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# The Medieval Bastides, Their Urban Planning and Some Possible Astronomical Orientations

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**Abstract** Bastides are the fortified towns built in medieval Europe, in particular in France, during the thirteenth and fourteenth centuries. Many of these towns are displaying a regular planning based on a grid of parallel and perpendicular streets. Here we will show some examples of these layouts using the satellite images. The cases of the bastides of Sauveterre-De-Guyenne, Aigues-Mortes, Libourne and Pavie will be discussed in more detail, because they have possible astronomical orientations. Sauveterre-De-Guyenne has one of its axes oriented along the southern moonrise on a major lunar standstill. Probably this orientation was chosen, because the year of the foundation of the bastide (AD 1281), was a year of major lunar standstill. In the cases of Aigues-Mortes, Libourne and Pavie we can see alignments along the sunrise on solstices.

**Keywords** Architecture, Urban planning, Archaeoastronomy, SunCalc.net Software, Photographer's Ephemeris Software, CalSky Software.

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Several words exist that are coming from the Provençal verb "bastir", which is meaning to build, to construct. For what concerns the verbs, we have in Italian "imbastire", the same of the English "to baste", that is, to sew with long loose stitches in order to hold something in place temporarily. Words like "bastion" and "battlement" are coming from "bastir". Bastion derives from "bastillon", diminutive of Old French "bastille", which is a fortress, tower, or fortified building. [1]. Battlement is coming from Old French "bataillement", earlier "bastillement", a fortification, from the verb "bastillier", which means to fortify, to equip with battlements to have a "bastille" [1,2]. Let us remember that a famous bastille existed. It was the Bastille, the Paris fortress used as prison, destroyed by revolutionaries on July 14, 1789.

Another word is "bastide". Bastides are the fortified towns built in medieval France during the thirteenth and fourteenth centuries [3]. Some of them were built under Raymond VII of Toulouse to replace villages destroyed during the Albigensian Crusade [3]. It seems that almost 700 bastides were built between 1222 (Cordes-sur-Ciel, Tarn) and 1372 (La Bastide d'Anjou, Tarn) [4]. Most of these towns were founded in the southwest of France that, at the time, was a frontier region belonging partly to France and partly to the kings of England [5]. As observed in [5], the bastides were built to establish a more modern society in a part of Europe that was rather wild and inhospitable. These towns were used to collect the population scattered in villages into centers which were easy to control and defend. This new environment helped to develop the trade and other productive activities.

In [6], the bastides are defined as the planned new towns (in France several places exist having the name of Villeneuve, that is of "new town"). However, they were not established in an arbitrary manner; most were set up on the sites of existing villages or at the intersections of routes. In this sense, the bastides were "new towns", due to the new layout they displayed. When compared to the medieval towns, they "were built in order to put some order into society, not to accommodate a rapidly growing population" [5]. To remark the new order of the society, most bastides were laid out on a grid pattern, with a central square; the grid pattern may have been inspired by the model of the ancient Roman colonies. Actually, the Roman colonies were also "new towns" established by Rome in the conquered regions.

Therefore, when allowed by the local environment, the bastides have a planning consisting of an almost regular grid of streets. The main roads in the grid are known as *carreyras*, or carriage ways, since they are wide enough for carts [5]. These streets are crossing at a central square, generally surrounded by arcades [5]. This square was used as the market place. Sometimes it possessed also a covered market hall [5].

The bastides were built at a time of relative peace and prosperity. Before the start of the Hundred Years' War, the early bastides were not fortified [5]; however once Anglo-French relations deteriorated, many bastides were fortified. One of the bastides, of which we can see well preserved walls is Aigues-Mortes, the medieval port of Crusaders on the edge of the Camargue.

The bastides were discussed also by Francis Haverfield, British historian and archaeologist, in his book on the ancient town planning [7]. This book is mainly devoted to the town planning of the Romans; the last chapter, entitled "The sequel", starts from a question. "What was the sequel to this long work of town-planning?" Haverfield pointed out two facts for substantiating his answer.

"First, the Roman planning helped the towns of the Empire to take definite form, but when the Empire fell, it too met its end. Only here and there its vestiges lingered on in the streets of scattered cities like things of a former age. But, secondly, from this death it rose again, first in the thirteenth century, with ever-growing power to set the model for the city life of the modern world. ... Early in the thirteenth century men began to revive, with certain modifications, the rectangular planning which Rome had used. Perhaps copying Roman originals seen in northern Italy, Frederic Stupor Mundi now built on a chess-board pattern the Terra Nova which he founded in Sicily. Now, in 1231, Barcelonnette was built with twenty square 'insulae' in south-eastern France. Now, too, the 'Bastides' and 'Villes Neuves' of southern France and towns like Aigues-Mortes (1240) were built on similar plans. Soon after, the chess-board pattern came to England and was used in Edwardian towns like Flint and Winchelsea ... It is unnecessary here to follow further the renaissance of town-planning. By intervals and revivals it continued to spread. In 1652 it reached Java, when the Dutch built Batavia. In 1682 it reached America, when Penn founded Philadelphia".

In [7], Haverfield illustrated the plan of a bastide by that of Sauveterre-De-Guyenne, near Bordeaux (AD 1281), as given in the Figure 1. Let us start from this bastide our discussion on the layout and related orientation of some of them. We will see that this bastide is very interesting, because in its orientation we find a link to the year of its foundation.



**Figure 1:** The plan of the bastide of Sauveterre-De-Guyenne, near Bordeaux (AD 1281), illustrated by A.E. Brinckmann in [7].

### Sauveterre-De-Guyenne and the lunar standstill

This bastide was built in a village, the name of which was "Athala". The bastide was first named "Salva-Terra" (Salvation of the land), which later became Saubeterre and then Sauveterre [8]. It was founded as an English Bastide in 1281 by King Edward I of England. As told in [8], the king signed the "Charte des Coutumes de la Cité" in 1283, which protected the inhabitants and set the rules of life in the village community [8]. Sauveterre-de-Guyenne maintains the typical Bastide 'grid' layout, with the entry points into the city guarded by four stone tower gates, and a central market square surrounded by stone houses having arcades on the ground floor [8]. And in fact, if we use satellite maps, such as that provided by Wikipedia (Figure 2), we have the same layout depicted in [7]. In the Figure 3, the northern gate is shown.



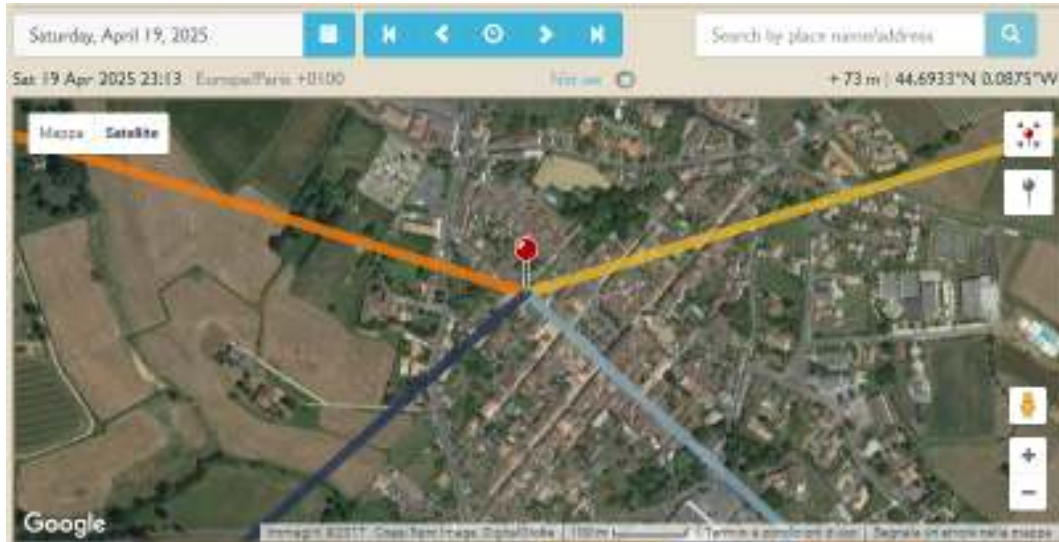
**Figure 2:** The bastide of Sauveterre-De-Guyenne in a Wikimapia image.



**Figure 3:** One of the gates of Sauveterre-De-Guyenne in a Street View image of Google Earth.

As we have shown in several previous discussions [9-18], the ancient towns could have been oriented according to the rising of the sun and of the moon. That is, we can find examples where the main street was aligned along the sunrise, in particular, on the summer or the winter solstice. However, also the northern or southern directions of the moonrise was relevant, in particular for the major lunar standstills. Let us note that, in this case, the moonrise directions cannot be confused with the sunrise directions [19,20].

Since the planning of Sauveterre-De-Guyenne is not cardinally oriented, we can ask ourselves if other astronomical orientation, according to the sun or the moon, are present. In fact, if we apply the Photographer's Ephemeris software, we can see that one of the axes of the grid is along the southern moonrise on a major lunar standstill. In the Figure 4 we can see the result simulated for year 2025, a year of major lunar standstill.



**Figure 4:** One of the axes of Sauveterre-De-Guyenne is oriented along the direction of the southern moonrise (pale blue line, azimuth 133 degrees from true north) on a major lunar standstill (Courtesy, Photographer's Ephemeris software). In the figure we can see also the directions of the moonset (dark blue line) and of sunrise and sunset (yellow and orange lines).

It is therefore possible that the bastide was founded with an astronomical orientation. To sustain this possibility, let us consider the example of Augusta Emerita, today Mérida, in Spain. This Roman town has the main street, the Decumanus, which is aligned along the northern moonrise on a lunar standstill. As we have discussed in [18], the year of the foundation of Augusta Emerita was 25 BC, close to a year of major lunar standstill (24 BC), as we can evidence using CalSky software. The moonrise directions on standstills for 25 BC and 24 BC are practically the same.

Here, let us use CalSky for Sauveterre-De-Guyenne too. We obtain the following results for moonrise azimuths close to 133 degrees.

19 Jan 1281	Rise: 6h09m (az=133°)	Transit: 10h07m (h=15.9°, 9.0%)
15 Feb 1281	Rise: 3h52m (az=133°)	Transit: 7h49m (h=15.7°, 31.9%)
15 Mar 1281	Rise: 2h40m (az=133°)	Transit: 6h37m (h=15.9°, 48.3%)
9 Apr 1281	Rise: 23h32m (az=131°)	Transit: 2h41m (h=18.6°, 89.8%)
10 Apr 1281	Rise: --h--m (az=---°)	Transit: 3h35m (h=16.5°, k= 82.7%)
11 Apr 1281	Rise: 0h33m (az=132°)	Transit: 4h31m (h=15.9°, k= 74.0%)
7 May 1281	Rise: 22h27m (az=132°)	Transit: 1h30m (h=17.1°, k= 97.1%)

These results indicate that the year AD 1281 was a year of major lunar standstill, and therefore, that an astronomical orientation of the town to remark the year of its foundation is possible too.

#### **Aigues-Mortes and the sun**

The name is attested in the Latinized form *Aquae Mortuae* in 1248. It is coming from the Occitan *Aigas Mortas* meaning "dead water", due to the presence of marshes and ponds present in the place [21]. As told in [21], the foundation of the city is said to have been by Gaius Marius, around 102 BC.

The region was under the rule of the monks of a local Benedictine abbey [21]. In 1240, Louis IX, who wanted to have his own port for transporting his Crusaders, focused on the strategic position of the place. The king obtained the town and the surrounding lands from the monks of the abbey [21]. Aigues-Mortes became the place from which the king departed for two Crusades: the Seventh Crusade in 1248 and the Eighth Crusade in 1270. The king died during this Crusade. In 1272, his son Philip III the Bold ordered to build the walls for protecting the town [21], and we can see them in the Figure 5.



**Figure 5:** The bastide of Aigues-Mortes in a Wikimapia image.



**Figure 6:** The bastide and the sun. Thanks to the SunCalc.net software we can see the directions of sunrise (yellow) and sunset (red) on the satellite images. Here we see one of the streets aligned along the sunrise on the winter solstice. Also the southern part of the walls is oriented along this same direction.

It is interesting to note that this town has an orientation along the sunrise on the winter solstice. We can see it using the SunCalc.net software as shown in the Figure 6.

### Libourne

This town was created as a bastide by Roger de Leybourne, English soldier and landowner, in 1270. The original name of Leybourne changed to the present Libourne. Its original reason of existence was that of being a port to ship wine of the Dordogne valley to England [22]. We can see the bastide in the Figure 7.

Also in the case of the bastide of Libourne, we can find an astronomical orientation. The main axis of the bastide is aligned along the sunrise on the summer solstice (Figure 8).



Figure 7: The bastide of Libourne in a Google Earth image.



Figure 8: The bastide of Libourne. Using the SunCalc.net software we can see that the main axis of the bastide is aligned along the sunrise on the summer solstice.

### Bastide Saint Louis

This bastide is named after the king Louis IX, commonly known as Saint Louis. This bastide was built during his reign, with a regular grid about the central square, now the Place Carnot. As told in [23], «c'est en effet en 1247 que ce nouveau bourg est créé en rive gauche de l'Aude ... Cette nouvelle ville dont le tracé se trouve plus près des rives d'Aude est à l'image des bastides du grand Sud Ouest». Today, the Bastide is delimited by the boulevards laid out in the XVIIIth and XIXth centuries on the site of the old moats [24]. We can see the bastide in the Figure 9. In this case, the town has an orientation according to the cardinal points.



**Figure 9:** The bastide Saint Louis at Carcassonne in Google Earth.

### Monpazier

Monpazier is in the Dordogne department of Aquitaine. As told in [25], the town has been named as one of the most beautiful villages in France by the association Les Plus Beaux Villages de France. The bastide was founded by Edward I of England in 1284. Again, we can see in the satellite images (Figure 10) a rectangular layout, built around a main square surrounded by arcades.



**Figure 10:** The bastide of Monpazier in Google Earth.



**Figure 11:** The bastide of Mazères in Google Earth.



### Mazères

« Site néolithique, romain, mérovingien, la bastide de Mazères fut créée en 1253 par l'acte de paréage entre les comtes de Foix et les abbés de l'abbaye de Boulbonne. De la fin du XVe siècle au milieu du XVIIe siècle, Mazères fut une citadelle protestante. » [26]. And also, the name « Mazères proviendrait du mot latin *màceriā* signifiant: mur de clôture (en pierre sèche), muraille, mesure » [27]. The Figure 11 shows the bastide.

### Grenade-sur-Garonne



**Figure 12:** The bastide of Grenade-sur-Garonne in Google Earth.

La ville est une bastide fondée en 1290 à l'initiative des moines cisterciens de l'abbaye de Grandselve (détruite à la révolution française) qui avaient fondé Beaumont-de-Lomagne une dizaine d'années auparavant, as told in [28]. This bastide was founded by Eustache de Beaumarchès [29].

Eustache (c. 1235 – 1294) was a French baron and military leader. He took part in the War of the Navarrería in 1276–77 and in the Aragonese Crusade in 1284–85 [30]. In the county of Toulouse, Eustache oversaw the construction of 22 bastides: Rimont (1272), Alan (1272), Montréjeau (1272), Fleurance (1274), Valence-d'Albigeois (1275), Beaumont-de-Lomagne (1279), Verdun-sur-Garonne (1279), Saint-Lys (1280), Mirande (1281), Pavie (1281), Cazères (1282), Cologne (1284), Miélan (1284), Plaisance-du-Touch (1285), Réjaumont (1285), Pampelonne (1285), Boulogne-sur-Gesse (1286), Valentine (1287), Aurimont (1287), Beaumarchés (1288), Grenade-sur-Garonne (1290), that we see in the Figure 12, and Sorde (1290). In the Figure 13 we can see four of these bastides.



Figure 13-a



13-b



13-c



13-d

**Figure 13:** The bastides of Fleurance (a), Beaumont-de-Lomagne (b), Mirande (c) and Pavie (d). (Courtesy Google Earth)

Let us consider in more detail the case of Pavie. Like Fleurance, also Pavie has the name of an Italian town. As told in [31], la nouvelle bastide prend le nom officiel de la ville de Pavie en Italie. The town had maintained its original planning. Here we find a possible astronomical orientation along the sunrise on the summer solstice. We can evidence this orientation using SunCal.net software (see the Figure 14).



**Figure 14:** The bastide of Pavie. By using the SunCalc.net software we can see that the bastide is aligned along the sunrise on the summer solstice.

### Villeneuve-sur-Lot

Here an example of a Villeneuve, that is of a “new town”. It is Villeneuve-sur-Lot. The area of this town was first populated by the Romans. In the 11th century, a Benedictine abbey was built there, with a small village of potters and farmers around the abbey [32]. Between 1254 and 1263, Alphonse of Poitiers built a bastide. This is like those we have seen before, with a rectangular layout about a central square (Figure 15).



**Figure 15:** The bastide of Villeneuve-sur-Lot (Courtesy Google Earth).

### Conclusion

In this paper we have considered only a few of the existing bastides. In particular we have searched for possible astronomical orientations in the layout of those having a regular grid of parallel and perpendicular streets. We have found four cases of possible orientations along the sunrise on solstices and moonrise on a lunar standstill. Probably, the persons that planned them added these alignments in the layout of the bastides for symbolical reasons. Actually, the case of Sauveterre-De-Guyenne is very interesting and remarkable. The town has one of its axes oriented along the southern moonrise on a major lunar standstill, and the year of the foundation of the bastide, AD 1281, was a year of major lunar standstill. Therefore, it is possible that, in the case of Sauveterre-De-Guyenne, the alignment was decided as a symbolical reference to the year of the foundation.

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