

## ***A Roman world, a Romanesque world and Santonian fossils: wandering around Saintes (Charente-Maritime - France)***

— And a detour to the **Marais Poitevin** —

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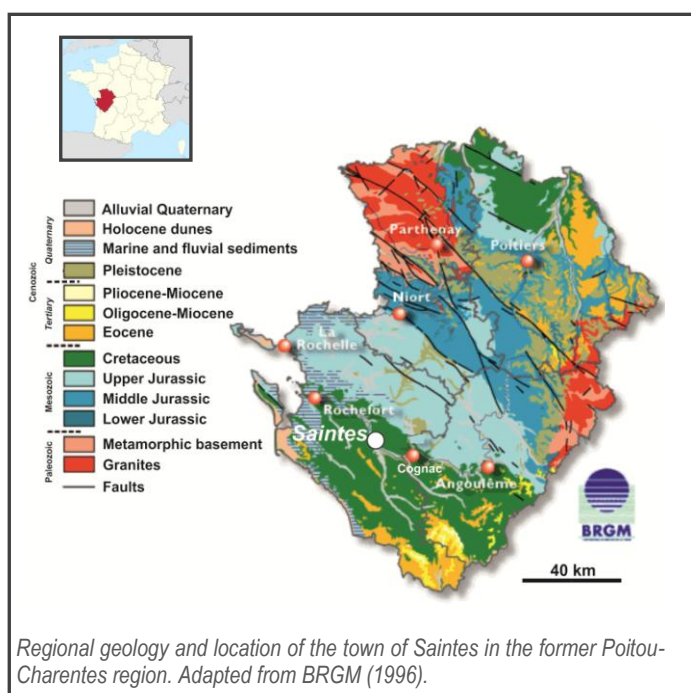
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Above, the Germanicus Arch (18-19 AD) and the Charente river; below left, the Roman amphitheatre (40-50 AD); in the centre, the Ladys' Abbey (9th c.); on the right, fragments of fossil bryozoans from the Santonian. Top image: P. Baudry, in: *Lipemh* (2018).

### ***A little bit of history***

In pre-Roman Gaul, Saintes was the territory where the Gaulish people called Santons lived. After the Roman conquest, a city called Mediolanum Santonum was built. The city was built on the banks of the Charente river at the end of the Roman road linking Lyon (*Lugdunum*) to Aquitaine. The city became an important administrative centre and was then endowed with a monumental ensemble worthy of a great capital (*Réseau des Villes Romaines de l'Atlantique 2022*). Highlights of the Roman period include the amphitheatre, the baths, the Arch of Germanicus, and other engineering works of the period. Mediolanum Santonum played an



important role, becoming the capital of the Civitas Santonum (*the city of the santons, a Roman administrative subdivision*) and of the province of Aquitanian Gaul, the largest Roman province in Gaul, at the end of the 1st century BC (Wikipedia 2022a). See also Annex 1.



Partial view of the Roman amphitheatre of Saintes (40-50 AD), with a capacity of 15,000 spectators. See also, initial image.

**Not to be confused**

**Roman art** is that which was produced during Ancient Rome, i.e. from the legendary foundation of the city in 753 BC until the fall of the western part of the Empire in 476 AD.

**Romanesque art** falls within the medieval period, centuries after the unified power of Rome had disintegrated. Specifically, it developed during the 11th, 12th and 13th centuries, mainly in the countries of southwestern Europe, i.e. Spain, France and Italy, although it also appeared elsewhere.

Noain Maura (2017)



The Germanicus Arch, built between 18 and 19 AD, now located on the eastern bank of the Charente river.

But Saintes was not going to be an impressive monumental city 'only' in Roman times. After the fall of the Roman Empire, and a turbulent and dark history during the early Middle Ages (5th to 10th century), the



history of Saintes changed radically. In the 11th century, the tomb of Saint Eutropius (*Saint-Eutrope*) became a stage on the French pilgrimage route to Santiago de Compostela (*Wikipedia 2022a*). This was going to have major consequences for Saintes.

Saint Eutropius is considered to be the first bishop of Saintes. One of his successors, Palladius (573-596) discovered his tomb at the end of the 6th century and placed his remains in a church which he founded and dedicated to the holy bishop, making it a place of pilgrimage. In 1081 William VIII of Aquitaine, Count of Poitiers, gave the site to the Cluniac Order (*Cluny*) to establish a priory there and care for the site, which led to the reconstruction of the church, a building that was consecrated in 1096 with the assistance of Pope Urban II (*Monasteries 2013*). The crypt, where the remains of Saint Eutropius rest, is an extraordinary example of Romanesque architecture.



*The church of Saint Eutropius, rebuilt by the Cluniac Order and consecrated in 1096.*

Other important religious buildings from the medieval period are the Abbaye-aux-Dames (*Ladys' Abbey*) and the Cathedral of Saint-Pierre, the former in Romanesque style and the latter in Gothic style (*gothique flamboyant*). The Abbaye-aux-Dames is a Benedictine abbey established on the right bank of the Charente river, founded in 1047 by Geoffroy Martel, Count of Anjou, and his wife Agnes of Burgundy. The abbey was placed under the protection of the King of France in 1378. Richly endowed, its influence extended beyond the borders of the county of Saintonge and the duchy of Aquitaine, and in time it became one of the most powerful women's monasteries in the whole of south-west France.

Today, fully restored, the Abbaye-aux-Dames houses the Cité Musicale, an important cultural centre in the region, with a large arts education programme, and a famous music festival in mid-July.

On the other hand, the history of St. Peter's Cathedral, is more complex (*Wikipedia 2022b*). At the beginning of the 15th century, the Romanesque cathedral of St Peter was in very poor condition and in 1420, the partial collapse led the religious authorities to consider the total reconstruction of the building. Work began shortly afterwards, during the episcopate of Bishop Guy II de Rochechouart. The

Romanesque sanctuary was succeeded by a Gothic building, which was still under construction when King Louis XI visited it in 1472. See Annex 1 for location of all these places.



*The Romanesque crypt of Saint Eutropius in the church of the same name.*



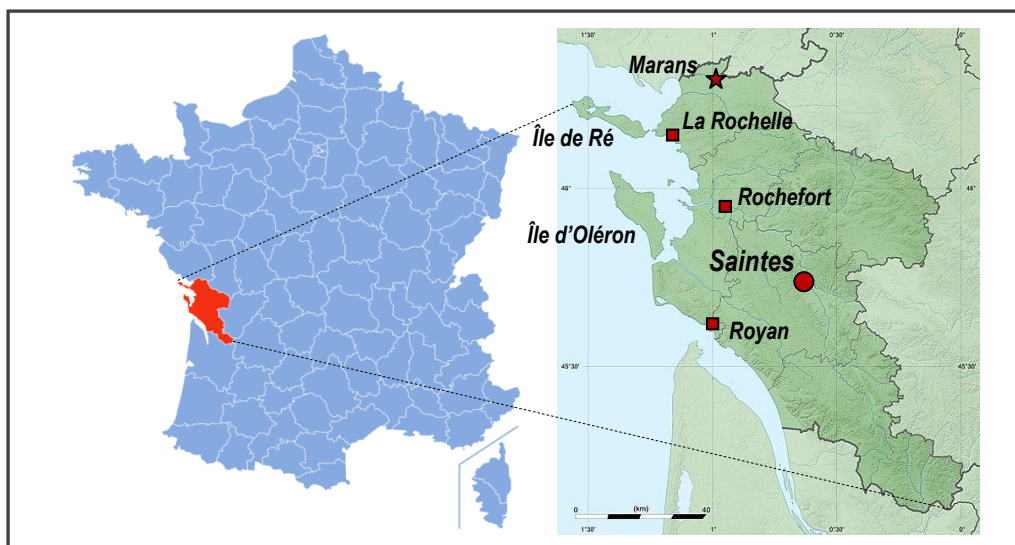


*The Abbaye-aux-Dames (Ladys' Abbey), with its characteristic bell tower in the shape of a "pine cone" ("en pomme de pin"), is one of the emblematic monuments of the Saintongeais Romanesque (Wikipedia 2022c).*



*St Peter's Cathedral and the the Charente river.*

Saintes currently belongs to the Department of Charente-Maritime and is part of one of the 13 new regions of France (as of 2016), i.e. the region of New Aquitaine, which absorbed the former regions of Aquitaine, Limousin, and Poitou-Charentes (Wikipedia 2022a,d).



The Department of Charente-Maritime, its position in France and the most important cities. Adapted from Wikipedia (2022d). Marans (★) was toured during a visit to the Marais Poitevin canals.

### Monumental buildings and geology: the most common building stone in Saintes

Before getting into this matter, let us provide a brief introduction to the geology of the Charente-Maritime (Wikipedia 2022d). The Charente-Maritime occupies the northern part of the Aquitaine basin. The geology is characterized by the ubiquitous presence of Mesozoic and Cenozoic sedimentary rocks, with limestones, marls, shales and sandstones. The northern part of the department is occupied by Upper Jurassic limestones and marls, mainly marking the landscapes of the Île de Ré, the northern part of the Île d'Oléron and the Aunis plain. The Upper Cretaceous is mainly composed of limestones, marls, calcarenites and shales of Cenomanian, Santonian and Campanian age.

Subperiod	Stage	Start	End
		(Mya)	
Late Cretaceous	Maastrichtian	72.1 ± 0.2	66.0
	Campanian	83.6 ± 0.2	72.1 ± 0.2
	Santonian	86.3 ± 0.5	83.6 ± 0.2
	Coniacian	89.8 ± 0.3	86.3 ± 0.5
	Turonian	93.9 ± 0.8	89.8 ± 0.3
	Cenomanian	100.5 ± 0.9	93.9 ± 0.8
Early Cretaceous	Albian	113.0 ± 1.0	100.5 ± 0.9
	Aptian	125.0 ± 1.0	113.0 ± 1.0
	Barremian	129.4 ± 1.5	125.0 ± 1.0
	Hauterivian	132.9 ± 2.0	129.4 ± 1.5
	Valanginian	139.8 ± 3.0	132.9 ± 2.0
	Berriasian	145.0 ± 4.0	139.8 ± 3.0

The stratigraphic study of the Upper Cretaceous of northern Aquitaine indicates the evolution of a carbonate platform with contrasting environments, from its coastal edges to the north and east to the slope that separates it from the basin domain to the southwest. On this platform, Upper Cretaceous sedimentation is organized in two megasequences or "transgression-regressive" cycles. The first in the Cenomanian-Turonian and the second from the Coniacian to the Maastrichtian.

These megasequences are separated by a major discontinuity corresponding to a local emersion phase.

Platel (1987)

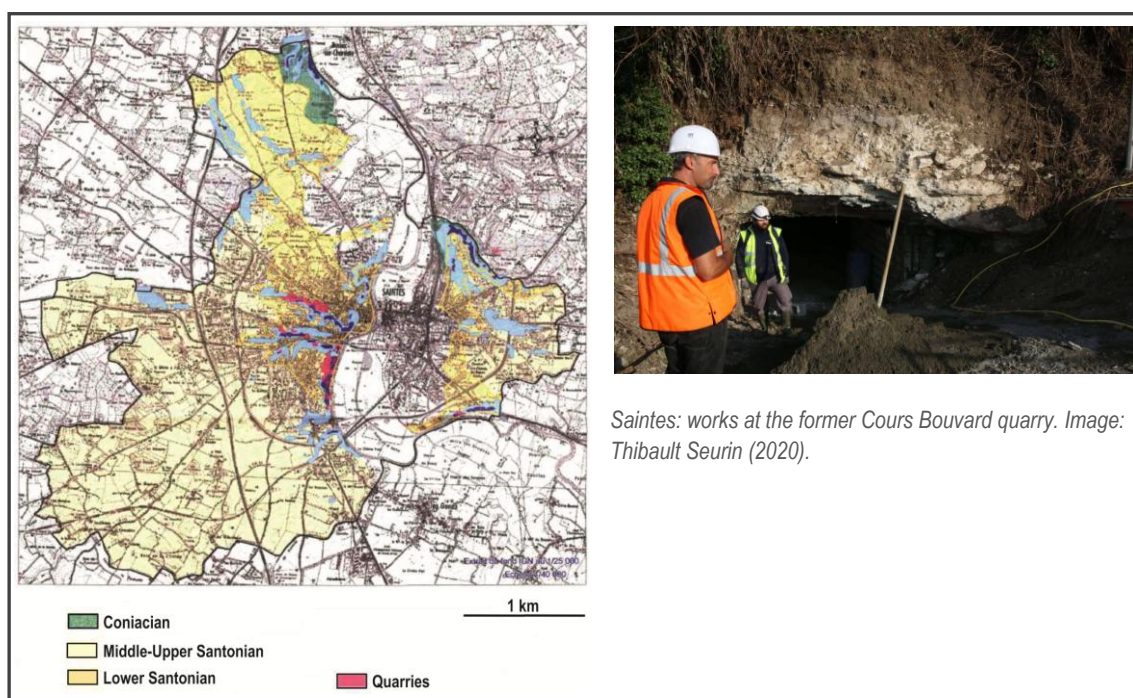
The Cretaceous Period/System (Wikipedia 2022e). The Santonian stage has been highlighted in a red rectangle because it is the age of the calcareous rocks cropping out in and around Saintes.



Cenozoic sandy-clay soils cover the south-eastern part of the department. The coastal marshes (*Rochefort, Brouage, Poitevin*) are composed of fluvio-marine alluvium from the Quaternary. The subsoil of the Charente-Maritime region is structured by faults and open folds several kilometres long oriented NW-SE.

When building with large or small sized blocks of stone, the source of the materials had better be nearby. If this is not the case, the constructor will encounter serious difficulties like those encountered by the builders of the pyramids or those of the megalithic monument of Stonehenge (*England*). The Romans, brilliant engineers and practical people, had no such problem as they used the limestone materials of the Santonian surrounding the city of Saintes, or *Mediolanum Santonum* as they called the site. The Santonian is the fourth of the six Upper Cretaceous stratigraphic stages.

The Santonian is well represented in the Charente-Maritime, particularly around Saintes (*to which it owes its name*). It was in this town that the Santonian was first studied in 1858 by Henri Coquand (*Bourgueil & Moreau 1969*). The Santonian is characterized by marly limestones, with alternating black flint beds in the lower and upper parts of the stage, these two sections being the most fossiliferous. The number of outcrops in and around the town of Saintes is particularly large (*around fifty*), not counting all the fields where marly limestone appears on the surface (*Fossiles du Crétacé Supérieur de Charente-Maritime 2022*).



Saintes: works at the former Cours Bouvard quarry. Image: Thibault Seurin (2020).

Distribution of the Santonian and Coniacian in the town of Saintes and surrounding area. The area occupied by the quarries coincides with the Lower Santonian levels. Adapted from Renault (2002).

The Santonian is about 60 m thick in the region, with 32 m in the lower section, containing greyish-whitish to greyish-yellowish limestones with flint nodules; the middle section contains 7 m of clayey limestones, and finally the upper section contains about 20 m of fine-grained clayey limestones and flints (*Renault 2002*). According to the work of the latter author, the Lower Santonian levels are the ones that would have been most extensively exploited in the Saintes area (see map above) due to the more massive characteristics of the Lower Santonian stone. These works ceased at the end of the 19th century due to a decrease in the quality of the stone.



*Lower Santonian limestones seen from the Charente river around Saintes, with their characteristic yellowish-gray color and the presence of abundant flint nodules (arrows).*

A quick inspection of some buildings such as the church of Saint Eutropius allows us to recognize distinctive features of the lower part of the Santonian, with its yellowish color and dark flint nodules.



*Columns built with fine-grained limestones from the lower section of the Santonian in the church of Saint Eutropius, with black flint nodules (arrows).*

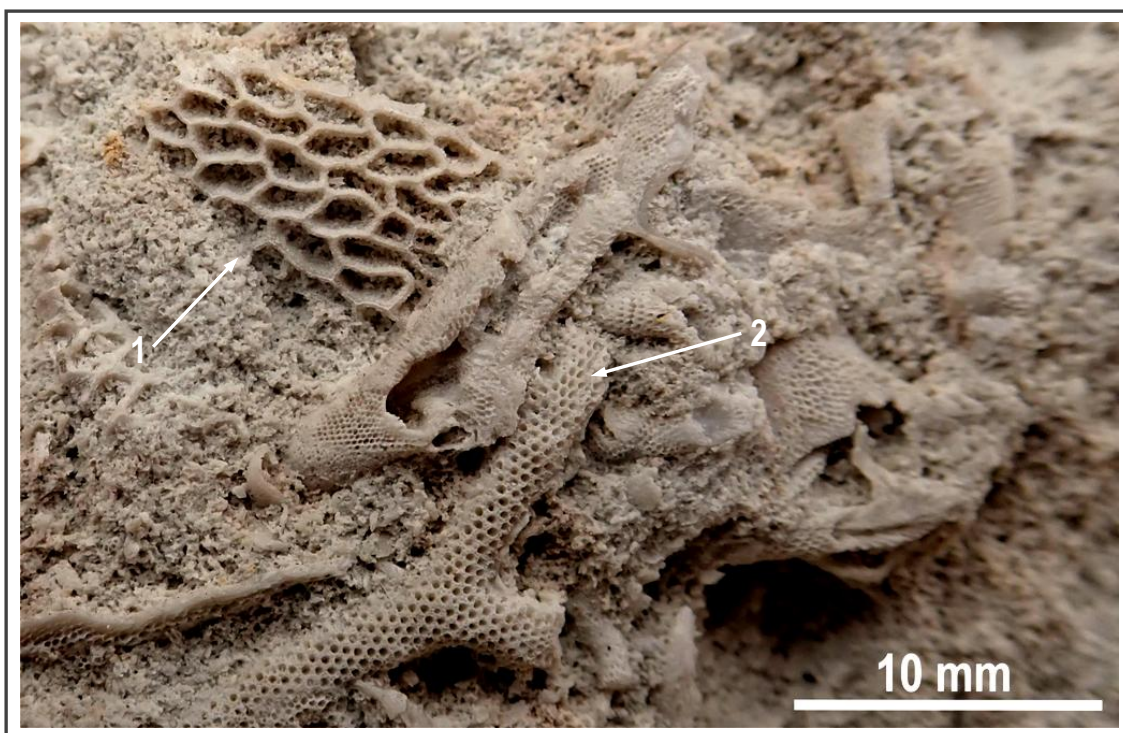


### ***Limestones and fossils: a winning combination***

Most limestones, such as those of the Santonian, have a granular texture, and the size of the grains varies from about 0.001 mm to visible particles. In many cases, the grains are microscopic fragments of fossil animal shells. Limestones usually originate by biogenic precipitation of calcium carbonate ( $\text{CaCO}_3$ ) from seawater, the main agents of which are marine invertebrates that secrete  $\text{CaCO}_3$  to form their shells or rigid surfaces (*Britannica* 2022). The Germanicus Arch offers us a first clue if we get close enough to the limestone blocks that form the base, where there are abundant examples of bryozoans.



*The Germanicus Arch (left) and the its base (right) where abundant fossil bryozoans can be found.*



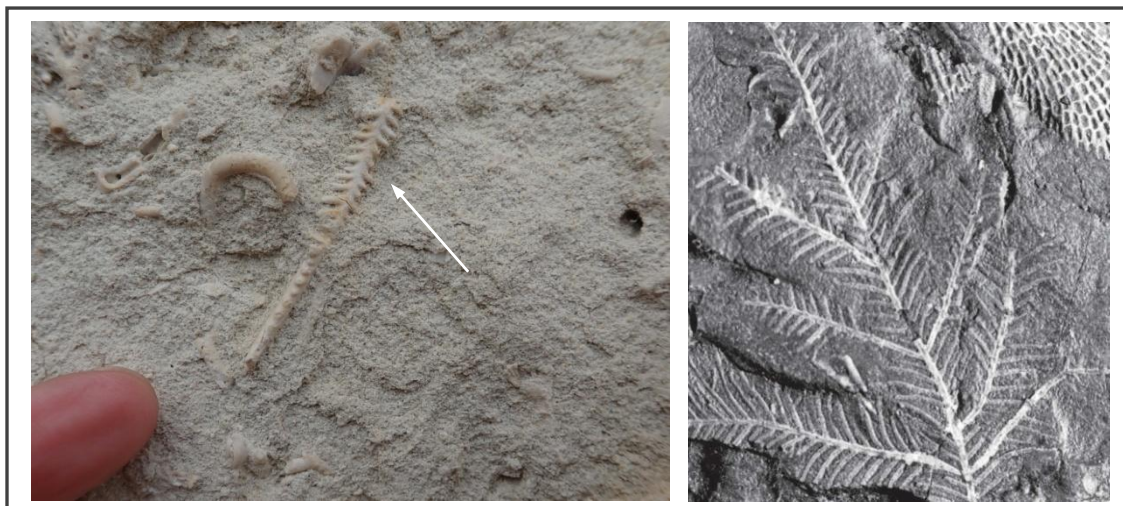
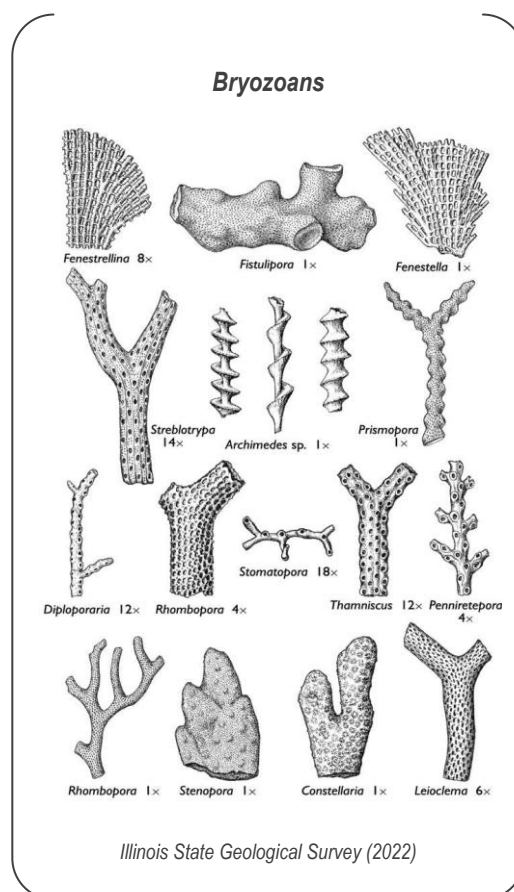
*Fragments of fossil bryozoans at the base of the Germanicus Arch. Two characteristic forms are recognized, 'honeycomb' (1) and 'branching' (2).*

*Compare the forms from the image above with those of modern bryozoans on the right (Zabala & Madurell 2022). Image: Enric Ballesteros, Cova d'Anciola, Cabrera Archipelago National Park (Spain), at 25 m depth.*



But what are bryozoans? They are tiny colonial animals that typically build calcium carbonate shells (e.g. *Illinois State Geological Survey* 2022). Bryozoans grow in a variety of shapes and patterns (see figure at right). The carbonate framework has numerous tiny holes, and each one is home to a small animal. They spend their lives attached to the seafloor, rocks or other animals. Bryozoans are one of the most common fossils. The oldest come from Cambrian rocks, more than 500 million years old, and their descendants live today. During the Lower Carboniferous period, bryozoans were so common that their broken carbonate fragments formed entire limestone beds.

Corals and bryozoans: despite having almost everything in common they are different. According to Samanthi (2020) bryozoans and corals are similar in appearance. Both types are aquatic organisms that exist as colonial forms. They form a framework of calcium carbonate connected to each other. However, these animals belong to two different phylogenetic groups. In addition, corals are marine organisms, while bryozoans live in both marine and freshwater environments.



On the left, another bryozoan fragment (arrow) from the Germanicus Arch (scale: the tip of a finger), showing some similarities to an older specimen, shown on the right: *Penniretepora elegans* Young & Young, 1875, showing a pinnate growth shape comprising a main stem from which secondary lateral ones develop, some of which bear tertiary pinnae, GAGM 01-53wg; Brigantian, Lower Carboniferous; Dykehead Pit, High Blantyre, Scotland. Right image: Jackson & Clark (2018).

But bryozoans are not the only fossils that can be found in Saintes, nor is the Germanicus Arch the only place to observe them. Thus, in the Avenue des Arènes, which leads to the Roman amphitheatre, a relatively well-preserved specimen of *Rynchonella* (Phylum Brachiopoda) was found, which has certain morphological similarities with the paleontological species of the same genus *R. vespertilio*, also from the Santonian period.





On the left, the fallen specimen of *Rynchonella* found on the floor at the base a limestone block wall of the Avenue des Arènes in Saintes; on the right, *R. vespertilio*, from the Santonian at Dissay-sous-Courcillon (Sarthe). Right image: MNHN (2022). The box marks the zone of similarity.

This is not the only 'extra' case, since echinoderms (*Echinodermata*) are also found in the church of Saint Eutropius, in blocks of Santonian limestone.



Echinoderm (E) in Santonian limestone in the church of Saint Eutropius, surrounded by bryozoan fragments (B), in a fine-grained granular matrix.

### **What we see (and don't see) when we visit places**

Visiting a new place, if it is particularly remarkable for its monuments and landscapes, is almost disorienting in many ways, since the eye has too many elements to choose from. In this context, a building stone does not seem to constitute *a priori* something important enough to focus our attention. Sometimes a building stone is just that, one more architectural element (*among many*) in front of our eyes, but sometimes, as in Saintes, this block can hide real treasures of nature.

Taylor and Waeschenbach (2015) indicate that "fossil bryozoans have been chronically neglected in many parts of the world". Very few fossil bryozoans have been described from South America and sub-Saharan Africa. Even in paleontologically well known regions, bryozoans have received scant attention; for example, of the 128 recently monographed species from the Campanian and Maastrichtian (*Late Cretaceous*) of the eastern and southeastern United States, 82 (= 64%) turned out to be undescribed." Somewhat the same can be said for Europe, and it is hard to find modern literature on the subject. Perhaps a 'tourist visit' (☺) to Saintes could help to improve the knowledge about these interesting colonial animals, often mistaken for corals, but different after all.

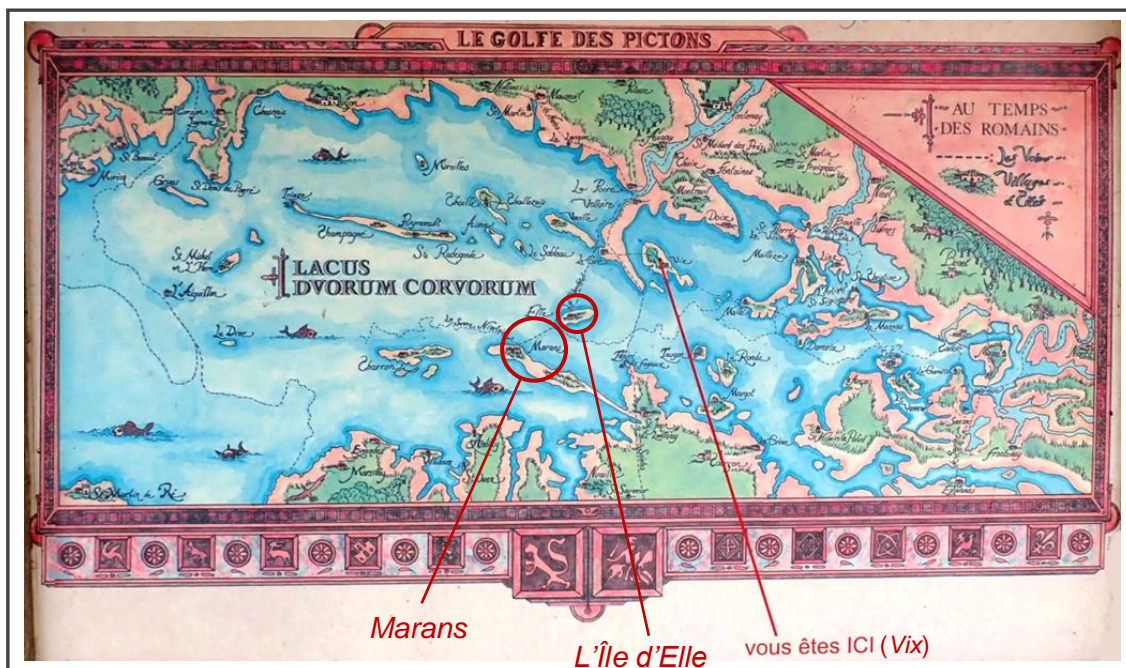
A day in Saintes is enough to do many things, and to be part for a few hours of the Roman and Romanesque worlds, and as almost everything goes together there, to see fossils in the limestone blocks.

*The observation of fossils at Saintes was carried out without damaging the limestone blocks.*

### **A totally different world north of Saintes: the Marais Poitevin**

As early as in 1916 Jules Welsch described the Marais Poitevin as a natural region clearly differentiated from the neighboring limestone regions of the Plaine du Poitou, to the north and east, and the Bois de Aunis, to the south. The Marais Poitevin is shared by three Departments: Deux-Sèvres, Vendée and Charente-Inférieure (*now Charente-Maritime*) and extends parallel to the coast from Esnandes (*Charente-Maritime*) to the south, from Longeville (*Vendée*) to the north and in depth from the Anse d'Aiguillon to Coulon (*Deux-Sèvres*). Its surface area is about 75,000 ha and corresponds to the Roman Golfe des Pictons (see figure below). The draining works started in the 13th century, and today it is fundamentally a drained marsh (*marais asséché*), most of which is cultivated. The rest (*marais mouillé*) is full of canals shaded by poplars and ash trees, and is called 'the Green Venice' (*Venise verte*) near Niort, as it is nationally and internationally known.

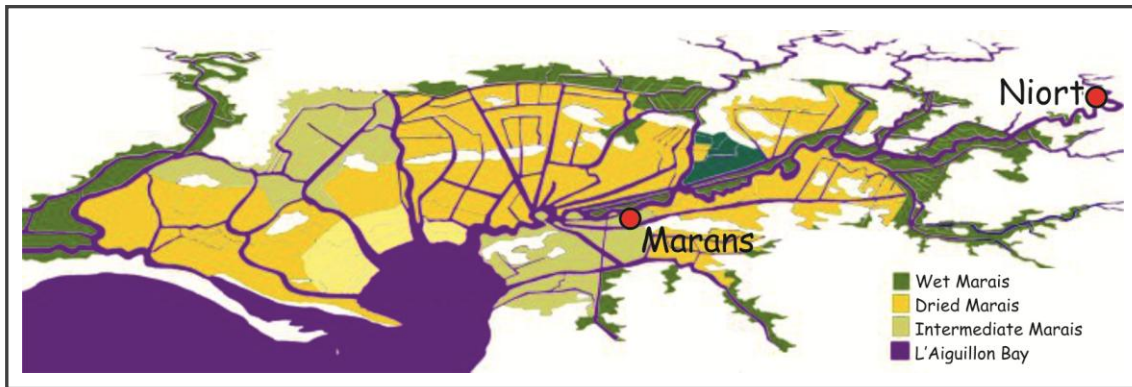
The Marais Poitevin is thus a flat country, broken only by coastal dunes and in the interior by some mounds or former islands (*which ceased to be islands when the area dried up*), a land whose soil is made up of loamy clay. The carbonate materials of the 'islands' are Jurassic, of Upper Oxfordian - Lower Callovian age.



The Marais Poitevin in Roman times, when there were islands in the area. Panel on a site of entertainment and sale of local products near Vix. Slightly modified, to add the position of Marais and L'Île d'Elle.

According to Association l'Evail (2022), the marsh depression owes its origin to the erosion of a vast calcareous plateau that was flooded during the last great glaciation. The significant drop in sea level that occurred between 80,000 and 10,000 years before our era caused an increase in the force of the rivers. These rivers eroded the surface soil and exposed the geological formations that make up the subsoil and the coastal plains of the marshes.





Inclined schematic map of the Marais Poitevin. Adapted from: Association L'Eveil (2022).

There are still some elongated hills (former islands) in the center of the basin, corresponding to more resistant calcareous materials (see previous image).



Some localities such as L'Île d'Elle still retain in the name their original nature as "islands". Image: Google Maps.

Romain Gaillard (2022), who was born and bred in the Marais Poitevin and who is an expert in the natural history of the area, has the following to tell us:

*What would the Marais Poitevin be without its trees? Probably a vast expanse of marshland unsuitable for agriculture or farming. Boat rides on the water in the shade of the wet marsh trees would also disappear. Like the dykes and the lock system, the trees are today indispensable to the survival of the Marais Poitevin as we know it, shaped and maintained by man for more than 10 centuries. But behind the emblematic pollarded ash, the majestic poplar, the succulent angelica and the duckweed hides a rich and abundant local vegetation that can be contemplated all year round. This green landscape has contributed greatly to the nickname given to the wet marsh for decades: the Green Venice.*

Marans is a town in the Charente-Maritime Department crossed from east to west by the Sèvre Niortaise, a river that serves as administrative boundary with the neighboring department of Vendée. The town stretches along both banks of the river, and its port is located less than ten kilometers from the Atlantic Ocean, where the river flows into the Aiguillon Cove Nature Reserve, a wintering and stopover site for many migratory waterfowl.





*One of the canals of Marais where you can rent a motor boat and navigate.*

Marais is also a reference point within the Marais Poitevin Regional Natural Park (Wikipedia 2022d). A boat ride along its canals is a good way to enjoy this area and appreciate the vegetation that covers the margins of the park and the birds (Wikipedia 2022d).

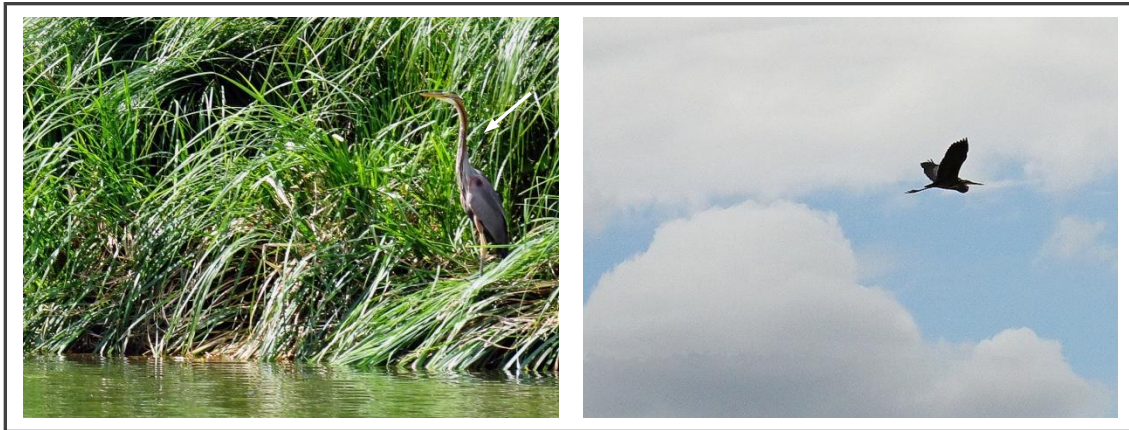
Ash trees (*Fraxinus excelsior*) have been planted in large numbers since the 19th century, when important works were undertaken to drain the wet marshes, because they are very tolerant to water and have a complex root system that consolidates the banks of the canals. In this way they prevent erosion, especially during periods of high water levels. In addition, its selective pruning, giving it the shape of a pollarded ash, allows the use of its branches that provide a hard wood of high density with an excellent calorific value. The banks also abound with alders (*Alnus glutinosa*), willows (*Salix*), poplars (*Populus*) and a large grass, the reed (*Phragmites australis*).



*On the left, leaves and fruits of an ash tree (*Fraxinus excelsior*); on the right, alders (*Alnus glutinosa*) and an ash tree growing on the margin of one of the canals.*

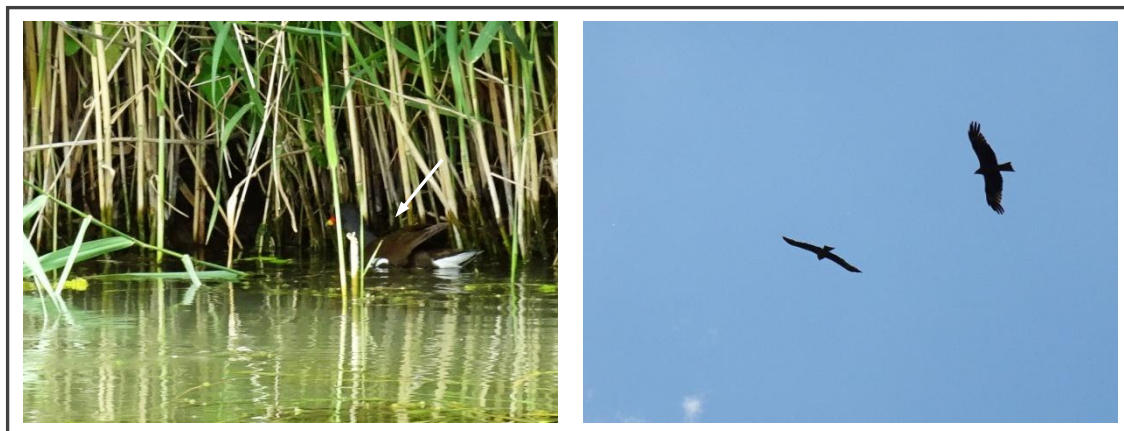
This riverbank (*riparian*) vegetation provides an unbeatable habitat for numerous animals, which makes possible the observation of numerous birds along the canal. Herons can be seen camouflaged in the reeds stalking their prey.





On the left, a purple heron camouflaged among the reeds. On the right, a grey heron.

The purple heron (*Ardea purpurea*) is smaller than the grey heron (*Ardea cinerea*), from which it also differs by the greater diversity of colors of its plumage, which varies from brown to black. The long stripes on its neck and belly allow it to go unnoticed when it is erect in the middle of the vegetation. It feeds on fish and insects and occasionally catches some amphibians, rodents and crustaceans. It usually builds its nest in a bush, generally at low altitude, forming a platform made of reeds or twigs. The grey heron nests in tall trees and in the Marais Poitevin it is often found perched in poplars. The nest of the grey heron consists of a large pile of thick branches located at the height of the treetops (between 20 and 40 meters from the ground). While the grey heron is present in the region all year round, the purple heron is only in the area during the breeding season, returning in spring from mid-March to mid-May (Parc Naturel Régional du Marais Poitevin 2022).



On the left a common moorhen, with its typical yellow and red beak. On the right, black kites.

Another bird that can be observed in the riverside vegetation is the common moorhen (*Gallinula chloropus*). It is an excellent swimmer and can submerge its head and body underwater in search of food (shoots, duckweed, fruits, insects, worms, snails, fry and seeds). In the Marais Poitevin, thanks to the mild and rainy oceanic winter climate, they can be seen all year round. They breed between April and the end of August. Once formed, the pair builds its future nest and remains faithful for life. The nest can be built in the vegetation on the banks or directly on the surface of the water, attached to branches (Gaillard 2022). And finally, flying nimbly in the sky, numerous black kites (*Milvus migrans*) can be seen.

**Images (unless indicated):** P. Cubas & R. Oyarzun.

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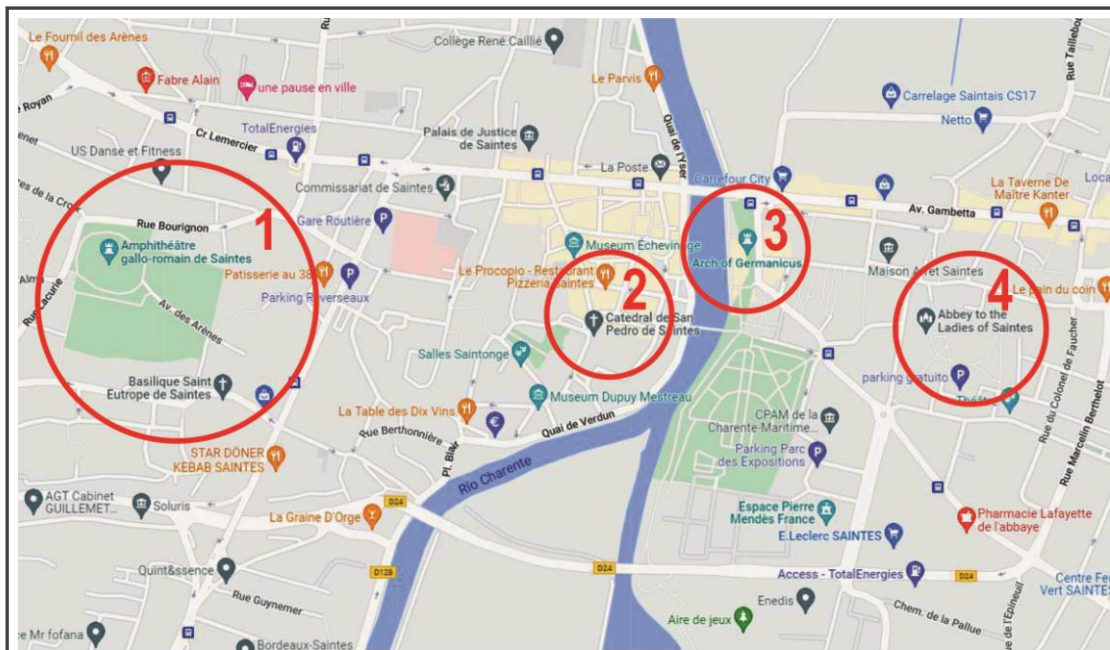
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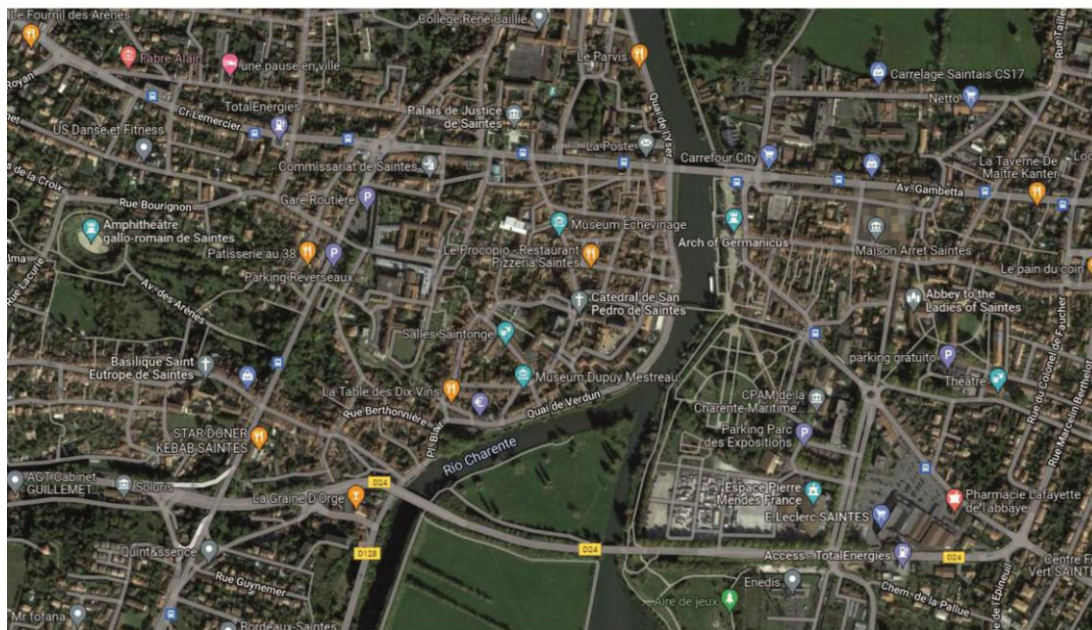
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# Annex 1

## Must-see sites during a visit to Saintes



1: Roman Amphitheater, Av. des Arènes, Basilica of St. Eutropius. 2: St. Peter's Cathedral. 3: Arch of Germanicus. 4: Abbey of the Ladies.



200 m

Images: Google Maps.



