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# Solstices at the Hardknott Roman Fort

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## Abstract

From the most ancient times, the Roman military camps were planned according to a certain ideal pattern that was also applied to the coloniae, the outposts established in the territories conquered by Rome. The planning of castra and colonies was based on a chessboard of parallel streets, the main of them being the Decumanus. Probably, some Decumani were oriented to confer a symbolic meaning to the place too. Here we discuss the distinctive layout of a castrum in the Roman Britannia, the Hardknott Fort, and its orientation to the solstices.

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## Article body

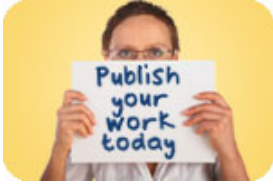
### Introduction

From the most ancient times, the Roman military camps, the castra, were planned according to an ideal pattern that was also applied to the coloniae, the outposts established in territories conquered by Rome. The Romans created the castra with a precise regular scheme, based on two main streets, which crossed at right angles near the center of the settlement. These streets are usually known as Decumanus and Kardo. When the castrum evolved in a colonia, this crossing, around which the military command was encamped, became the central forum of the town [1]. It is easy to see an example of the urban planning of a Roman colonia: it is enough to look at a satellite map of the center of Torino, a town that was born as a Julius Caesar's castrum. Its main street, the Decumanus, coincides with Via Garibaldi. The Kardo (Via di Porta Palatina) crosses the Decumanus at the center of the town, which was the umbilicus soli (Figure 1).

As told by F. Haverfield in his book on ancient town-planning [2], it seems that the Decumanus could have been determined to have its direction aligned with the azimuth of the rising sun. The Decumanus points, "where the sun rises above the horizon on the dawn of some day important in the history of the town" [2], or, let us add, important for symbolic reasons. Since the sunrise azimuth changes during the year, the Decumani have different orientations. Using satellite maps and sunrise azimuths, it is possible to check if a Roman town or castrum had a possible solar orientation [3,4]. Of course, this analysis is not limited to Roman locations; it is easy to find several examples of places around the world, which have a solar orientation in their planning [5-8], in a layout symbolically linking Earth and Heavens.

Here we discuss an example of a castrum, the Hardknott Roman Fort (Mediobogdum), at Eskdale in Cumbria, United Kingdom, which has a quite distinctive layout. We will see that it appears having an orientation of its axes to solstices, so that, through its four gates, we could imagine to see sunrise and sunset on those days. Let us note that some examples of Roman towns having the Decumanus oriented to sunrise or sunset on solstices exist. In particular, we find Como (Comum) [9], Verona, Vicenza (Vicentia), Bene Vagienna (Augusta Bagiennorum) [10], and probably Milano (Mediolanum) too [11]. In the case of Bene Vagienna and Milano, the southeast gate of the town could have been the perfect frame for the rising sun on winter solstice [10].

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**Figure 1 – The Romans planned the castra with a precise regular scheme, based on two main streets, which crossed at right angles at center of the settlement. These streets are usually known as Decumanus and Kardo. Sometimes, the castrum evolved in a colonia and then in a town, which is the core of a modern city. An example is Torino, a town that was born as a Julius Caesar’s castrum. The main street, the Decumanus, coincides to Via Garibaldi. The Decumanus is crossed by Kardo, which is Via di Porta Palatina, at the central point of the town, the umbilicus soli. In this Google Earth map, we can easily see the rectangle of the Roman town, composed of several insulae. Note that the orientation of the Decumanus is not coincident to East-West cardinal direction. At the ends of Kardo and Decumanus, four gates existed, but only two remain.**

### Castra and Coloniae

Before the analysis of the orientation of Mediobogdum castrum, a few words on the planning of Roman coloniae are useful. Let us also consider that castra and coloniae were strongly linked, because several military towns evolved into coloniae, as it happened for Torino.

As Francis Haverfield observed in his book [2,12], during the later Republic and the earlier Empire, Romans used to send bodies of emigrants to form the coloniae, which were new towns already full-grown from their birth, to constitute new centers of Roman rule. In particular, Haverfield pointed out another important reason for the foundation of new towns: at the end of the civil wars of Sulla, Caesar and Octavian, who used for their wars quite huge armies, large masses of soldiery had to be discharged. For the sake of future peace, these men were quickly settled in the civil life by creating some coloniae. These soldiers were "planted out in large bodies, sometimes in existing towns which needed population or at least a loyal population, sometimes in new towns established full-grown for the purpose" [2]. Therefore, it is not surprising that we find in many towns, of the later Republic or Empire, a definite type of town planning, which was the same of castra. "The town areas ... are small squares or oblongs; they are divided by two main streets into four parts and by other and parallel streets into square or oblong house-blocks ('insulae'), and the rectangular scheme is carried through with some geometrical precision. ... The two main streets appear to follow some method of orientation connected with augural science. As a rule, one of them runs north and south, the other east and west, and now and again the latter street seems to point to the spot where the sun rises above the horizon on the dawn of some day important in the history of the town" [2]. For instance, the town of Timgad in Africa was oriented to the sunrise on September 18, the birthday of Trajan. On Timgad, Haverfield is referring to a discussion he found in the works of Walter Barthel (1880-1915), a German archaeologist, who studied towns and land limitation (subdivision) of Roman Africa [13].

Concerning the founding of a town, Haverfield remarks that evidences from augural lore exist. "We know that the Decumanus and the Kardo, the two main lines of the Roman land-survey and probably also the two main streets of the Roman town-plan, were laid out under definite augural and semi-religious provision" [2]. However, Haverfield observes, for the town-planning that was "so distinctive and so widely used", the Roman had not created a "series of building-laws sanctioning" it. Roman lawyers and land-surveyors, the so-called Gromatici, do not tell that legal rules relative to town-planning existed, different from those generally used for surveying. In fact, it seems that surveyors are much more concerned with the soil of the province and with its 'limitation' and 'centuriation'. Let us remember that the centuriation was a subdivision of the land, characterized by the regular layout of a square grid traced using surveyor's instruments.

The name Gromatici, used for the Roman surveyors, is coming from an instrument they

used, the Groma. The Greeks of the 4th century BC knew this surveying instrument, which was brought to Rome by the Etruscans [14]. It was made of a vertical staff with horizontal crosspieces mounted at right angles. Each crosspiece had a plumb line hanging vertically at each end. It was used to survey straight lines and right angles, and so the squares or rectangles of centuriation. From the center of any new military camp or town or of any land limitation or centuriation, using the Groma, the Gromaticus began to lay out the grid of the streets, with a plough and a pair of oxen.

### Augurs and Gromatici

In ancient times, before the Gromaticus started his surveying, an augur, an official who was practicing augury, able of interpreting the will of gods by studying signs and omens such as the flight of birds, found the best place for land limitation. The augur, with its lituus, a curved augural staff, was determining a ritual space in the sky, known as the 'templum'. The passage of birds through the templum indicated divine favor or disfavor of gods for the chosen place.

As previously told, Haverfield is referring to the discussion written by Walter Barthel concerning the orientation of the Decumanus. In [13], Barthel tells that the orientation of Roman planning was based on the 'Disciplina Etrusca'. The Etruscan Doctrine was mainly a set of rules for conducting all sorts of divination, a religious and political constitution for Etruscans [15]. However, it was not a set of laws, but rather a collection of rules for asking the gods questions and receiving answers. In [16], we find more information on the Etruscan Doctrine. Heavens and Earth, supernatural and natural world, or, if we prefer, macrocosm and microcosm, appear echoing each other in a doctrine based on the orientation and division of space.

We can find information on the Etruscan Doctrine, on how it partitioned the sky and its divine inhabitants, in the works by Pliny the Elder and Martianus Capella [16]. Therefore, we know that Etruscans had a 'sacred space', oriented and subdivided, the concept of which is well described by the Latin word 'templum'. It refers to the sky or to a sacred area, such as the enclosure of a sanctuary or a town, or a much smaller area, such as the liver of an animal used in divination, as long as orientations and partitions are agreeing to the celestial model [16].

The orientation seems given by the four cardinal points, joined by two intersecting straight lines, Kardo and Decumanus. Kardo is the word used to indicate the pivot about which something turns, and then it is used for the pole of the sky too, the pole about which the world is turning. In the Etruscan Doctrine, if an observer is at the cross-point of the two lines, with his shoulders to the North, he will have behind him the half-space delimited by the Decumanus. This half-space is called 'pars postica', 'the posterior part'. The half-space he has due South is the 'pars antica', 'the anterior part'. "A similar partition of space also occurs along the Kardo line: to the left of the observer, the eastern sector, of good omen, (he has the) pars sinistra or familiaris; to the right, the western sector, of ill omen, pars dextra or hostilis" [16]. The sky is further subdivided in sixteen sectors, each having its divinity.

From [15,16], it seems that the Disciplina Etrusca is considering orientations to the cardinal directions; however, we find many examples of land centuriation and planning of towns and castra that have a different orientation. Probably, the Roman augurs and Gromatici, applied a Disciplina, which was including orientations to sunrise and sunset too. Moreover, the Roman Gromatici preferred a centuriation where the direction of its main street, the Decumanus, was dictated by practical and local opportunities, such as, for instance, the direction of main roads passing across the land. An example is the planning of the several Roman towns of Val Padana, which are crossed by the Roman Via Emilia.

As told in the introduction, an orientation to solstices is observed in the planning of Como. In the Figure 2 we can see the Roman Como, and in the Figure 3 the solar direction on the winter solstice, given by Sollumis.com. Haverfield [2] is telling that the Decumanus is oriented to the sunrise, but the Decumanus of Como had been oriented to the sunset of the winter solstice. In [9], it is explained that, according to Adriano Gaspani (Osservatorio Astronomico di Brera), augurs and surveyors decided the planning of Como according a solstitial orientation to the sunset, a practice that is more pertaining to Celtic culture than to Etruscan Discipline.





Figure 2 - The Roman Como.

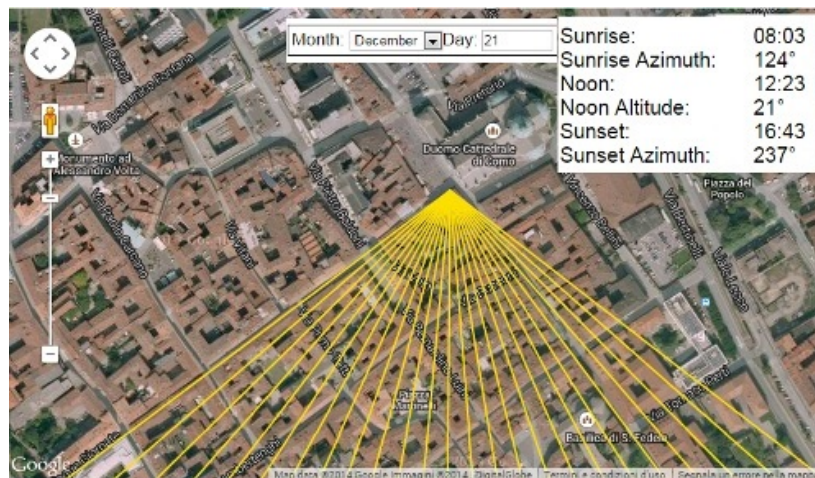


Figure 3 - The direction of the sun on the winter solstice, given by Sollumis.com. Haverfield [2] is telling that the Decumanus is oriented to sunrise, but the decumani of Como had been oriented to sunset. In [9], it is explained that, according to Adriano Gaspani (Osservatorio Astronomico di Brera), augurs and surveyors decided a planning of Como towards the sunset of winter solstice, according to a solstitial orientation proper of Celtic cultures.

### The castrum at the Hardknott Pass

The Latin word *castrum*, plural *castra*, was used by the ancient Romans to mean a place reserved for use as a military defensive position. In classical Latin the word '*castrum*' means a great legionary encampment, including both temporary and fortified permanent ones. The diminutive form '*castellum*' was used for the smaller forts. A generic term is '*praesidium*', garrison. The word *castrum* is coming from the Proto-Italic *kastro-* which means 'part, share', cognate with Old Irish '*cather*', Welsh '*caer*', that is 'town' (and perhaps related to *castrare* via notion of 'cut off') [16]. A *castrum* then was a reservation of land 'cut off', that is, limited, for military use [17]. It was a plough, pulled by a pair of oxen, which was cutting and dividing the land.

As explained by [17], the best-known type of *castra* is the camp, a military town designed to house and protect soldiers, equipment and supplies, when they were not fighting or marching. Roman Army regulations required a major unit to have a properly constructed camp to retire every night. Camps were the responsibility of engineering units to which specialists of many types belonged, officered by '*architecti*', that is, chief engineers, who had the required manual labor from the soldiers [17]. Permanent camps were '*castra stativa*', that is, the standing camps.

Even from the most ancient times, Roman camps were constructed according to the

pattern discussed in the Section 2, the orientation of which was not fixed, but changing according to location, environmental opportunity, and probably, symbolic reasons too. In fact, we find 'location', 'opportunity' and 'symbolic reason' in a Roman castrum of the Roman Britannia. It is the Hardknott Roman Fort, located on the western side of the Hardknott Pass in the English county of Cumbria. The fort was built on a rocky spur near the River Esk, and it is protecting the Hardknott Pass (Figure 4). These ruins have been identified in the Ravenna Cosmography as Mediobogdum [19,20]). Built between about 120 and 138 AD, the fort was abandoned during the Antonine advance into Scotland. The fort was occupied again around 200 AD and continued its life until the last years of the 4th century [19].

The fort is square with rounded corners. The wall has four gates, at the center of each side, and lookout towers at each corner. Within the walls are the remaining outlines of three buildings: a granary, a garrison headquarters building and a house for the garrison commander [19].

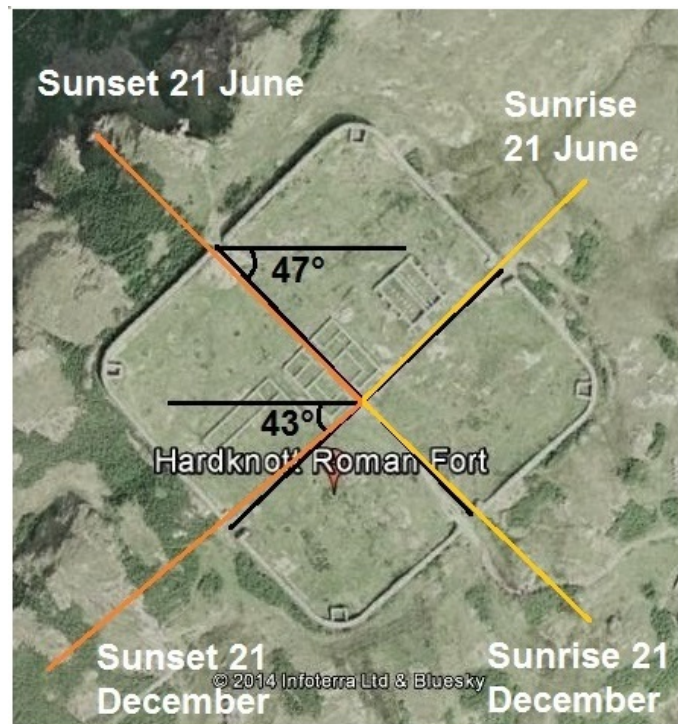


**Figure 4 - Located on the western side of the Hardknott Pass, the Roman fort was built on a rocky spur for protecting the pass (Google Earth Courtesy)**

As we can easily see from the Figure 4, 'location' and 'opportunity' are clear. We need to illustrate the existence of a possible symbolic meaning of its orientation. To help us in finding it, let us search with Solumis.com the azimuths of sunrise and sunset on solstices. At the coordinates of this place, we have for the sunrise on December 21, 132 degrees, and for sunrise on June 21, 46 degrees. For the sunset on December 21, we have 229 degrees, and for that on June 21, a value of 315 degrees.

Let us draw these directions on a satellite map of the Roman Fort. The result is shown in the Figure 5. This image is very interesting, because we can easily imagine the sun passing through the four gates on solstices. Moreover, the four towers of the garrison seem aligned to cardinal directions. Some differences could be caused by the fort being on a slightly inclined plane.





**Figure 5 – The Hardknott Fort and sunrises and sunsets directions on solstices. The Roman fort had the sun passing through the four gates on solstices. Moreover, the four towers of its wall seem aligned to cardinal directions. Some differences exist; probably the fort is on a slightly inclined plane.**

The Gromaticus, or engineer of the Roman army, decided the best strategic place for this castrum, and adapted its layout perfectly to the location. Moreover, at the latitude of this fort, with a perfect squared figure, he had the opportunity of paying homage to gods ruling the sky and the sun, may be, to Sol Invictus, or to Mithra, whose Mysteries were a religion popular in the Roman army. In any case, in my opinion, the planning of this fort was not made by chance.

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