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Brouage: a new early modern town through history, archaeology and geophysical survey

Adrien Camus, Alain Champagne, Vivien Mathé

Today, Brouage is a small French village, lost in the middle of marshlands 3 km from the Atlantic Ocean, situated between Nantes and Bordeaux (fig 1). These marshes are opposite the Isle of Oléron, on the Antioche sluice. This area is protected from westerly winds by the Isle of Oléron, and it is therefore very favourable for sailors. Today the village is surrounded by cultivated marshes, which has nothing to do with past activity based mainly on salt production and breeding. The unique and imposing surrounding wall of the village reflects a glorious past in itself.

Currently, there is a narrow bay formed between the estuaries of the River Charente and the Seudre, 10 km wide and 15 km away from the actual shore. Some small isles still exist in the bay, one of which is called Hiers and is the nearest to the village of Brouage. There used to be other islands which no longer exist. Part of the salt marshes were under the rule of different local priory (for example in Erablais), and belonged either to the important abbey (as La Chaise-Dieu and Notre-Dame-du-Puy) or regional ecclesiastic monasteries of Saintes, Poitiers...

Protohistoric, antique and medieval settlements have been found at the bottom of the bay on the limestone substratum, but not actually in the marshes.

Figure 1: *Map of the main places mentioned in this study.*

As there were no rivers to remove alluvial silty deposits during the Middle Ages, and probably also related to human activity, this bay has gradually filled and turned into a marsh. Today, Brouage is such a small village that the rural community has merged with the municipality of Hiers.

This text proposes a review of the historical and archaeological beginnings of the city based on the experience and results of several excavations under the Museum of Memory, which has been called Maison de Champlain since 2003 (Robin (eds) 2003, Champagne (ed.) 2005, Champagne (ed.) 2006, Champagne (ed.) 2007, Champagne (ed.) 2008). The area has been relatively free of construction since the late eighteenth century, and as such, the archaeological deposits are exceptionally well preserved beneath contemporary gardens and a square.

The origins of the city, before its foundation, its establishment, the city morphology, and finally, the living conditions will be discussed below.

1) Brouage before Brouage

First of all, the origin of the name Brouage needs to be explained. There is a channel called Brouage, which is known from medieval records: it was the medieval tower called "Broue", situated at the bottom of the bay, on a magnificent headland. "Broue" could be another word for "brie", which is the typical blue clay found in these marshes. The origin of the word "brie" can be found in the Celtic language: *brao* means mud. "Brao" became "brie" and turned into the new name of "Broue" (Mille 2003: 36).

This area was well known for its salt marshes since the sixteenth century, and was visited by merchants from Northern European countries (mainly from Germany, Netherlands, England and the Baltic countries). We find mentions of Brouage from the eleventh century, for example, it can be found in the donation charter of 1047 signed by Geoffroy Martel, Count of Anjou, for the abbey

Sainte-Marie of Saintes, which is assumed to be one of the first mentions "of canali videlicet Suidra et Broatga" (Grasilier (ed.) 1871: 5). The contemporary salt marshes are now located close to the limestone substratum, but far away from the Brouage city site. At this time the name of Brouage was used for a channel, but also for a harbour as it was favourable to the contemporary sailors. There was no village, no settlement in this area, except on the island. In fact, we do not really know what the shoreline was like during the Middle Ages, not until it is described on the first maritime map - the Portolan Chart. Brouage is rarely mentioned on the Portolan Chart, only once in the fifteenth century and then from the beginning of the sixteenth century, the reason being that it was an uninhabited site (Fiquet 2004, Passerat 1910).

So the visiting sailors had no other option but to stay overnight in the nearest villages, mainly in Hiers or Broue, as there were no houses or buildings near the Brouage Channel.[1] Nevertheless, the island was a well-known place thanks to its salt production and collection. The name of Broue and Brouage was also given to the bay, for example during the fifteenth century in the chronicle of Caspar Weinreich - a shipowner from Danzig (Dollinger 1964: 481), and even sometimes to the maritime area. The records testify to the progressive presence of some salt workers declaring themselves to come from Brouage before its foundation, but we do not really know the true and full extent of their presence there (Seguin 2000: 254).

1. In 1453, for example, a merchant from Utrecht, Henry Gillesonne, coming from Germany with his ship in Brouage was living in Hiers (Archives Nationales, Paris, JJ 182, n° 2 as cited by Tranchant 2003, p. 333).

The area is a very safe harbour, deep enough to anchor vessels of large tonnage, and close to La Rochelle, the major port for international trade - especially wine (Tranchant 2003: 285-352). The sixteenth century authors boast these qualities. Moreover Nordic sailors preferred to stay in Brouage rather than go further down the dangerous Gironde estuary to join Bordeaux (Seguin 2004: 29). Its geographical location was also valued because it was closer to the Northern European countries interested in the salt business who also preferred Brouage to the other salt-producing areas of the Iberian Peninsula. The voyage to Portugal is a long journey, 500 leagues longer than going to Brouage, especially in a stormy area.[2] This is the argument used by the author of an administrative report.

The Royal French records tell us about the great interest of the kings of France in this area. This ambitious report is written for King Louis XII, after 1491, with the aim of taxing the salt sold to foreigners in France and Britany[3]. We learn that creating a city in Brouage would be a great benefit for the kingdom and that building two artillery towers would be sufficient to fortify and secure the entrance to the harbour. The two towers protecting the harbour are very similar to those set up at the entrance of the great neighbouring port La Rochelle, another city founded during the twelfth century. The aim was to secure the site and put an end to the murders and robberies committed by sailors and foreign visitors. The insecurity explains why the place is uninhabited, "no houses", as the records say. If the place had been safer, then the sailors and merchants coming would have increased in number. It is well-known,

2. Archives départementales of Loire-Atlantique, E 129/28, fol. 2.
3. Archives départementales of Loire-Atlantique, E 129/28, fol. 2-5 as cited by Seguin 2005, p. 127.

currently, that sailors, especially if they are foreigners, are an aggravating factor to insecurity and danger. Another condition making things worse is the material aspect of this land: half water, half earth; a non-accessible marsh, a redoubtable maze.

Consequently, they had the intention to build not only a few houses but a real town, which meant a town loyal to its king and to its military engagements. Of course, a new tax would appear for the merchants with the building of a city. The tax would double the price of salt, but for the author of the report, it would be offset by the length of the trip, as it was shorter to go to Brouage compared to Portugal.

But the text was not accepted as the nearest cities such as Bordeaux and La Rochelle disagreed and opposed the idea. This document gives us an idea of the importance of this harbour during the fifteenth century, an exchange place for diverse merchandise.

This record also reveals how important and serious the project was during the fifteenth century, but that they had to wait until the sixteenth century for the project to be realised.

2) The establishment

Discrete documentary evidence

The foundation of the town took place during the most economically favourable phase of the sixteenth century, between 1540 and 1568 (Seguin, M. 2005). It was a period of economic growth, with favourable climatic conditions and a relatively quiet period compared to the second half of the sixteenth century. There aren't any official documents testifying the foundation, it is only referred to in the

conclusion of court proceeding and the in the writings of some chroniclers.

These lands belonged to Jacques de Pons, Lord of Hiers and Mirambeau, grandson of Marie de Valois, Lady of Taillebourg, a bastard himself of King Charles the 7th (Seguin, M. 2000). This man was married three times, each time gradually increasing his income. He was able to enter marriages which ended very favourably for him. For the French historian M. Seguin, he is a real upstart.

First, he reinforces his social position and boosts his fortune. Then, he starts organizing his control on the seigniory of Hiers. To begin, he demands recognition in court as the only judge of the lordship of Hiers, and therefore the only one responsible for the harbour.[4] The opponents were numerous: Lord Antoine de Pons, the Abbess of Saintes - because of the tithes she levied on salt, the lord of Soubise for the rights to the harbour of Brouage and mainly, the community of salt merchants from Marennes and the community of merchants from Hiers. The document provides a lot of information: a measure was created called the measure "of Brouage". We learn that the measure was controlled precisely by the officer of Jacques de Pons, since 1546, and moreover that it was imposed by the Lord of Pons and included new taxes. So, even though the city did not exist, even though there were no buildings, no houses, they created a real administration to rule the harbour.

The opponents fail to demonstrate that only the king had the right to establish a new port and to impose new taxes, and consequently, they lost the case. The private interest was predominant and the public was considered to be a minor factor. This way of considering things, and

4. Archives départementales of Gironde, 1B 121, fol. 226.

the origin of the founder, a simple local aristocrat from the gentry, was not helpful and only hindered the city in its process of becoming a successful long lived city. This private city was condemned to become a royal city later on. Jacques de Pons won his court proceeding and therefore started building a city called *Jacopolis*, the city of Jacques, in 1555 according to a chronicler of the sixteenth century (Lancelot-Voisin 1581, livre 37, fol. 211 v°). The case gives legitimacy to Jacques de Pons, but unfortunately, it did not give us information about the organisation of the city.

If we have a closer look, Jacques de Pons was not working on his own: he entered into a partnership with local family merchants and made a deal with them. Two financiers worked with him. Jean Relion, controller of a Royal tax in Saintonge, a land tax, and his brother-in-law, Etienne Guillet, the receiver of the same tax in Saintonge (Seguin 2005: 33).

The business seems to have been profitable. Many local merchants, coming from the neighbouring villages of Moëze, Broue, Hiers, Tonnay-Charente, and the isle of Oléron (fig 1), made one or more of their sons settle in the new city. Some sailors from the Basque country, as well as Dutch merchants, who had previously regularly visited the place, stayed and settled definitively.

The choice of site

In 1570, the local chronicler La Popelinière described materials like sand, stones and other ballast materials that northern ships brought and unloaded in Brouage (Lancelot-Voisin 1573: 389-390). In 1598, Alain Nicolas, another chronicler, makes mention of a lot of debris, rocks,

gravel, and manure covering the old marshes (Alain 1889: 31). Old sources suggest that the foundation would have been facilitated by massive deposits of stone ballast.

In 1998, Lazareth Claire, from La Rochelle University, defended a geological thesis on a few of these ballast stones (Lazareth 1998) in which she revealed their geographical origin. They are absolutely alien to the local geology and testify to the relationships between the French harbour and Northern Europe (Cornwall, Northern Ireland, and Tönsberg harbour in Norway with a stone call larvikite).

However, in the archaeological sounding realised for this occasion, their number was very small and nothing indicated that the foundations were on an artificial stone island.

Geophysical investigations were also carried out in Brouage in 2010 by a team from the University of La Rochelle. The objective of the study was to map the geological surface on which the town was established in the sixteenth century. This site, which is currently at the heart of the marsh, saw its geomorphology evolve rapidly in the last centuries. In some places, the coastline has increased by more than 1 km from the seventeenth century. In the past, there have been a few studies which have provided valuable information, but little is known about the foundations of the site. Through two doctoral theses defended at the University of La Rochelle, we know that the western curtain (Curtain of the Sea) is based on more than 10 m of river-sea clays (Lazareth 1998), locally named "bri", whereas part of the north rampart is built on sand (Riou 2002).

Until now, no exhaustive mapping of the basement of the citadel had been realized due to the urbanization of the site and the necessity to protect its integrity, among other reasons. Geophysical methods are particularly well

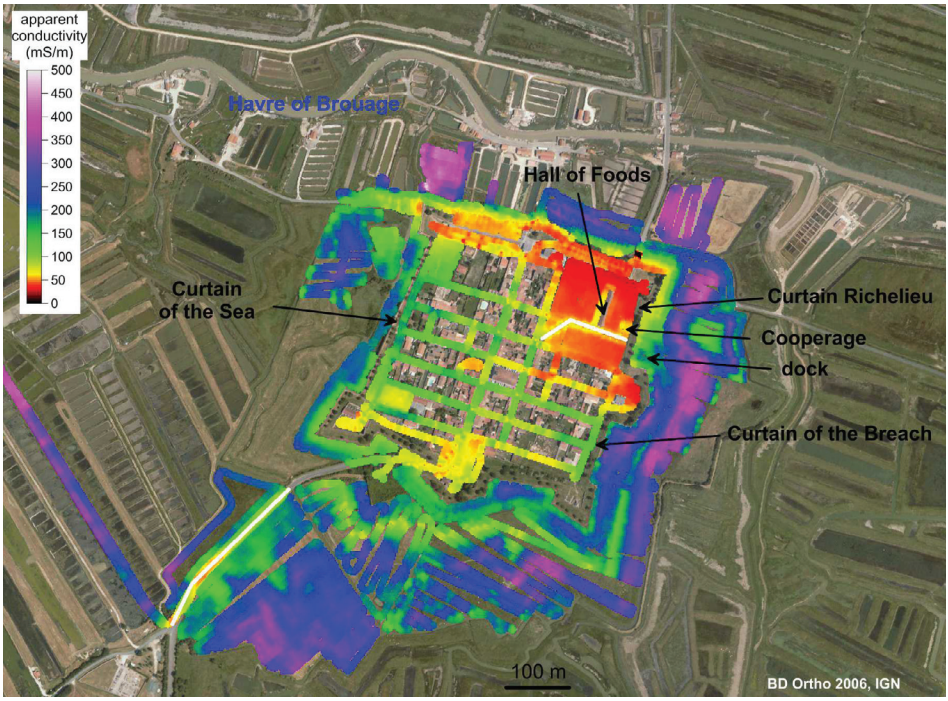

Figure 2: *Results of the electromagnetic survey (EM31-MK2) in the citadel of Brouage and in the immediate neighborhoods.*

adapted to the problem in this context. Our experience in comparable contexts such as the marsh of Rochefort (Camus 2008), that of Narbonne or those of the Gironde (Mathé *et al.* 2010), led to our choice to use electromagnetic prospecting with a *Slingram* instrument (EM31, *Geonics Ltd*). Such a device measures the apparent electric conductivity of the basement on a thickness of several meters. The conductivity is low in the presence of stones or dry sand. On the contrary, the very wet zones, even those which are salty, have a very high conductivity. The whole region of the site as well as the accessible spaces within the citadel, particularly the sector of the Hall of Foods, were prospected. These investigations covered a surface

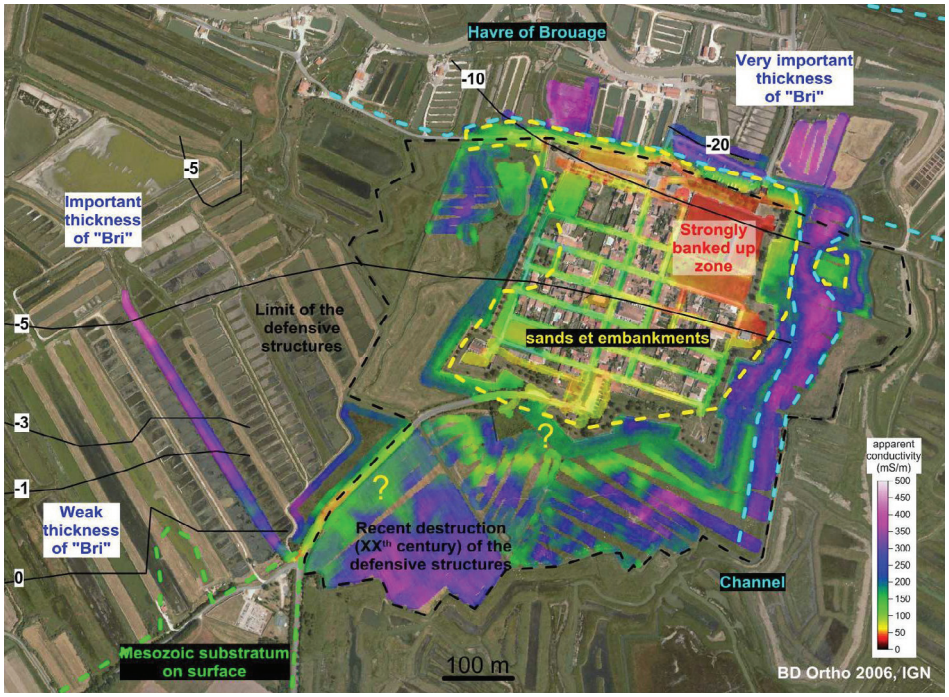

Figure 3: *Interpretation of the map of conductivity having compared it with the historic plans and with previous works. The black continuous lines indicate the height in meters NGF of the roof of the Mesozoic substratum.*

about of 45 ha. The electromagnetic data acquired during this campaign was then compared to historic plans of the citadel as well as with the results of previous studies (geotechnical studies, archaeological soundings…).

Figure 2 shows the results of the electromagnetic survey. Less conductive levels (sands and embankment), shown in green and yellow, are present below the entire city as well as in the northwest ramparts. We distinguished a rather clear resistant zone in the south and in the east, excluding the purple zone which is the old wet dock of the harbour. The archaeological data shows the presence of sands throughout the entire city, but there is not an elevated level of ballast stones. The height of these heterogeneous sands

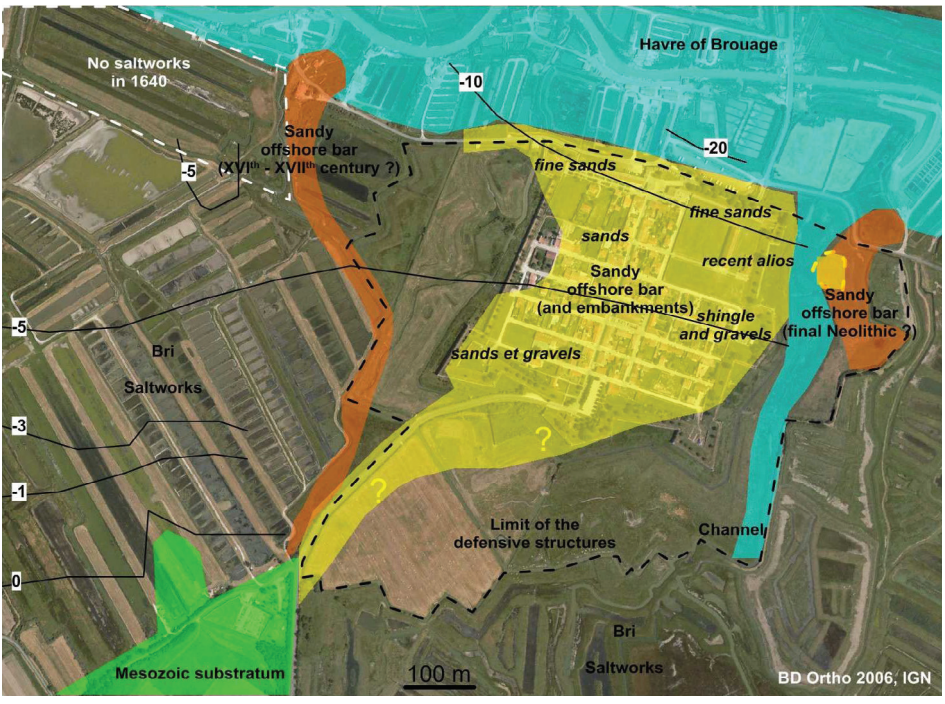

Figure 4: *Proposal of reconstruction of the surface geology at the time of the foundation of the city. The extension of the defensive structures is indicated by black dotted lines. The offshore bar attested on the geologic map (Platel et al., 1977) is in orange while the sandy zone revealed by the prospecting and the soundings is yellow. The black lines indicate the height in meters NGF of the roof of the Mesozoic substratum.*

ranges from 2 to 3.45 m above the sea level. The citadel seems to have been built on a sandbank along the mouth of Havre of Brouage, which was much wider then than it is today. The outline of this layer continues to the east and the west and was able to be exactly mapped (fig 3). The presence of the sand, a very draining material which forms a weak rise in this wet and flat environment, was certainly a major element in the choice of the location of the city. The sand is based on sediments resulting from compaction and maturation of salt marsh mud some meters thick in the south, and more than 10 m in the north. Only the central

part of the Curtain of the Sea (in the West) is not based on sand.

The zone seems strewn with more or less old sandy offshore bars (fig 4). The builders of the city probably relied on the sandy level to build, taking advantage of conditions that the nature offered them (sand is very stable) by trying to optimize them. This study allowed them to abandon the statements of the columnists of the sixteenth century. However these observations do not exclude the contribution of the embankment, whether it is in the form of stones or sand.

The inside of the citadel, particularly the sector of the Hall of Foods, is located at an altitude which is globally higher (extra height of the order of 1 to 2 m) causing a decrease in electric conductivity; this is due to an accumulation of embankments since the sixteenth century, as shown by the foundations of the Hall of Foods, the Cooperage, and several loop-holes distributed along ramparts and buried in the embankments.

The prospecting outside of the citadel also showed the existence of a very conductive zone following the Curtain of the Breach and the Curtain Richelieu; it corresponds to channels used to connect the Havre with the underground harbours, indicated on several historic plans.

Further south and on the west there are the defensive structures that were made from earth, which, although sometimes completely worn, are clearly shown by the electromagnetic survey. To the east of the road leading to Hiers city, the low conductivity values may correspond to the end of the offshore bar attached to the tip of the paleo-island (substrate flush).

The morphology of the new town

The city was rectangular, 338 meters long and 228 meters wide (fig 5). The surface was divided into irregular blocks that were roughly 33 meters deep and an irregular length.

These were split into parcels of roughly 7 meters by 16.5 meters which were either rented or sold for building houses. In 1574, the permanent lease of a parcel measuring 33 metres by 7.5 metres wide amounted to 50 *sous* every year[5]. The richest people had the possibility to rent a double parcel or more if they could afford it. The archaeological excavation revealed that the width of each parcel had not changed much over time. The main street led to two city gates, one of which overlooked the harbour and the other the village of Hiers. There was only one small wooden bridge that gave access to Brouage from Marennes, as the marsh was no more than a maze even after the foundation of the city (Seguin 2000).

A general survey of the city revealed that it was quite successful, efficient and amazing for the people living there, such as the French chroniclers La Popelinière and the German traveller Nicolas Platter. They were very surprised by the new conception: the streets were straight and well-adapted to traffic (Lancelot-Voisin 1573: 389). The houses were low for better protection and were perfectly aligned, which was typical and representative of modern aesthetics (Lancelot-Voisin 1573: 389 ; Le Roy Ladurie 2000: 573). Moreover, there was a large square where soldiers could parade. There was also an Academy for the education of young Lords, next to a magnificent stable, a real tennis court, and a hall (market place) (Le Roy Ladurie 2000: 574-76).

5. Archives départementales of Charente-Maritime, 3E XX 2, 1st July 1574, as cited by Delafosse 1965, p. 18.

Figure 5: *Map of the city of Brouage (National archives, London, MPF 1/18).*

Unfortunately, there is no known documentation of the conception of the city. The important case between the Lord Jacques of Pons and his opponents only offers us information about the justice rights and taxes on salt, but absolutely nothing to do with the conditions of settlement for the new inhabitants of Brouage.

The fortification of the town does not seem to have been very important at the time.

The first bulwark was built in a very simple way: the bastions and the wall were constructed from the masts of vessels, large pine planks, turf and bundles used to hold the earth and gravel together. These were only necessary

when protecting the city during the night and so that the merchants could supervise the transit of goods. Despite this rudimentary aspect, the building of the site cost a lot of money.

The different excavations do not give us a better idea of the town's first wall. The details we do have are from chronicler's texts. After an initial period without any information, the texts became more numerous during the religious wars when the city wall needed fortifying with stone. This was when four Italian engineers began to work for the King of France in Brouage (Lancelot-Voisin 1573: 389 v°).

- Jacques degli Orlogio, known as le chevalier Horloge (Reloge). He returned to Italy in 1569,
- Benardino da Colle, known as El Bellarmato, a royal engineer who arrived in 1560 after working at the construction site of the city of Le Havre in 1541, at Dieppe in 1544…
- Bephano arrived in France in 1534
- Jacomo Fusto Castritto d'Urbino, both a captain and an engineer (he died in 1561 in Calais); he was the author, along with Girolamo Maggi, of "Della fortificatione delle città"They drew a map of a fortress with bastions at each of its four corners surrounded by new ditches. The same materials were again used, such as masts of vessels, boards, bundles of firewood, and clay (Lancelot-Voisin 1573: 389 v°). This is a good example of how difficult it was to find building materials. They gathered together the remains of wrecked ships and other pieces of wood that were washed ashore. All of the medieval sites were built using old wood, the big ones as well as the smaller ones. The city was always surrounded by wide moats filled with water; according

> to some authors there were as many as three moats (Le Roy Ladurie 2000: 573).

When the French engineer, Robert de Chinon, arrived in 1570, it was not long before the king controlled the city of Brouage definitively; this happened after an exchange of pieces of land between the Lords of Pons and the king. Stonework was used, but only with parsimony, and only on a few of the bastions and the curtains that were situated opposite the harbour. The port was the real entrance to the city; its back faced inland towards the village of Hiers. For example, access to the city was still dangerous, the road was no more than a narrow sandy path bordered by marshes and ditches (Lancelot-Voisin 1581: 374). It was so dangerous that the soldiers could easily drown. At this time, the city became a definitely royal city.

Its situation was different from other new French cities of the sixteenth century. There were very few foundations during the sixteenth century in the Kingdom of France. Le Havre was a new real city, built on a small village by François the 1st in 1517 (fig 6). It was an ambitious Royal project which was enabled thanks to the considerable financial means of the kingdom (Salch 1998: 5). Most of the other construction during the sixteenth century consisted of the transformations of ancient villages or lesser towns into new fortresses such as: Saint-Paul-de-Vence (Corvisier 2012) or Navarrenx (1543). There is also the example of cities destroyed by Charles V and the Holy Roman Empire, such as Thérouanne, which was rebuilt with a small geographical shift, Hesdin-le-Vieil (today Hesdin) in 1553 (Mertens 2004), and Vitry-le-François in 1544. Rocroy was a city fortress built on the border by François the 1st in front of the Holy Roman Empire. Many of them were built with stonework, quickly or not.

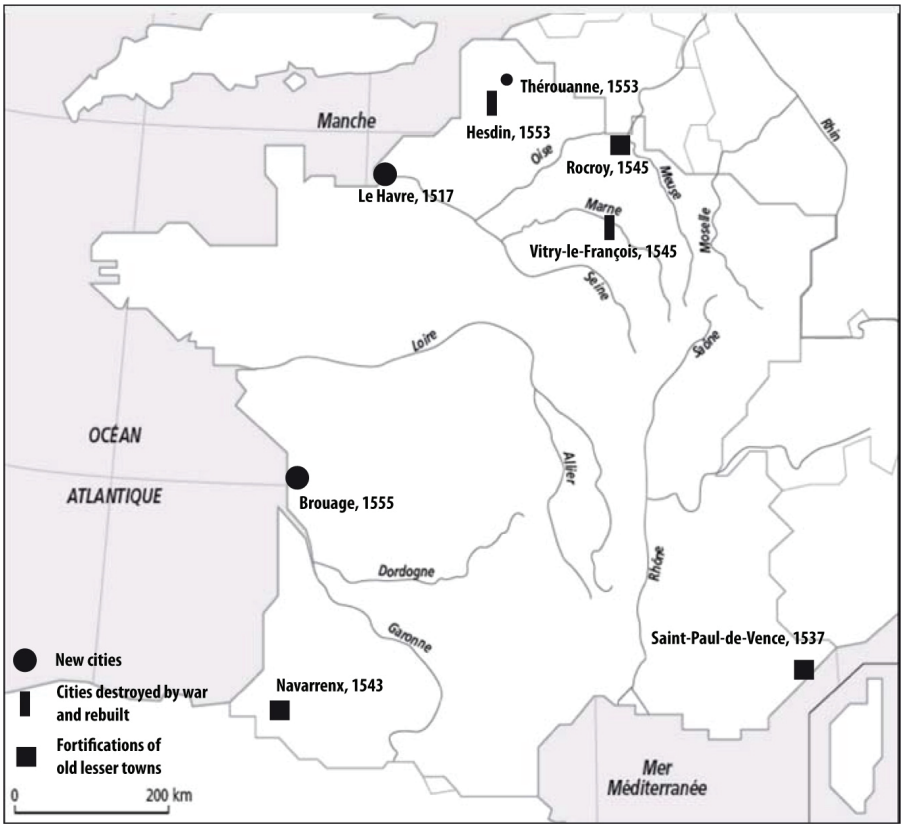

Figure 6: *Map of the new cities and new fortifications of the sixteenth century in actual France.*

We must not forget that to begin with, Brouage was not a Royal city, a fact which was very unusual at the time. Jacques de Pons did not care much for the display of power symbols, stone or walls. The cost of stone construction can explain the presence of clay walls in Brouage for many years.

For example, only the covered markets and the central square were rebuilt and repaired when damaged by strong winds and storms. Brouage was not a fortified place like Vitry-le-François, nor a naval dockyard like Le Havre. It was only a trade harbour.

3) The material aspects of the new foundation

The new settlement took place in an economically and a geographically favourable context. This new city had all the assets for success, but what was the reality like?

The question of building materials

The city, located in marshlands, had no building materials at its disposal other than clay. Clay has been used in vernacular architecture in the western French marshes, for example, earthen houses have been studied in the Vendée marshes by anthropologists: they are built with adobe - a mud brick made of a mixture of loam, mud, sand, and water.

But soon, the ballast stone, discharged from ships, was considered a suitable building material for house construction (fig 7).[6] Otherwise, all the other materials had to be transported from the continent (tile, brick, wood, stone, whitewash, iron, window glass). Only one wooden bridge and a path winding between the salt marshes connected the inland to Brouage. Carrying heavy materials such as stone is quite an impractical experience. We do not know much about the origins of the building materials used during the seventeenth and eighteenth centuries (Champagne 2011). Limestone can only be carried short distances, a few dozen kilometres. The archives of 1632 give us an example of stones being transported from the carrier of Saint-Même, a village localised on the Charente River, 80 km inland.[7] Later, during the eighteenth century, stones are mentioned as having been

6. Archives départementales of Loire-Atlantique, E 129/28, fol. 3.
7. Archives départementales of Charente-Maritime, 3E 3106, 17 february 1632.

Figure 7: *View of wall n° 23, built with ballast stone and limestone (1,00m scale, picture A. Champagne)*

extracted from the carrier of Beaugeay (6 km in a straight line) and from Saint-Savinien on the Charente River (30 km in a straight line).[8] The nearest carrier probably supplied rubblestone while the furthest supplied freestone. The cost of the carriage significantly increases the price of these materials. Yet over time, local limestone and ballast stones were used together in masonry. There does not seem to have been a special use for each one. These difficulties explain why the salvaged elements of old ships (wood, stone ballast) were used extensively. This was not particular to this area or to this period. The recovery and recycling of building materials is a common part of the usual practices of medieval construction sites, including the most modest to

8. Archives départementales of Charente-Maritime, 3E 61/271, 12-13 marsh 1742.

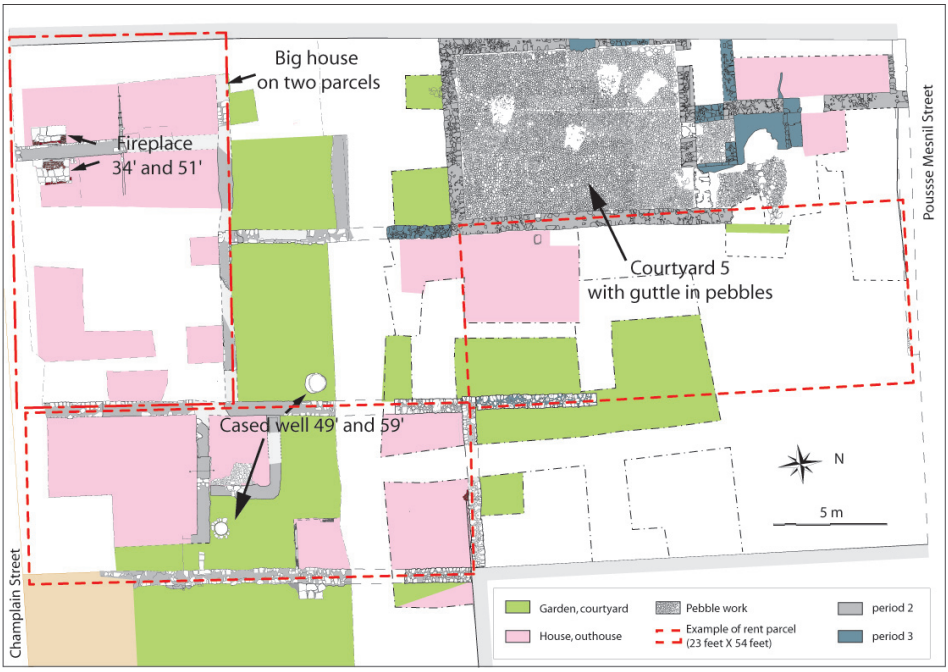

Figure 8: *Plan of principal archaeological features of the Champlain House site (late sixteenth and early seventeenth centuries, period 3) (graphics A. Champagne, G. Demeure, C. Gay, O. Richard)*

the most famous sites (Fiquet Leblanc 1997, p. 80). In 1635, after the capture of the city of La Rochelle, the citadel of Saint-Martin-de-Ré was destroyed. The wood was recovered and taken to Brouage and another fort on the island of Ré where it was used for the construction of fortifications.[9] Brick was also used for the partitions and the fireplaces (fig 8). As for the tiles, which are used both to drain the rainwater (fig 9) and to cover the roofs of the houses, part of the baked clay was imported from the northern area of Libourne by boat in the sixteenth century (Seguin 2004, p. 28). Its origin is surprising, because there are known tileries near Saint-Sornin and around La Chapelle-des-

9. Archives départementales of Charente-Maritime, 3E 20/22, 11 june 1635 as cited by Champagne 2011, p. 25.

Figure 9: *View of the pound (in black) and associated tiles drain, site of garden of the Memory Museum of Champlain, Brouage (0.50 scale) (picture A. Champagne)*

Pots, near the city of Saintes, both of which are closer to Brouage (Palissy 1996: 139 ; Chapelot 1980). The promoters of the project, Etienne Gillet and Jean Relion, were deeply established in Bordeaux, and it may explain the distant origins of architectural terracotta. However it should also be noted that the cities of La Rochelle and Marennes also obtained supplies of architectural terracotta from the same moorlands at the north of Libourne.[10]Archaeologically speaking, it is not easy to spot where wood and earth have been used for the construction of houses as they were replaced by stone buildings in a later reconstruction.

10. Archives départementales of Gironde, 3E 1142, 5 november 1567, as cited by Seguin 2005, p. 122.

Figure 10: *View of court n°5, with softwood bottom plate with two embedded vertical elements (Picture A. Champagne)*

Nevertheless, it is worth noting the presence of a base wall made of stone that was covered with mud and a softwood bottom plate (courtyard 5, period 1, fig. 10).

The prevailing species is actually softwood, the same that was used for ship's masts, but it is impossible for us to know its origin. We have only one mention of wood coming

from a small local forest, near the city of Marennes, but that was in 1669.[11] Some of it was used for the bottom plate, but it was also used for the waterfront. It is a little surprising that there was so little oak. It is only present in a pit latrine (cased well 49' and 59', fig 8) and a pole. This finding, based on the archaeological discoveries, is in contrast with the few references found in the archives. For example, we learn that during the winter of 1566-1567 (Seguin 2004: 28), the covered market was blown away by a tempest, as well as the real tennis court, a few houses, and some of the other buildings. The marketplace was made of large oak piles, similar to those still existing today in the region. For the fortification that took place during the seventeenth century, oak seems to be predominant although the beams were elm.[12] Elm was also used for posts, midplates and boards in the important waterfront found on the Southwark excavation in London (Blatherwick Bluer 2012: 110).

The presence of wood for the fences between building plots is also confirmed by seventeenth century archives and archaeological excavations. This is the case for the fence separating the gardens of Jacques Troussereau, a sailor, from those of Bastien Philipot and some of the neighbouring windmills in 1657. They probably came from the area excavated, situated behind the museum of memory, known as Maison Champlain.[13] The paucity of the notarial archives from the sixteenth century makes it difficult to understand the physical and concrete state of the city

11. Archives départementales of Charente-Maritime, 3E 20/40, 16 june 1669 as cited by Champagne 2011, p. 26.
12. Archives départementales of Charente-Maritime, 3E 52/271, 6 june 1640.
13. Archives départementales of Charente-Maritime, 3E XX29, december 1657.

during the first decades of its life. Yet, the texts testify that there was quick growth accompanied by the immigration of many merchants from the Atlantic coast. The quality of the proposed services (hall, tennis court, and academy) seems to attest to the success of the establishment.

The invasion of saltwater and the lack of fresh water

The geographical situation often caused flooding during high tides and storms. There are many signs of the struggle against the elements. The violent storm of the 1566 winter, which washed away buildings and houses, has already been mentioned. The risk of storms is normal for a city built on lowlands at sea level. A similar disaster took place in the new city of Le Havre in 1524. The houses were destroyed, and there were more than one hundred casualties (Salch 1988: 12).

So the inhabitants escaped from the difficult and risky living conditions. Nevertheless, the site started rebuilding, and people come back encouraged by the king's financial help.

During the sixteenth century winters the people of Brouage were forced to live in particularly wet houses. La Popelinière mentioned that its first inhabitants had to fight against the water that invaded homes and streets during the high tides and stormy weather (Lancelot-Voisin 1581, book XVL, fol. 374). A rare document from 1573 gives us some really interesting information about the consequences of flood risk.[14] About twenty years after the foundation of the town, Micheau Berteau, a ploughman, from Hiers, rented a

14. Archives départementales of Charente-Maritime, 3E 20/1, fol. 172 v°, 11 december 1573.

wooden house in the main street of the new city to Jean Le Roy, an armourer living in "Jacopolis" upon "Brouage". The price was 30 *livres* per year, but the tenant also had another obligation: he must carry some earth, sand and pebbles, and cart them up in front of the house and his shop at a suitable height. This work was to be remunerated and the salary deducted from the rent. This obligation was directly dictated by the water problem and the general elevation of the city near sea level. In courtyard n° 5, the first bottom plate was at 2 m OD only (fig 10).

There are two obvious components to the Champlain house site.

The first one is a large hole dug into the sand and clay, which is here called a pond (fig 8). Its dimensions are more than 3.1 meters wide and 8 meters long. It was one meter deep compared to the contemporary sand levels. A drainpipe made of tiles, 4.3 meters long, allowed for the draining of water from the neighbouring land, and therefore, made it possible to build a house on it. The pond and the drain-pipe are shown on the sixteenth century city plan, conserved in the National Archives in London.[15] Over time, the size of the pond decreased. Different structures were built with the aim of separating the water from the town area. Different parts of the pond were filled in, and the waterfront was built with a plank wall, strengthened by softwood posts. The planks were positioned horizontally, but not vertically.

The remains of the pieces of wood found by our investigations are not in a good state of preservation. They were not always submerged, especially during low

15. National Archives, London, MPF 1/18.

tides. However, the planks are very thin, between 3 to 10 centimetres thick; in the area of Brouage, the posts were between 7.5 to 10 centimetres in diameter and softwoods were the only species of trees used. The structure found in the area of Brouage looks similar to the one found on the waterfront of the Southwark site, near London bridge, especially number 12 for example (Blatherwick Bluer 2012: 82-119).The comparison stops here, because although the shape is similar, the modulus of the wood used in London was much larger, showing the importance of retaining backfill.

Another difference can be noticed. There has been no wattle recovered in Brouage from the waterfront yet, but it was already present on the south bank of the Thames at the end of the sixteenth century (Blatherwick Bluer 2012: 132). These light structures could have been well-adapted to the low height of the banks in Brouage.

The drainage system is interesting. The water was channelled onto the street by stone drains and flowed out through pipes in the masonry of the city wall. In another case, it was canalized in the courtyard of the houses by a pebble gutter (court 5, fig 8), where it stagnated.

The second component is evidence of the substantial effort to solidify the ground in the houses, the courtyards, and the gardens with the various solid materials that were available. All over the excavation site, we can see massive and regular loads of backfill composed of sand, gravel, and clay obtained through the cleaning of the salt marshes. The result was that houses were raised up above the water level. Phases of raising the ground level, sometimes by several tens of centimetres, can clearly be seen in the stratigraphy (for example Champagne 2007: 26, 30). Obviously, the

priority was to drain the land and to raise the ground level up above the water level.

A lack of fresh water

While, there was no shortage of salt water in the town, there was a distinct lack of fresh water. The famous Bernard Palissy mentioned this issue and suggested the installation of a fountain at the end of the sixteenth century (Palissy 1996: 88-89). He proposed that wooden pipes should be used, but there are no indications of the eventual realization of this project. The difficulties in supplying a new town with water are already well known in this period. The water came from inland, from the neighbouring island of Hiers, or wells revealed by the excavations or which are mentioned in the archives. The deeds of house sales regularly mentioned wells, and also tanks for holding rainwater.[16] There were some tanks at the period of the Governor Thiméon de Saint-Luc (1578-1597), but they were clearly not enough as he claimed 10.000 *écus* from the king in 1580 for the construction of various buildings including tanks (Vigé 1990: 177). These first wells consisted of oak barrels stacked on top of each other. In fact, the system was far from being perfect, because the water was at best brackish, if not salty. It was a great inconvenience for the city.

There was no fresh water piped into the city before the seventeenth century. In 1616, a contract was agreed between the lieutenant's men of the salt marshes in Brouage and two hydrant men from Bordeaux for the

16. Archives départementales of Charente-Maritime, 3E 20/40, 20 january 1689.

construction of a water supply to the village of Hiers,[17] a seemingly expensive and complex project. In 1619, another notary's document informs us that the inhabitants of Brouage were to be exempted of taxes. This enabled them to gather enough money to build a city house and a pipe to obtain fresh water from the inland (Vigé 1990: 177). The fountain was built in 1633 by a hydrant man from Paris, Jean de la Veille (Vigé 1990: 179-180).

These difficulties were not specific to new cities. For example, in Le Havre, one year after the official foundation in 1518, a source was tapped and diverted through a clay pipe about a league long (Salch 1998: 12).

Conclusion

The combination of the studied texts, archaeological excavations and geophysical surveys have made it possible to distinguish between reality and legend in the founding of Brouage. The place seems to have been popular for a long time as its location made it a favourable harbour. But the inhabitation process was slow until people finally settled permanently in the city. The very first building of Brouage was made possible thanks to the presence of a sandbank which was used as a base, rather than an artificial island made of stone ballast.

This city had been planned for a very long time, and was created for strictly economic reasons by a man of the gentry and financial traders, something which is very unusual for that period. Firstly they created a primarily commercial harbour, giving priority to the commercial buildings, but

17. Archives départementales of Charente-Maritime, 3E 20/540, 4 april 1616.

still conforming to the fashions of the time. There were no engineers or architects whose names were related to the project.

It is obvious that the production of salt made it a wealthy city. However, the different excavations demonstrate the difficult living conditions and the endless fight against the seawater. These events are often overlooked in the texts. There is a striking contrast between the efforts to create landmark buildings to fill its visitors with wonder, and the hard reality of the living conditions of its inhabitants.

Obviously, the elite people accepted these conditions of living. They came to Brouage and their presence made this site an unmissable place.

Ultimately, the natural dynamics of the marshes put a stop to the activity of the city and an end to its harbour leading to an irreversible decline in the eighteenth century.

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