de la ciudad griega de Emporion (L'Escala, Catalunya, España) y en sus alrededores (canteras y talleres metalúrgicos)

Tradicionalmente, el conocimiento sobre el pasado de la ciudad griega de Emporion se había limitado al estudio de su núcleo urbano, sin tener en cuenta su proyección exterior a su área de inmediata influencia, dando lugar a estudios que pudieran valorar tanto su intensidad como marco cronológico. El objetivo de este artículo es demostrar la presencia de restos materiales que prueban la existencia de actividades de extracción y transformación documentadas en la costa ampuritana, entre la población vecina de L'Escala al Sur y la villa de Sant Martí d'Empúries al Norte. Estos restos incluyen las canteras de las que se extraía la piedra utilizada en la antigua ciudad, y los talleres metalúrgicos destinados a la producción de hierro, que estuvieron probablemente activos en los siglos II-I a.C. Además este artículo estudia el llamado 'muelle griego', que se encuentra en la actual playa de Empúries, desde un punto de vista estructural y funcional, que llevan a la conclusión de que, de hecho, se trataba de un rompeolas posiblemente construido en el periodo romano republicano.