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The Antique Port of Seville: Transformations from Roman Times to the Islamic Period

El antiguo puerto de Sevilla: transformaciones desde época romana al periodo islámico

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Abstract: The purpose of this paper is to briefly introduce and discuss some of the geomorphological transformations that the Guadalquivir River and the ancient port of Seville endured from the Roman period until the Middle Ages. To illustrate these transformations different archaeological finds from the *Plaza Nueva* site will be presented. In 1981, a cruciform iron anchor and the remains of a wooden boat were found in a salvage excavation conducted at *Plaza Nueva*. At present, this salvage excavation is the only archaeological intervention that has been conducted in an area where the ancient port of Seville once was located. The archaeological findings from *Plaza Nueva* are helping us to better understand the geomorphological transformations of the Guadalquivir River. Particularly, they are helping us to understand when the ancient riverbed of the Guadalquivir and the ancient port of Seville ceased to be navigable and, soon after, disappeared after being assimilated by the expansion of the city.

Key words: Paleo-geomorphology, *Lacus Ligustinus*, Guadalquivir River, ancient port of Seville, *Plaza Nueva* site.

Resumen: en este trabajo se presentan y discuten brevemente algunas de las transformaciones geomorfológicas que el río Guadalquivir y el antiguo puerto de Sevilla sufrieron desde época romana hasta la Edad Media. Para ilustrar estas transformaciones, se presentarán diferentes hallazgos arqueológicos del yacimiento de la Plaza Nueva. En 1981, un ancla de hierro cruciforme y los restos de una barca de madera fueron hallados en una excavación de urgencia llevada a cabo en la Plaza Nueva. Hasta el momento, esta excavación de urgencia es la única intervención arqueológica que se ha llevado a cabo en un área donde una vez se encontraba el antiguo puerto de Sevilla. Estos hallazgos arqueológicos nos están ayudando a comprender mejor las transformaciones geomorfológicas del río Guadalquivir. Particularmente, nos están ayudando a en-

tender cuándo el antiguo cauce del Guadalquivir y el antiguo puerto de Sevilla dejaron de ser navegables y cómo, poco después, desaparecieron siendo asimilados por la expansión de la ciudad.

Palabras clave: paleo-geomorfología, *Lacus Ligustinus*, río Guadalquivir, antiguo puerto de Sevilla, excavaciones de la Plaza Nueva.

Scholars place the origin of Seville in a settlement on a small hilly island surrounded by and connected to the salt-water lagoons and the *Baetis* (i.e. the name Romans used for the Guadalquivir River). Around the 9th century BC, the Phoenicians founded a colony and started to interact with already established nearby Turdetan settlements (Escacena/García, 2012: *passim*). This Phoenician colony was known by the Semitic name *Spal* or *Ispal* (Lipinski, 1984: 100). In the first century BC, following orders from Julius Caesar, a roman colony was established at the same location, and given the name *Hispalis* (Ordóñez, 1998: *passim*).

The roman colony of *Hispalis* was probably the most important *emporium* and port of the wealthy *Provincia Baetica*. It has been estimated that 53 million amphorae (mostly Dressel 20 type) comprise *Monte Testaccio* in Rome (Rodríguez, 1984). All these amphorae, among many other cargoes, largely departed from the port of *Hispalis*. However, despite the major role that this port played in antiquity, the exact location and characteristics of the ancient port of Seville are still little known by scholars.

The city of Seville was continuously called *Hispalis* through the convulsive historical periods that followed the fall of the Western Roman Empire (i.e. Germanic invasions, Visigoth period, and Byzantine occupation). In AD 712 *Hispalis* was occupied by the armies of the Umayyad's Empire and subsequently controlled by different Islamic governments until AD 1248, the year in which it was conquered by Christian armies under the command of Ferdinand III of Castile. During the Islamic period the city was renamed as *Isbiliya*, the name from which its current name *Sevilla* (i.e. Seville in Spanish) comes from.

Paleo-geomorphology of the Guadalquivir River

Seville is located 85 km inland northwards from the Atlantic coast; it is separated from the ocean by an extended area of marshy lowlands near the banks of the Guadalquivir River. The Guadalquivir marshes have an approximate area of 2000 km², they are one of the largest agricultural production areas of rice in Spain, and are also the home of one of Spain's largest natural reserves: Doñana National Park, declared a Unesco World Heritage Site in 1994. However, during Roman times the area that occupies these marshes was very different than in the present day; it was a large body of water that can be described as an interior sea, a large inner lake, or a large estuary (Fig. 1). The lake slowly became filled in with deposited sediment, gradually transforming into the current marshes (Ruiz *et alii*, 2002).

We know that during Roman times this interior sea was navigable and deep enough to allow seagoing merchant vessels of considerable size to navigate through it (Strabo 3.2.3). However, we do not know under which name this area was known during Roman times since none of the main Roman Era geographers named this interior body of water. Neither Strabo, Pomponius Mela, Pliny the Elder nor Ptolemy assigned a specific name for this area.

Ptolemy, however, is the only geographer that, despite not using a specific name, described the area in detail; in his *Geography*, he gives a description of the *Baetis* River and the cities and towns around it. He refers to this area as the estuary (i.e. *ἀνάχυσσις*) of Asta and Nabris-

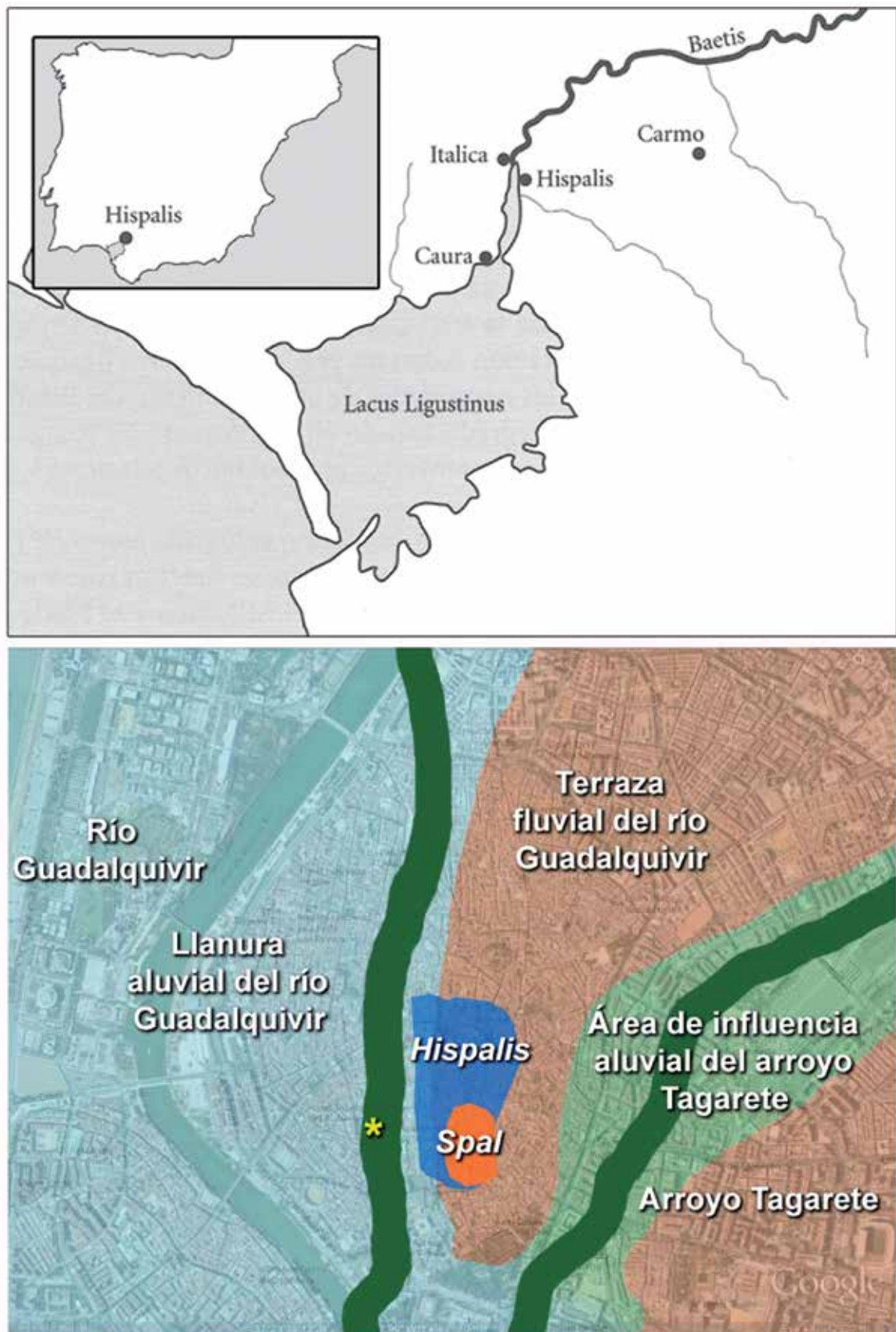


Figure 1. Reconstruction of *Lacus Ligustinus* and location of *Hispalis* (top); geomorphology of the Guadalquivir in Seville and the position of the ancient riverbed circa 1st c. AD, the asterisk marks the *Plaza Nueva* (bottom).

sa (Strabo 3.1.9). He defines *ἀνάχυσσις* as follows: «the name of estuaries is given to hollows covered by the sea at the high tide, and in the same way that rivers afford waterways to the interior and to the cities on their shore».

Ptolomy continues describing the area above the Atlantic coast situated between the «Sacred Promontory» (i.e. Cape St. Vicent) and the «Pillars» (i.e. Strait of Gibraltar) where, he described, there is a considerable plain that extends inland. This plain is composed by many inlets and hollows running from the sea towards the interior; these were large size riverbeds of the Baetis estuary that extend for many stadia (Strabo 3.2.4).

Despite the extended and detailed geographical description of the entire area that Ptolomy produced he described it as estuary or country but never gives a specific toponym. The first time that a specific name is used for the estuary of the Guadalquivir River occurred in the 4th century AD, when Avienus described the area as *lacus Ligustinus* in his *Ora maritima* (Avieno, *Ora Maritima*, vv. 283-303).

Ora maritima is a poem containing borrowings from the early 6th century BC *Massiliote Periplus*. The editor of one of the French translations of *Ora maritima*, A. Berthelot, remarked that Avienus composed his poem by searching archaic travel accounts and *periplus* and then summing the information gathered with his personal impressions and perceptions of the world in the 4th century AD (Avienus, 1934). The result is a rather confusing account of the coastal regions of the known world in the form of a poeticized *periplus*. The account is confusing because the geographic description of the areas is real yet the toponyms used to name certain places are often borrowed from other different and distant locations. Consequently, neither the indigenous peoples living in the *Baetica* region nor the Romans that colonized it called the estuaries of the *Baetis* with the name *lacus Ligustinus* (Ferrer, 2012: 65). Avienus borrowed this term from the *ligur* coast, a place located in the Mediterranean shores of southeast Gaul close to the Greek colonies of the area. Nevertheless, and despite never being used by the Romans, the hydronym *lacus Ligustinus* is widely accepted in the modern day historiography probably because we lack a different name for the *Baetis* estuary (Ferrer, 2013: 218).

Strabo described how the area of the *lacus Ligustinus* was navigable from the sea to the many cities located inland for both small and large vessels (Strabo 3.2.4). He also explains further and in more detail that the *Baetis* was navigable for seagoing vessels across 500 *stadia* (i.e. a distance of about 80 to 92 km) as far as *Hispalis*; up to *Ilipa* was navigable for smaller vessels; and up to *Corduba*, 1200 stadia from the sea (i.e. a distance of about 192 to 222 km), was only accessible by river-boats (Strabo 3.2.3). *Hispalis* was, therefore, located at the reach of tides from the Atlantic Ocean occupying a strategic point at which two different and complementary networks converged: the maritime Mediterranean network and the riverine and terrestrial network of the *Provincia Baetica* within the Guadalquivir Valley.

The strategic position of this area was unquestionably recognized by the Phoenicians, which founded a colony in this precise spot around the 9th century BC (Escacena/García, 2012). Scholars place the origin of *Spal* on a small hilly peninsula surrounded by and connected to the salt-water lagoons and the *Baetis* (Ordóñez, 2003: 59). This location at the tip of a peninsula close to the sea and also close to indigenous settlements, follows the traditional model that the Phoenicians used for establishing their colonies around the Mediterranean (Aubet, 1993: *passim*).

In antiquity, the area where *Spal* was founded was significantly different from today's geographical morphology. The settlement was in an area within the Atlantic Ocean's tidal range, surrounded by salt-water lagoons, and nearby several streams. This peninsula is a fluvial terrace of the Guadalquivir River with an average height of more than 10 meters above sea level, thus

protected from tides and river floods. The peninsula is flanked towards the west by a large alluvial plain of the Guadalquivir River, in which the ancient riverbank flowed through a corridor situated in a different location than the current riverbed. Towards the east the Tagarete stream, and its area of influence, flanked the other side peninsula (Fig. 1).

The position of the Guadalquivir riverbed has changed through time. The current position of the riverbed has been stable from the 12th century onwards but through Antiquity and the Early Middle Ages the position of the ancient riverbed changed. On the alluvial plain of the Guadalquivir River, it is possible that a few riverbeds existed alongside the elongated peninsula where *Spal* was established. The exact number of riverbeds in antiquity is uncertain, their exact position and evolution remains unclear and has been a point of debate for scholars who have thoroughly studied the formation process of the city of Seville (Ordóñez, 2003: 59; Ménanteau, 2007: 173-178). However, archaeological and geological evidence suggest that one main riverbed existed from the 1st century AD onwards. The ancient riverbed of the Guadalquivir flowed north to south through an area that today is occupied by central downtown Seville (Fig. 1). It was in this ancient riverbed where the ancient and little known port of the colony *Spal*, later on named as *Hispalis*, and finally *Isbbiliya* was located.

Geo-archaeology of Guadalquivir in the area of Seville

For the last two decades geologists have studied the morphological changes that the Guadalquivir River endured from Roman Times to the Medieval Period. Although precise details remain unclear, the general evolution and migration processes of the Guadalquivir ancient riverbed is now understood.

One of the works that provides the most complete information for understanding the paleo-geomorphology of Seville is a doctoral thesis later published as a book. The thesis focused on the palaeographic reconstruction of the city of Seville, its immediate surroundings, with an emphasis on the paleo-hydrology of the Guadalquivir River. The study encompasses the evolution of Seville and the river during the last Holocene period, known as the Sub-Atlantic climatic phase that goes from approximately 500 BC to present (Barral, 2009).

According to this work, the palaeographic reconstruction of the city of Seville during the last 2500 years could be accomplished by understanding the migration processes of the Guadalquivir riverbed(s) by comparing two opposed phenomena: first, the *alluvial phases* that were predominant during the aggradation processes that shaped the alluvial plain of the Guadalquivir River; and in contrast, the *stability phases* that allowed the urban expansion and development of the city in different historical periods (Barral, 2009: 534).

This study was conducted analysing three different, but complementary, sets of data: geomorphological information (provided by bore core samples), historical information, and archaeological information. Once the study was concluded a series of different alluvial phases were established by the author.

During one of the phases, the one described by Barral Muñoz as «alluvial phase from pre-Roman to early Imperial», a process of change in the fluvial river dynamics comes to an end; in this period (*circa* 500 BC to *circa* 50 BC) the Guadalquivir River leaves a braded system of multiple interlaced riverbeds, or river channels, evolving into a meandering system in where one single riverbed existed (Barral, 2009: 537-540). In this phase, first a large alluvial plain composed the paleo-environment of Seville where possible multiple riverbeds flowed interlaced (i.e. braded system) on the west side of the city; this environment was highly affected by both alluvial



Figure 2. «Roman Imperial stable phase» of the ancient riverbed 1st-2nd centuries AD (top); position of the ancient riverbed circa 6th-9th centuries AD, note that it has migrated slightly westwards (bottom).

seasonal episodes and the regular Atlantic Ocean tides creating many marshy areas affected by floods. Later on, the Guadalquivir alluvial plain environment changed towards a state in which only one riverbed was more predominant. This single riverbed seems to have migrated eastwards during this phase, and towards the end of the Republican period became fairly stable closer to the east bank of the Guadalquivir and the city of *Hispalis*.

The following phase is a stable one and it occurred during the 1st and 2nd century AD, Barral Muñoz denominates it «Roman Imperial stable phase». At the beginning of this phase there is an inverted displacement of the riverbed that in two points of the city moved slightly towards the west and then they stabilized (Fig. 2) (Borja, 2014: 285, fig. 6). In general, this period is characterized by fluvial and riverbed stability; this immobility of the riverbed allowed the expansion of different urban areas of the city that were previously affected by floods (Barral, 2009: 540-542).

The Roman Imperial phase of stability coincides and it is related with the beginning of the new decrease of the sea level (Borja, 2014: 290). Relative sea level is the sea level related to the level of the continental crust. Relative sea level changes can be caused by absolute changes of the sea level and/or by absolute movements of the continental crust; also, climatic and morphological influences on coastlines could cause localised regional sea level changes. Therefore, sea level changes are relative movements that vary from place to place (Angremond/Pluim-Van der Velden, 2001: 18-19).

Multidisciplinary studies along different locations of the Western Mediterranean coast are improving our understanding of historical sea level change. Some of these studies have used a multidisciplinary approach including the study of roman fish tanks with the aim of documenting the relative sea level changes in the Mediterranean since Roman times. The studies concluded that the sea level during the 1st century AD was slightly lower than at present (Evelpidou *et alii*, 2012: 275). It seems that relative sea level changes since Roman times have been very minor of the order of a few decimetres. It has also been suggested that the role of the sea level in shaping coastal changes is relatively minor in comparison to other geological phenomena such as sediment inputs (Morhange *et alii*, 2013: 371). Aggradation is a term used in geology to refer to the increase in land elevation due to the deposition of sediment by a river, stream or current. Aggradation occurs in areas in which the supply of sediment is greater than the amount of material that the system is able to transport.

The lower sea level that occurred during Imperial times (Borja, 2014: 290) produced a change in the gradation and velocity of the Guadalquivir River. Fluctuations in sea level have a long-term impact on the riverine environment of rivers that flow into the sea. If the sea level rises, the gradient of the river in its lower course is reduced; consequently, the velocity of the water carried by the river declines, hence so does its ability to carry sediment. As a result, riverbeds increase horizontally expanding and occupying nearby areas that would be converted into flooding areas. This results in the sediment being mainly deposited near the river mouth (Campbell, 2012: 11).

On the other hand, if the sea level falls, the velocity of the water carried by the river should increase; its ability to carry sediment (i.e. downcutting) will increase accordingly. This results in riverbeds with deeper and very stable channels that have narrower breadth. This later scenario is what happened to the Guadalquivir River during the 1st and 2nd century AD, the phase that Barral Muñoz denominates «Roman Imperial stable phase». This stability of the riverbed is not completely incompatible with other aforementioned processes of migration of channels, seasonal fluvial floods, or with daily tides as indeed happened in *Hispalis* demonstrated by some of the boring cores obtained in the study (Barral, 2009: 541).

Brief description of the Roman port of *Hispalis* during the imperial period (1st-2nd centuries AD)

During this so-called «Roman imperial stable phase», the ancient port of *Hispalis* seems to have experienced its greatest commercial activity and urban development period. The humble port infrastructures from the Republic period, located around the area that today occupies the Cathedral of Seville, were expanded southwards towards the mouth of the Tagarete stream. During the Augustan and Julio-Claudian periods the port infrastructures of *Hispalis* were expanded and conditioned to manage a substantial increase in maritime commercial activities (García, 2013: 259). It is in that period when the estimated 53 million amphorae (mostly Dressel 20 type) from *Monte Testaccio* in Rome (Rodríguez, 1984) were shipped in *navis oneraria* departing from the port of *Hispalis*.

During the Flavian dynasty a new commercial district was erected adjacent to the large port that included storehouses, small shrines, and, probably, commercial corporations (García, 2013: 259). To the north of this port district, the eastern bank of the *Baetis* had anchorages, jetties, and other lesser port infrastructures used in connection to different storage and craft production areas located both inside and outside the city walls; these commercial areas, and their related port infrastructures, are documented from the Julio-Claudian period until the Flavian dynasty (García, 2013: 259-260).

It seems that this greatest commercial activity and urban development period lasted until the last years of the Flavian dynasty or the early Nerva-Antonine dynasty, when the south port district was transformed into a large necropolis. Also around the end of the 1st or the beginning of the 2nd century AD, the commercial areas in the north part of the *Baetis* seem to be replaced by residential areas (García, 2013: 260).

Plaza Nueva archaeological findings

As we have seen, very little is known about the exact position, morphology, or installations of the ancient and now lost port of Seville; but we know that the ancient riverbed passed through the area occupied today by the *Plaza Nueva* Square. In different public works carried out in the public square (because of different urban development projects) several archaeological findings, in direct relation with the ancient port and its use, were discovered. The study of these archaeological remains is of paramount importance because they could provide essential information for a better understanding of the ancient port of Seville that, despite its importance, is still largely unknown by scholars.

In 1258, after the Christian conquest of Seville (AD 1248), the convent of San Francisco was built on the site now occupied by the *Plaza Nueva*. This Franciscan monastery, one of the largest and most important in Spain until the 19th century, was destroyed by fire in 1810 (Castillo, 1988). Around the mid 19th century the ruins of the convent of San Francisco were demolished creating on its site a public square. This public square had several names throughout its first century of existence and in 1931 was renamed *Plaza Nueva* (AA.VV., 1993: 139-144).

In 1851, during the demolition of the ruins of the convent of San Francisco, a necropolis from the Islamic Period of Seville was found directly beneath the convent in *Plaza Nueva*; within the numerous graves an epitaph was recovered with an inscription dated to the year of the Hegira of 412/AD1022 (Lévi-Provençal, 1931: 43-46). This epigraphic discovery seems to prove the existence of a graveyard located at *Plaza Nueva*, in the first quarter of the 11th century; this

graveyard seems to extend to adjacent areas of Seville's city centre such as the *Avenida de la Constitución* (Jiménez/Pérez, 2012: 310). Ibn Abdun, author of a *Hisba* treatise for the city of Seville written at the beginning of the 12th century, described the presence of a potter's neighbourhood with a mosque, next to which a graveyard was constructed at some point during the 11th century (García/Lévi-Provençal, 1981: 95). It has been previously hypothesized that the Islamic necropolis found at *Plaza Nueva* is the graveyard described by Ibn Abdun (Valor, 1989: 331). The existence in the year 1022 of a necropolis in the *Plaza Nueva* area would provide a *terminus ante quem* (Renfrew, 2012: 132) for the existence and navigability of the ancient riverbed of the Guadalquivir.

However, the most noteworthy archaeological findings from the *Plaza Nueva* were a boat and an anchor discovered during the construction of Seville's underground in 1981. The fact that the ancient riverbed runs through the city centre of Seville is the reason why a boat and an anchor were found at *Plaza Nueva*, located far from the Atlantic Ocean in the busy city centre. In addition to the findings described in this article, on at least two occasions shipwrecks (or remains thereof) were found during the second half of the 20th century in areas where the ancient riverbed ran through. Some publications mention these findings without providing further information due to the unfortunate absence of archaeological control or intervention at the time of their discovery (Ordóñez, 2003: 67).

The Plaza Nueva salvage excavation of 1981

During the preliminary construction work of Seville's subway, in 1981, abundant archaeological remains were found in a public square called *Plaza Nueva*. The remains ranged from the Iberian to Islamic periods. Mr. Fernando Fernández Gómez was in charge of the archaeological retrieval (i.e. salvage) of material recovered at the subway tunnel works. According to him, different *strata* or archaeological levels were discovered during the subway public works at *Plaza Nueva*.

From all the archaeological materials found in the tunnel pit of the *Plaza Nueva* two finds were most significant: the remains of a small boat and an iron anchor. These two artefacts were found at different *strata* or archaeological levels. In early June 1981 the remains of a wooden boat were found 11 meters from the surface (Fig. 3), in a *stratum* where pottery sherds from the Islamic period were found in abundance (Guerrero, 1984: 95). The anchor was found 4 meters beneath the boat (i.e. at 15 meters from the surface) (Fernández, 2007: 168). The *stratum*, in which the anchor remains were found, also contained three marble column shafts. Finally, beneath the *stratum* where the anchor was found, Roman Era archaeological material appeared; these were described as pottery and *amphorae* sherds identified as: one handle of an Iberian *amphora* and multiple sherds of Dressel 8, 11, 17, 19, 20 *amphora* types among other ceramic materials (Guerrero, 1984: 95). Beyond that *stratum*, no archaeological materials were found¹.

The boat, the iron anchor, and other related finds (e.g. *amphorae* sherds) found at *Plaza Nueva* in 1981 seem to indicate that this location was a longstanding anchorage area in the ancient port of Seville. This discovery, therefore, could help to determine the position of the Guadalquivir River during different historical periods, and their detailed study could help establish the exact chronologies, as well as some morphological characteristics of the ancient port. The preliminary results of the study of the *Plaza Nueva* findings can be found elsewhere (Cabrera, 2013; 2014; in press).

¹ Fernando Fernández Gómez, personal comment.

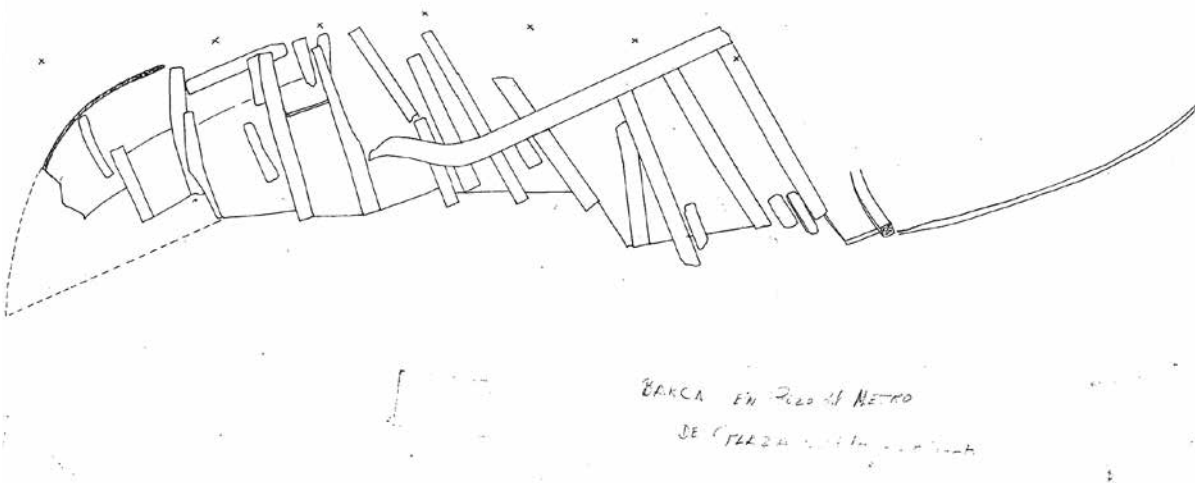


Figure 3. Remains of the *Plaza Nueva* shipwreck at the time of recovery in 1981 (top); drawing of the boat's wooden remains that were able to be documented during recovery (bottom).

The Plaza Nueva shipwreck

The remains of the wooden boat were found in a *stratum* composed by fine slit (Fig. 3), which allowed the preservation of the wooden remains (Grattan, 1987: 55-67). At present the remains kept at the museum are broken into more than 400 fragments. It seems that less than circa 30% of the original boat's hull is preserved in the museum. The majority of the timber remains belonged to the external hull strakes and the internal frames of the original vessel. At this stage, it is difficult to evaluate how much of the external hull was recovered in 1981 and is now preserved in the museum.

The hull was carvel built. The planks are fastened to the internal frames with wrought iron nails driven from the exterior of the hull. Nails seem to be the only type of fastener used in the construction. It seems that the original boat had no sail, since no remains of mast step, mast, or any rigging elements were found or documented at the time of the retrieval. However, the

remains of what are probably the handles of two oars have been found. The discovery of two oars may support the hypothesis that this was the only propulsion system of the boat. Based on the preliminary study, the *Plaza Nueva* shipwreck was probably a lighter or tender boat used to carry goods from larger ships, anchored in the Guadalquivir River, to the port installations on the shore of Seville (Cabrera, 2013: 521; 2014: 243). Thanks to a 1:10 scale drawing made at the time of the retrieval (Fig. 3) and several original photographs taken on the same occasion, the boat's overall measurements can be reconstructed to circa 7 m in length by circa 2 m in beam.

Within the timber remains kept at the museum, fragments of cylindrical wooden pieces are present. These cylindrical fragments of wooden posts were probably found and recovered from the same pit at *Plaza Nueva*; they are poorly laboured and they are too thick and heavy to have been any structural part of the *Plaza Nueva* boat. The wooden posts are straight cylindrical pieces of wood; they are tree trunks from which branches have been cut and the bark has been removed. Some of the ends are sharpened and the opposite ends are cut flat. One post has residue of what seems to be remains of a white paint. The posts are probably part of the port installations of the ancient port of Seville; they seem to be piles from a pier or remains of mooring-posts, in which vessels, such as the *Plaza Nueva* boat, could have been moored.

The presence of the original oars within the boat remains suggests that it was not intentionally abandoned or scuttled. On the contrary, it seems that the boat suffered an unexpected wreckage. Therefore, the remains are not a derelict vessel but a shipwreck (Richards, 2008). This hypothesis could be supported by the presence of a mooring post nearby and the nature of the *stratum* in which the boat was found which was composed by fine silt. The wreckage probably resulted from an unforeseen incident of severe weather, such as a big storm/s and the subsequent flood of the Guadalquivir River.

With the objective of determining the historical period to which the boat belongs, radiocarbon dating analysis was conducted (Cabrera, 2013: 523; 2014: 243). One sample was extracted from the timbers from the boat's remains of *Plaza Nueva*, and taken for radiocarbon dating analysis. The result of the analysis gives dates of 12.6% probability of 898-920 cal AD and 82.8%

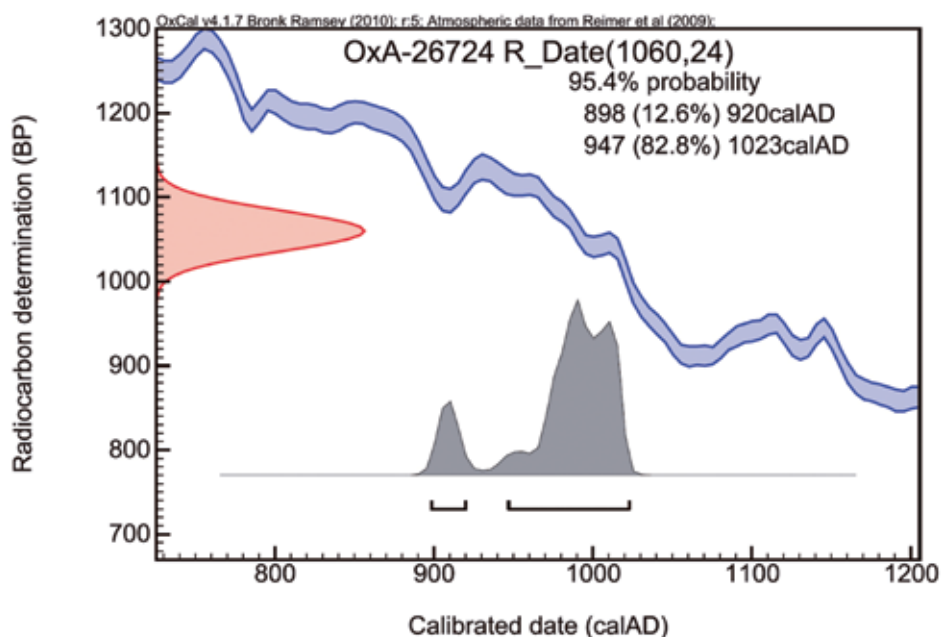


Figure 4. Results of the radiocarbon analysis of a wood sample from the *Plaza Nueva* boat.

probability of 947-1023 cal AD (Fig. 4). Taking into consideration the statistical distribution of the results, they seem to indicate that the boat was probably constructed and used during the second half of the 10th century or the first quarter of the 11th century. These results respect the *terminus ante quem* for the existence and navigability of the ancient riverbed of the Guadalquivir, established in the year 1022 by the presence of a necropolis in the *Plaza Nueva* (Lévi-Provençal, 1931: 43-46). Consequently, based on the preliminary results of radiocarbon dating analysis, it seems that the boat found at *Plaza Nueva* was lost during the last period in which the ancient riverbed of the Guadalquivir was navigable.

The Plaza Nueva anchor remains

Soon after it was recovered, the anchor from *Plaza Nueva* was studied. In 1984 Guerrero Misa, a Spanish archaeologist, wrote a brief article about the anchor found at *Plaza Nueva* (Guerrero, 1984: 95). On the basis of typological characteristics of the anchor, such as its cruciform shape, Guerrero Misa identified it as belonging to the Byzantine tradition (Fig. 5).

A series of historical events occurred in Seville during Late Antiquity, in which the city played a key role, which could support this hypothesis. In a series of subsequent military campaigns Justinian I (527-565) restored direct Roman rule over Vandal's North Africa, Ostrogothic Italy, and Visigothic Spain (Sarris, 2002: 46). In the early 550s the southern and eastern regions of the Iberian Peninsula, including Seville, were controlled by the Byzantine Empire and were known as *Provincia Spaniae* or *Spania* (Collins, 2000: 123). According to chronicles and historical accounts, it could be interpreted that Byzantine forces controlled Seville during three different periods: from 552 to 567, from 580 to 583, and in 610 (Vallejo, 1993: 123-124). However, the last occupation is unclear and debatable for some scholars (Vallejo, 1993: 241-243; Guerrero, 1984: 97).

Therefore, according to Guerrero Misa, on the basis of relating the anchor with the historical period in which Seville was under Byzantine rule, he suggested the following: that the anchor found at the *Plaza Nueva*, belonged to a vessel which anchored in the ancient harbour of *Hispalis* and that lost one of its anchors most likely during the second half of the sixth century AD (Guerrero, 1984: 98).

Taking into consideration its morphological characteristics (i.e. cruciform shape), the anchor, currently kept at the Seville Archaeological Museum, was probably made and used during Late Antiquity (Kapitän, 1984; Eliyahu *et alii*, 2011). However, its precise chronology, provenance and cultural origin are difficult to establish. The hypotheses by Guerrero Misa who suggests a chronology of the second half of the 6th century, a provenance from the Eastern Mediterranean, and a byzantine cultural affiliation are based partly on historical grounds. These hypotheses, although possible, seem not to be very firmly established. In opposition to this narrow proposed chronology, stands the fact that cruciform anchors were used since the second half of the 4th century until the 13th century (Kapitän, 1984: 42-43; Eliyahu *et alii*, 2011: 236-237). Consequently, and in the absence of a detailed study of the anchor, it can be suggested that the anchor from *Plaza Nueva* probably belongs to a chronology between the 6th and 9th centuries (Cabrera, 2013: 522; 2014: 244).

The characteristics and dimensions of the anchor could provide information about the size and nature of the vessel that carried this anchor and finally lost it in the ancient port of Seville. The anchor found at Seville is similar to the ones found among the remains of the 7th century *Yassi Ada* shipwreck that sunk off Turkish shores (Bass/Van Doorninck, 1982). Eleven anchors were found at this underwater site. The Seville anchor closely parallels anchors number

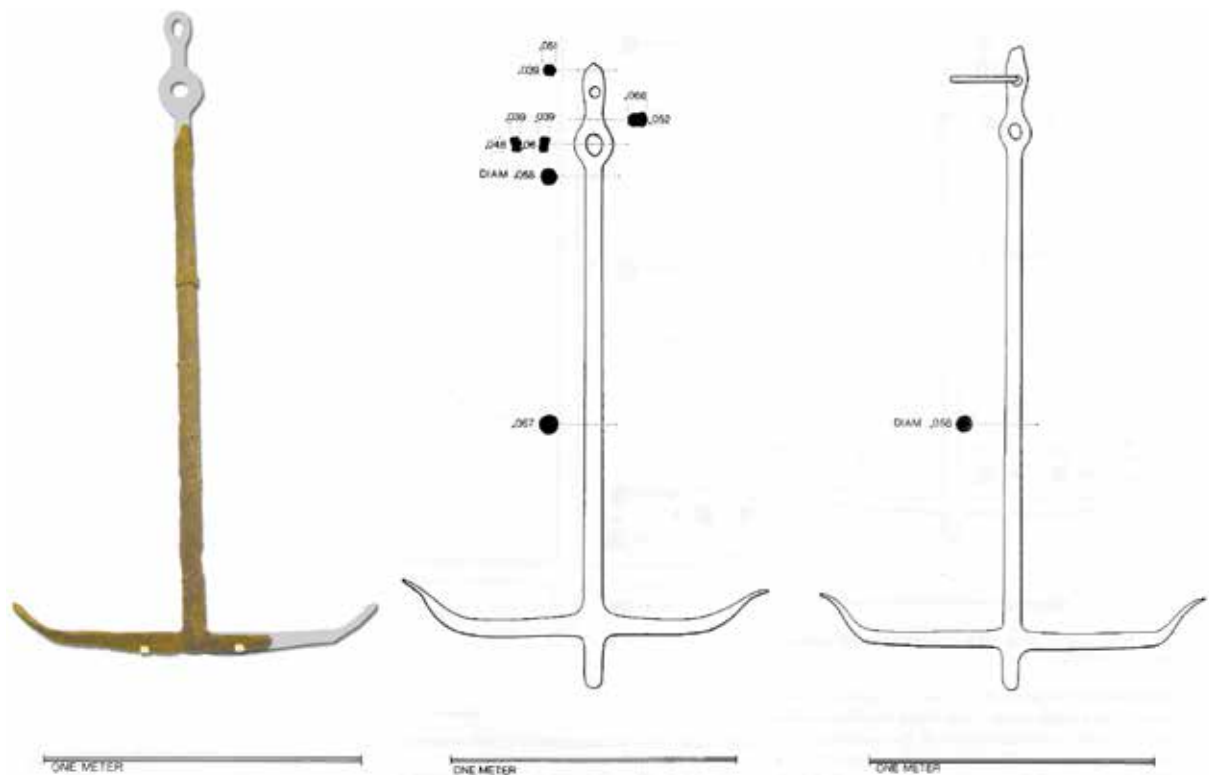


Figure 5. Plaza Nueva anchor (right), compared to anchors from the 7th c. Yassi Ada shipwreck # 3 (centre) and # 7 (left).

three and seven of the 7th century *Yassi Ada* shipwreck, since they all possess very similar overall dimensions and morphology (Fig. 5) (Bass/Van Doorninck, 1982: 126). Anchors number three and seven of the 7th century *Yassi Ada* shipwreck were used as bower anchors (Bass/Van Doorninck, 1982: 137). J. Richard Steffy's reconstruction of the *Yassi Ada* shipwreck suggests that the ship had an overall length of 20 meters and a capacity of about 60 tons (Steffy, 1994: 80). Steffy's reconstruction could provide an idea of the average size of the vessel that lost an anchor in the ancient harbour of *Hispalis*. Perhaps, having no further evidence to identify and describe the vessel that lost one of its anchors in *Hispalis*, it seems reasonable to think that the vessel was probably around the size of the *Yassi Ada* shipwreck, if not larger. Yet, taking into account the fact that there is no other evidence but the anchor remains, little more can be said about the vessel, which carried it.

Despite the limited information that the anchor provides, its size (i.e. *circa* 2 meters) suggests that it belonged to a fairly large ship. Therefore, the presence of the anchor at the *Plaza Nueva* provides an important piece of information: it suggests that during the historical period when the anchor was lost (i.e. estimated to be between the 6th and 9th centuries) the ancient riverbed of the Guadalquivir was navigable for seagoing ships of considerable size.

Deciphering the disappearance process of the ancient port of Seville

In this paper we have briefly presented the study of the remains of a small wooden boat and a cruciform anchor found at Seville's *Plaza Nueva* in 1981. The results of radiocarbon analysis conducted as part of this study indicate a 95.4% probability that the boat found at *Plaza Nueva* was built during the 10th or early 11th century (Cabrera, 2013: 523; 2014: 243), and probably be-

longs to the period of the Caliphate of Córdoba (929 to 1031). The fact that pottery sherds from the Islamic period appeared in the same *stratum* where the ship was found (Fernández, 2007: 168) would support this chronology. The results of the radiocarbon analysis rule out a previous hypothesis that described the «Ship of Seville» as Byzantine from the 6th century (AA.VV., 1988: 106).

The presence of the original oars within the boat remains suggests the boat was not scuttled but instead it suffered an unexpected wreckage, and it should be considered a shipwreck. The boat was found within sediment consisting of fine silt; this seems to suggest that an unforeseen incident of severe weather, such as big storm/s and the subsequent flood of the Guadalquivir River probably caused the wreckage. The lack of a sail propulsion system seems to indicate that the boat was not used for open sea or large-scale fishing. The presence of oars as the only method of propulsion seems to indicate that the boat was used to transport passengers or cargo from merchant ships to the harbour installations, or to cross the river from one bank to another (Cabrera, 2013: 521; 2014: 243). This type of multipurpose boat could be referred to as lighter or tender boat.

The ship remains were found in a *stratum* four meters above the anchor and closer to the surface (Fernández, 2007: 168), and hence, deposited later in time. This supports the hypothesis that the boat has to belong to an older historical period than the anchor.

The study reveals that the morphological characteristics of the *Plaza Nueva* anchor are similar to some of the anchors found in the *Yassi Ada* Shipwreck (7th century AD). Taking these similarities into account it has been previously proposed that the anchor found in Seville could be dated from the second half of the 6th century AD (Guerrero, 1984); this hypothesis also takes into consideration the historical period in which Seville could have been under the control of Byzantium. However, cruciform anchors were used since the second half of the 4th century until the 13th century (Kapitän, 1984: 42-43; Eliyahu *et alii*, 2011: 236-237). Therefore, and in the absence of a detailed study of the anchor, and taking into consideration the radiocarbon analysis of the boat, it can be suggested that the *Plaza Nueva* anchor probably belongs to a chronology between the 6th and 9th centuries (Cabrera, 2013: 522; 2014: 244). The presence of this cruciform anchor in the ancient port of Seville is of importance since it represents the archaeological example of a cruciform anchor found the farthest west within the Mediterranean (Votruba, 2014: *passim*).

It does not seem logical that an anchor about 2 meters long belonged to a small boat of about 7 meters in length. Therefore, it can be suggested with some assurance that the remains of the anchor are unrelated to the boat (apart from the fact that they were found in the same excavation pit) and should not have been associated. Very likely the anchor and boat were lost during different incidents and probably belong to different historical periods (Cabrera, 2013: 522; 2014: 243).

Although the anchor and boat may belong to different historical periods (i.e. Late Antiquity and Caliphate of Córdoba period), they were lost in the same area and found *in situ*; this indicates that this area was an anchorage of the ancient port of Seville for many centuries. Furthermore, to date, they represent the only archaeologically documented nautical finds from the ancient port. Due to the similarities of the *Plaza Nueva* anchor with those recovered from the seventh century *Yassi Ada* shipwreck, it can be suggested that this anchor, of *circa* 2 meters, must belong to a vessel around 20 meters in length if not larger in size. This suggests that in the historical period that the anchor was lost (i.e. estimated to be between the 6th and 9th centuries) the ancient riverbed of the Guadalquivir was navigable for oceangoing ships of considerable size.

As we have seen, the existence in the year 1022 of a necropolis in the *Plaza Nueva* area (Lévi-Provençal, 1931: 43-46) provides a *terminus ante quem* for the navigability and existence of the ancient riverbed of the Guadalquivir. In light of archaeological evidence, it seems likely that at some point prior to the 11th century the ancient riverbed of the Guadalquivir, as well as the port on its east bank, would no longer have existed in that particular area of the city. It seems that the ancient riverbed changed its position or morphology prior to the 11th century.

This hypothesis seems to be supported by recent studies of urban geoarchaeology in Seville (Borja, 2014). These studies, based on dozens of bore core samples, suggest that during the 9th and 10th centuries there was a dramatic change in the fluvial dynamics of the Guadalquivir River. The final study suggests, that over a long period of time, which probably began in the 9th century and lasted until the 11th, the Guadalquivir River progressively divided into two different channels or riverbeds. This splitting process (called avulsion in the field of fluvial geomorphology) was produced by progressive silting of the main riverbed from the sediments transported by the river. This avulsion was caused by a complex combination of different phenomena such as climatic, geological (i.e. variation of sea level) and to a lesser extent anthropogenic. Upon reaching a critical point the main riverbed (which existed since ancient times) could not assimilate more sediment and the water of the river, its course being obstructed, created a new channel through which it could flow freely. This process was gradual and needed around 40 events of high energy or floods providing the necessary quantities of sediment necessary to block the ancient riverbed; these episodes of high energy or floods would have occurred over a period of 150 years. If we take into consideration that by the 11th century the ancient riverbed was no longer navigable and that the avulsion process took about 150 years the following could be proposed: during the 9th and 10th centuries, the ancient riverbed of the Guadalquivir began to split gradually becoming a secondary channel, and gradually reducing its navigability. For a lengthy but undetermined period of time, around the 9th and 10th centuries, two channels or riverbeds coexisted (Fig. 6) while gradually, the new western channel became the main one (Borja, 2014: *passim*). This new main riverbed is the current course of the Guadalquivir River that separates Seville's centre from «Barrio de Triana», although during the High Middle Ages this channel was located further east from its current position (Fig. 6).

Therefore, it seems that the ancient riverbed, that throughout Antiquity and the Early Middle Ages accommodated the ancient port, gradually silted up until it was no longer navigable; this happened no later than the early 11th century, due to the presence of a necropolis in the *Plaza Nueva* dated in the year 1022 (Lévi-Provençal, 1931: 43-46) which offers us a *terminus ante quem* for existence of the ancient riverbed of the Guadalquivir. We saw that the boat from *Plaza Nueva* was found with its oars *in situ* within sediment consisting of fine silt, suggesting that its loss was an accidental product of a violent flood. It is possible, therefore, to propose that the incident where the boat was lost was one of the episodes of high energy or floods that recent geoarchaeology studies have shown were part of the avulsion process of the Guadalquivir's ancient riverbed, which ultimately led to its gradual disappearance. The radio carbon dating of the boat, which may belong to the Caliphate of Córdoba period (*vide supra*), respects the *terminus ante quem* from the presence of a necropolis of the 11th century and coincides with the proposed dates for the occurrence of episodes of high energy or floods (i.e. 10th century).

These morphological changes of the Guadalquivir River caused the wide corridor (through which the old riverbed ran) and its extensive port, to be no longer navigable, becoming a large barren area. Floodplains, ponds and sloughs made up this area and it was affected by the rise and fall of the river's water level caused by the Atlantic Ocean tides. As a result, this area would have had a limited use yet potters certainly would have found it useful since it provided unlimited supplies of quality raw material for the development of their craft. As we have seen, Ibn

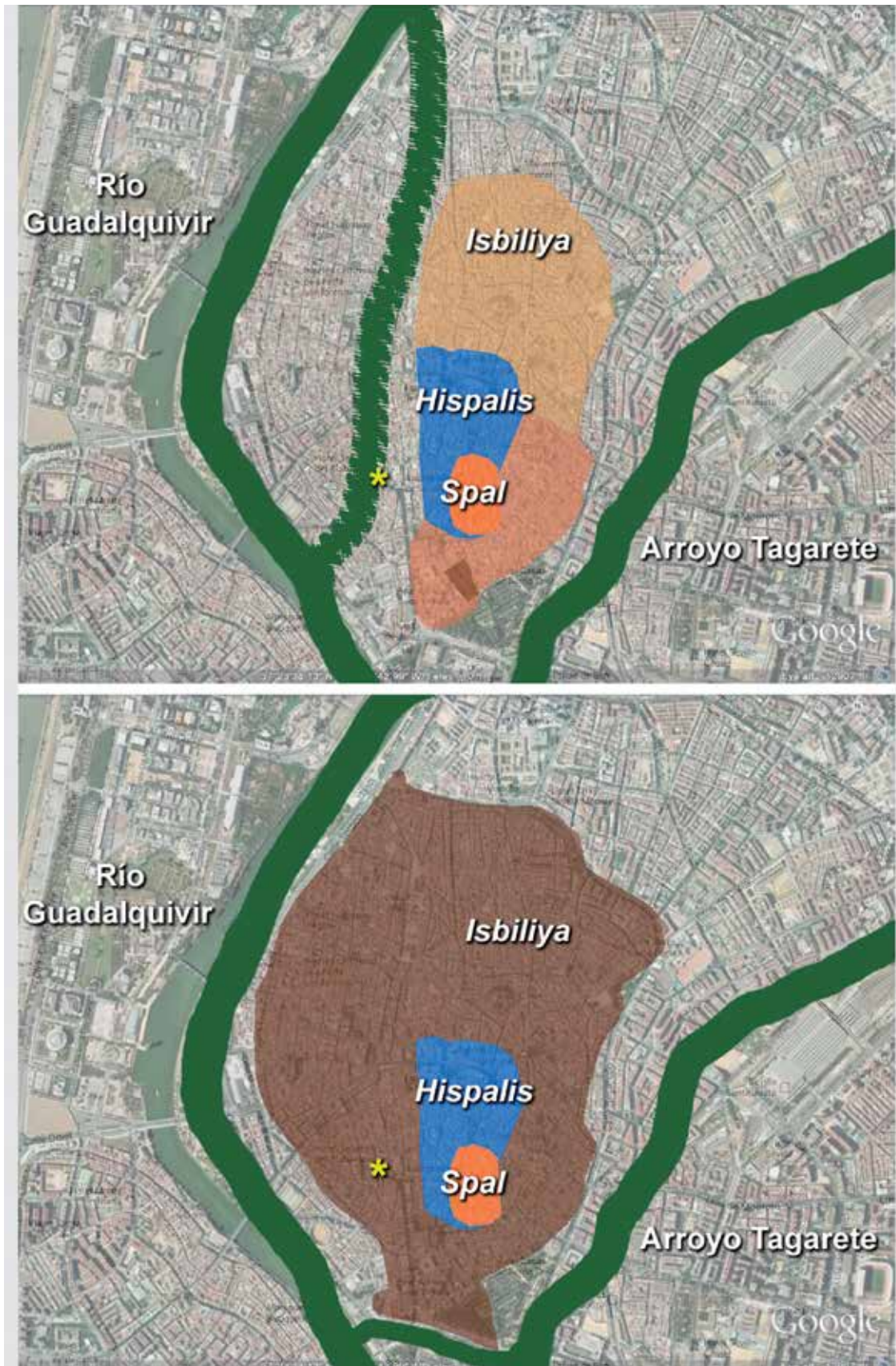


Figure 6. Splitting process of the Guadalquivir River *circa* 9th-10th centuries (top); position of the new riverbed in the 12th c. west to the walled Almohad city (bottom).

Abdun described the presence of a potter's neighbourhood with a mosque, next to which a graveyard was constructed at some point during the 11th century (García/Lévi-Provençal, 1981: 95). It has been previously hypothesized that the Islamic necropolis found at *Plaza Nueva* is the graveyard which Ibn Abdun describes (Valor, 1989: 331).

Despite the usefulness that these floodplains provided to the potters, the rest of the inhabitants of the medina *Isbbiliya* probably thought that this area was dangerous and insalubrious. The emergence of this new large area in the western part of the city certainly caused urban and administrative challenges for the Islamic rulers of *Isbbiliya*. This area of floodplains separated the medina of the vital Guadalquivir River and its port, forcing people to constantly cross through it. The emergence of this new large area, in the western part of the city, certainly led to the major urban transformations that *Isbbiliya* underwent during the 12th and 13th centuries, initiated by the Almoravids (Almagro, 1987: 427-428) and whose greatest period of urban renewal occurred during the Almohad Caliphate (Valor, 2008: *passim*).

To conclude, the study of the archaeological materials found at *Plaza Nueva*, currently in process, seem to be providing important archaeological information that, undoubtedly, is increasing our knowledge about the ancient and little-known port of Seville as well as helping in understanding the complex fluvial transformations that the Guadalquivir River has suffered throughout its history.

Specifically, the epitaph dated in the year of the Hegira of 412/AD1022 found at *Plaza Nueva* offers a *terminus ante quem* for existence of the ancient riverbed of the Guadalquivir. The finding of a cruciform anchor has proved the navigability of the ancient riverbed during Late Antiquity or Early Medieval Period, and a detailed study of it could improve our understanding of cruciform anchors in the Western Mediterranean. The study of ceramic materials from *Plaza Nueva* (currently in process) could support some of the hypotheses presented in this paper and contribute with new information. Finally, despite the fact that the boat found at *Plaza Nueva* does not belong to the Byzantine culture, its remains are still important. To this point, the circumstances of its accidental loss, due to a violent flood, have strengthened the geo-archaeological hypothesis that argues the Guadalquivir River split into two channels through a process of avulsion by means of a series of high-energy events (i.e. floods), which occurred during the 9th and 10th centuries (*vide supra*). Furthermore, the study and future reconstruction of the boat would likely provide additional information on the boat's function and use in the context of the ancient port of *Isbbiliya* as well as information about the shipbuilding techniques used in its construction. In the Western Mediterranean, there is scant information on shipbuilding practices during the Early Middle Ages or related to the Islamic Culture. The *Plaza Nueva* boat constitutes one of the few examples of ancient ships dated to the 10th or early 11th century. Therefore, a complete study is potentially of great importance because it could expand our knowledge about early medieval shipbuilding, especially in the Guadalquivir Valley.

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