Analysis of the orientation of the Decumanus of Roman Dertona

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Abstract This work proposes a study of the planning of the Roman Dertona, today Tortona, in Piemonte, according to three possibilities. We will see its layout in function of the natural environment which is surrounding it (secundum naturam), of the roman roads which were passing thorough the area, and according to a possible astronomical orientation (secundum coelum). This last analysis will allow us to define a possible year for the foundation of the town.

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The plan of the Roman colonies was implemented by means of a land survey method which is known as “limitation” or “centuriation”. It is characterized by a layout in the form of a square grid, created by parallel and perpendicular roads and canals, which subdivided the settlement in insulae, which were the house-blocks in the towns or the agricultural plots in the countryside. In some cases these plots were allocated to Roman army veterans. The Romans began to use the regular layout of the centuriation for the foundation of their colonies in the fourth century BC.

From the foundation of Ariminum (Rimini) in 268 BC, the centuriation became to cover the land in the Po valley according to the expansion of the Roman domain on it [1]. Piacenza (Placentia) and Cremona were founded as Roman military colonies in May 218 BC. Moving from East to West, the Romans arrived in Piemonte in the II century BC founding, among several towns, Dertona, today Tortona.

Dertona was probably one of the oldest colonies created under the Roman rule in the westernmost section of the Po valley, on the road leading from Genua (Genoa) to Placentia. The city was founded c. 122–118 BC [2,3] at the junction of the great roads; the Via Postumia and the Via Aemilia Scauri [4]. It has been said that a third road, the via Fulvia (from Placentia to Ocelum), crossed the other two at Derthona [5]. This location made Dertona an important military station.

Strabo speaks of Dertona as one of the most considerable towns in this part of Italy. Velleius Paterculus mentioned it among those founded under the Republic. Here what is told by Paterculus [6]. “Cassio autem Longino et Sextio Calvino, qui Sallues apud aquas, quae ab eo Sextiae appellantur, devicit, consulibus Fabrateria deducta est abhinc annos ferme centum quinquaginta tris. Et post annum Scolacium Minervium, Tarentum Neptunia, Carthagoque in Africa, prima, ut praediximus, extra Italiam colonia condita est. De Dertona ambigitur, Narbo autem Martius in Gallia Porcio Marcioque consulibus abhinc annos circiter centum quadraginta sex deducta colonia

est. Post duodeviginti annos in Bagiennis Eporedia Mario sextum Valerioque Flacco consulibus. Neque facile memoriae mandaverim quae, nisi militaris, post hoc tempus deducta sit."

"In the consulship of Cassius Longinus and Sextius Calvinus — the Sextius who defeated the Sallues at the waters which are called Aquae Sextiae from his name — Fabrateria was founded about one hundred and fifty-three years before the present date, and in the next year Scolacium Minervium, Tarentum Neptunia, and Carthage in Africa — the first colony founded outside of Italy, as already stated. In regard to Dertona the date is in question. A colony was established at Narbo Martius in Gaul about one hundred and forty-six years ago in the consulship of Porcius and Marcius. Eighteen years later Eporedia was founded in the country of the Bagienni in the consulship of Marius, then consul for the sixth time, and Valerius Flaccus." [7] The years and the consuls are: 124 BC - C. Cassius Longinus, C. Sextius Calvinus; 123 BC - Q. Caecilius Metellus Balearicus, T. Quinctius Flamininus; 122 BC - Cn. Domitius Ahenobarbus, C. Fannius; 121 BC - L. Opimius, Q. Fabius Maximus Allobrogicus; 120 BC - P. Manilius, C. Papirius Carbo; 119 BC - L. Caecilius Metellus Dalmaticus, L. Aurelius Cotta; 118 BC - M. Porcius Cato, Q. Marcius Rex.

Actually, we are ranging from 123 BC to 118 BC, for the foundation of Dertona. As we have seen, the date of the town has an uncertainly of a few years. If we assume that Paterculus was referring to a date in this interval, and not to the fact that the town could had been founded before or after this period, we can try to determine the specific year by means of an archaeoastronomical analysis of the direction of the decumanus. We will show it in the following discussion; however, before approaching this result, let us add some words about the centuriation.

Of course, the choice of the place of a town or colony was dictated by the local environment and the presence of rivers and roads. To subdivide the land for the colony, the surveyor (gromaticus) first identified a central viewpoint, known as the umbilicus agri or umbilicus soli. He then took up his position there and, after assuming a specific orientation, defined the territory with the following names: ultra, the land he saw in front of him; citra, the land behind him; dextera, the land to his right; sinistra, the land to his left. He then traced two road axes perpendicular to each other. The first was called decumanus maximus, the second the cardo maximus. After a grid of parallel and perpendicular roads were traced to subdivide the land in insulae.

In the Corpus Agrimensorum Romanorum, which is the Roman book on land surveying collecting works by Siculus Flaccus, Frontinus, Aggenus Urbicus, Hyginus Gromaticus and other writers, we find the following (ex libro Frontini secundo): Limitum prima origo, sicut Varro descripsit, a disciplina Etrusca; quod aruspices orbem terrarum in duas partes diuiserunt, dextram appellauerunt quae septentrioni subiaceret, sinistram quae ad meridianum terrae esset, ab oriente ad occasum, quod eo sol et luna spectaret, sicut quidam architecti delubra in occidentem recte spectare scripserunt. Aruspices altera linea ad septentrionem a meridiano diuiserunt terram, et a media ultra antica, citra postica nominauerunt.

According to Frontinus, who was referring Varro, the Romans inherited the manner to subdivide the land from the Etruscan Doctrine. Moreover we find that the determination of the two main axes of the centuriation, that is, of the decumanus and cardo maximus, was made by an aruspex, that is a soothsayer or diviner.

We read that the decumanus was running from “oriens” to “occasus”, that is from the sunrise to the sunset, because this is the meaning of the Latin terms, not the cardinal point of the compass. However, we often find in written sources that the decumanus in the roman towns is running from east to west, and that the cardo is running from north to south. It is necessary to stress that a cardinal orientation of the Roman town is quite rare. So it would be better to say that the decumani of the Roman towns were oriented towards the rising sun, or to the sunset.

If we assume that the orientation of the decumanus was determined towards the rising sun, as one of the possible rules for the foundation of a town [8,9], we can use an astronomical software to determine the possible day of the foundation (methods have been proposed and discussed in Refs.10-13). However, as in the case of Dertona, it is possible to find a decumanus which does not possess an orientation towards the sunrise. The azimuth of the decumanus is outside the range of sunrise azimuths. Then, we can imagine the moon involved in the orientation - and the moon is actually mentioned by Frontinus – but, there are cases where the rising and setting of the moon cannot be involved too, and the orientation was just dictated by the local environment or by the main roads of the area, as stressed by Le Gall and Castagnoli [14,15].

First, let us consider Dertona and its surrounding region. Actually, it is perfectly fitting it; that is, Dertona is following an orientation “secundum naturam” [16-18]. In the Figure 1, we see that Tortona is sited on the right bank of the Scrivia between the plain of Marengo and the foothills of the Ligurian Apennines.

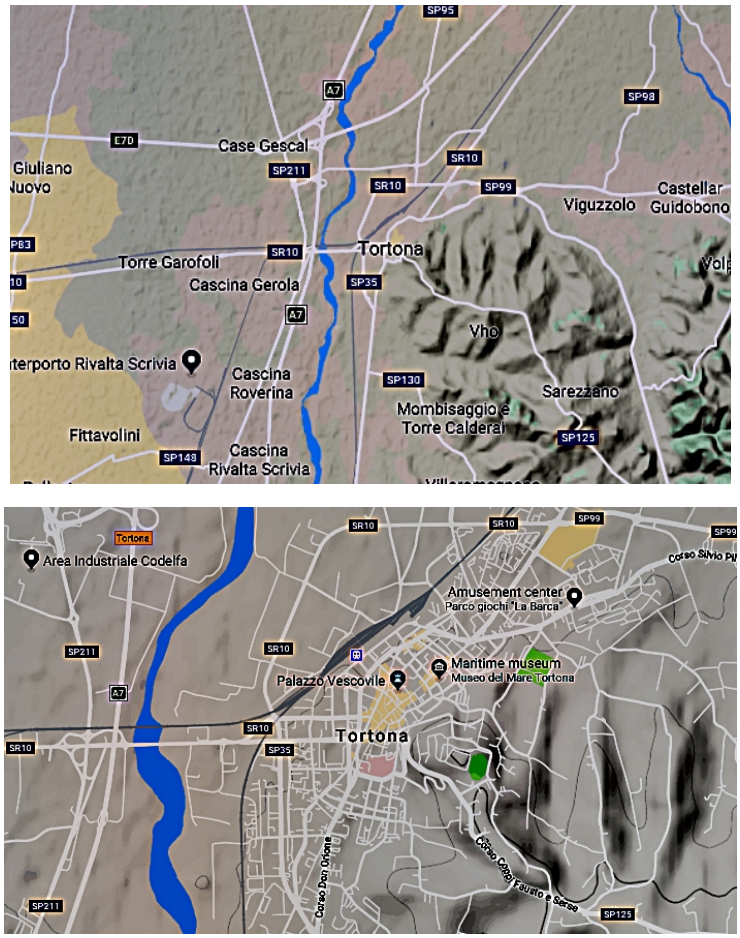

Figure 1. Thanks to Google Maps we can see the terrain of near Tortona.

Figure 2: Dertona was placed near the confluence of Ossona river in Scrivia river.

The Roman Dertona was placed at the confluence of a small river, the Ossona, in the Scrivia (see the Figure 2). From the view given in the Figure 3, it is clear the meaning of an orientation “secundum naturam” of the town.

Figure 4: View of Tortona. Credit M.M. Minderhoud, Wikipedia/Michiel1972

Besides the evident orientation of the roman town secundum naturam, shown by the previous images, we have to add that the location was also determined by the confluence of two roman roads, the Postumia from Genua and the Aemilia Scauri from Placentia. It was natural to have the bend of the road at the foothills of Tortona.

As we can see from the Figure 2, today the central axis of the topography of Tortona is represented by the Via Emilia, which crosses the town from S-O to N-E, tracing the Decumanus Maximus of Dertona [19,20]. This street is a part of the bend of the road joining Postumia and Aemilia. Among the possible angles, the Decumanus has an interesting astronomical orientation. As shown in [21], the azimuth of the decumanus coincides with the northernmost azimuth of moon rise. Therefore, a possible orientation of it, in the framework of an orientation "secundum coelum" is possible. This northernmost azimuth of the rising of the moon is observed when we have a major lunar standstill, or major lunistice.

Using the software CalSKY, we can see if, in the interval ranging from 123 BC to 118 BC, we had a major lunar standstill. The results that we obtain, for the northern directions of the rising moon, are:

123 BC	122 BC	121 BC	120 BC	119 BC	118 BC
57° az	55° az	52° az	50° az	48 ° az	49° az

Actually, 119 BC was a year of major lunar standstill. If we assume that the orientation of a roman town contained an astronomical element, we could conclude that Dertona was founded in 119 BC, the year of major lunar standstill, having the decumanus aligned towards the northernmost point of the horizon where the moon can rise. The same possibility was previously observed for Placentia, Augusta Emerita and Colonia Ulpia Traiana in Xanten [22-24].

To conclude our discussion, we can say that the Romans respected the orientation "secundum naturam" for sure, but that, in the case that the natural environment and the preexisting infrastructures allowed it, an orientation "secundum coelum" could had been added for ritual purposes, as a sign of good omens. Dertona could be an example of this pragmatic approach.

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