

What the Latin literature truly tells us about the orientation of camps, towns and centuriation

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Here we are proposing a presentation and translation of some parts of the work by J. Le Gall on the solar orientation of the Roman camps, towns and centuriation. Le Gall is giving us a detailed description of the Latin literature regarding this orientation. The article, that was published in 1975 in the *Mélanges de l'école française de Rome* is therefore a fundamental reading so as not to get biased by any suggestion about solar orientation, that we can find in modern literature.

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Centuriatio and limitatio are Latin terms used to describe the Roman grid and, in general, the method by means of which land was measured and subdivided by the Romans. The centuriation is characterised by the regular layout of a square grid traced using surveyors' instruments. Sometimes the grid is rectangular. In the landscape, it may appear in the form of roads, canals and agricultural plots. In some cases these plots were allocated to Roman army veterans to origin a colony.

Sometimes, we find told that the grid was oriented according to the cardinal directions or according to the direction of the sunrise, in the framework of a ritual of Etruscan origin. However, it would be better to know what the ancient Latin literature truly tells us about the orientation of centuriation, in order to avoid any bias about it. For this approach we have a precious help from a work published by J. Le Gall¹ [1]. This is a fundamental article for people wanting to investigate centuriation. The article is in French. Here the translation of some passages are given and some notes too. Let us note that, in [1], the Roman camp (castra), the towns and the centuriation of the land are considered as different subjects. Reasons exist for this division as it will be evident by Le Gall's words.

From the introduction [1]

"The Romans are commonly said to have oriented the planning of the towns they founded, their camps and centuriation according to the direction of the sunrise by virtue of an old religious tradition inherited from Etruscans. This idea is sometimes lost sight of, but it is so deeply rooted in people's minds that it always resurfaces, particularly in France and especially in relation to towns, without anyone ever being dreaming of verifying its foundations. It is this, [verifying the foundations of this supposed orientation in the Latin literature], which we would like to do here in conclusion of several previous approaches and by referring directly to the sources" [1] Page 287.

1 Joël Le Gall, né le 8 juin 1913 et mort le 20 octobre 1991, est un historien et archéologue français, professeur d'histoire romaine et directeur des fouilles d'Alésia de 1958 à 1985.

The astronomical "proof"

"When the Romans built a new town, they used to plan its streets as straight lines by drawing an orthogonal grid; excavations have provided us with an ample proof of this fact and it is not uncommon for the streets of modern towns to still reflect traces of this planning. It is also added [in the description of the Roman town-planning], that the streets of a general east-west direction were the "decumani", and that the principal one, the "decumanus maximus", was that the direction of which had been determined by the observation of the rising sun on the day of the foundation, and that the other streets had been planned in relation to it, either parallel, the other decumani, or perpendicular, that is to say in a general north-south direction, the "cardines", the main one being the "cardo maximus"; under these conditions it would suffice to find on what day of the year the sun rose in alignment [with the main street], to determine the anniversary of the town: many scholars have tried to do this research for the one [the town] in which they were interested, and the most of them have achieved a result, which seems to justify the theory. In fact this proof is purely fictitious" [1] page 288. See data and discussion given in the paper).

Instead of following the discussion in [1], let us use, for the sake of simplicity, Figure 1.

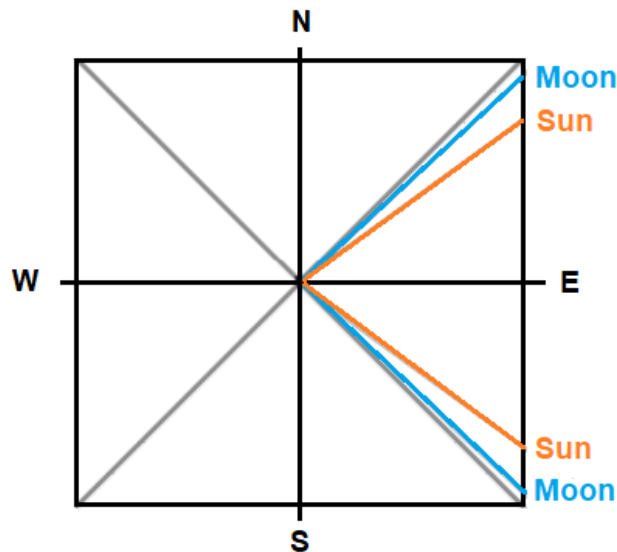


Figure 1. The square is used to mark the four cardinal directions, its diagonals to represent the symmetry of decumanus and cardo, the orange lines the directions of sunrise on solstices and the blue lines the directions of moonrise on major lunistics.

For the northern part of Italy, we have that the azimuth of sunrise on solstices is forming an angle of about 36° with respect to the west-east direction, and the moonrise on a major lunistic of 42° . Let us also consider the symmetry of decumanus and cardo, with respect to the diagonal direction of 45° . In the case that the grid is based on two indistinguishable perpendicular axes, a four-fold rotational symmetry exists. If we assume a uniform distribution for the direction of decumani, that is that the decumani have an orientation determined by chance, we can find a probability of $72/90$ to have a solar orientation too. The probability is even greater if we consider the moon: we arrive to $84/90$. It means that a distribution according to the sunrise or moonrise cannot be demonstrated by an analysis of the direction of decumani. Let us stress that, due to symmetry, the range of sunrise (moonrise) azimuths needs to be compared with a range of 90° and not with a range of 180° .

To stress the role of the symmetry, let us consider the Figure 2. In it, A and A' represents the two

perpendicular axes of a square grid. If we cannot distinguish decumanus and cardo (see the following discussion by Le Gall), A and A' are equivalent due to symmetry. Therefore, if we decide that A is a cardo, A' possesses consequently a solar orientation. For this reason, as previously told, the range of sunrise azimuths needs a comparison with a range of 90° , not of 180° . Figure 2 is illustrating a clockwise rotation, whereas Figure 3 gives the same for a counter-clockwise rotation.

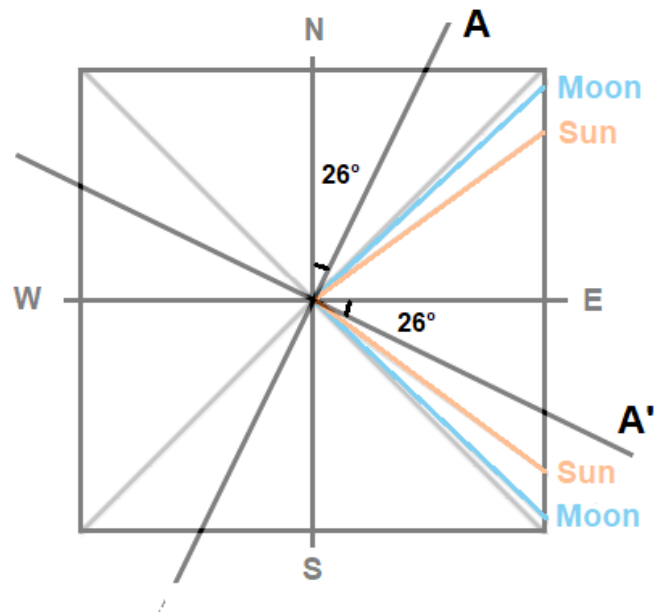


Figure 2. In the case that we have a square grid, and if we cannot distinguish decumanus and cardo, A and A' are equivalent due to the four-fold rotational symmetry (clockwise rotation). If we, arbitrarily, decide that A is a cardo, A' possesses consequently a solar orientation.

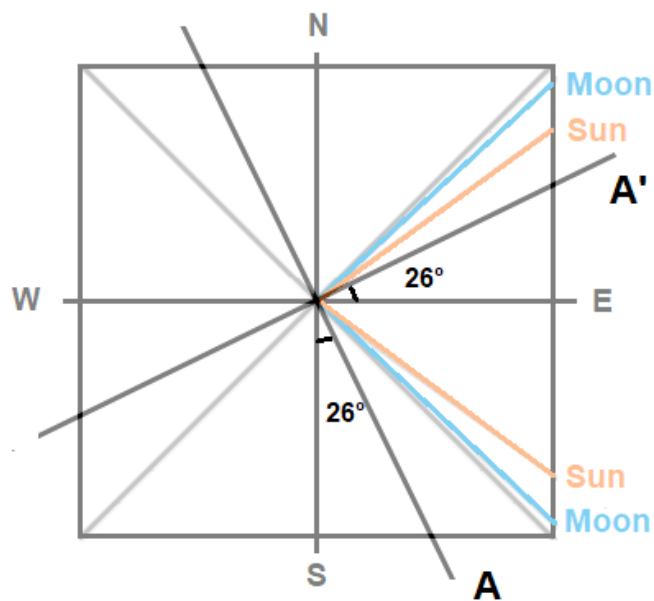


Figure 3. The same as in Fig.2 for a counter-clockwise rotation.

This is, proposed in a different manner, what is told in [1]. To avoid this objection, one could try to find specific alignments according to the Roman festivals of the calendar, as in [2]. However, in this case, we are facing a huge problem. The Roman calendar, before the Julian reform, was lunisolar and it had been run, in many periods of the Roman history, in a highly irregular manner. Therefore any comparison between Roman festivals and astronomical dates is very difficult or impossible (see for instance the discussion in [3]). Even after the reform of the calendar made by Julius Caesar in 45 BC, the calendar was, until 4 AD, not perfectly aligned with astronomical time [4]. Therefore, the only astronomical orientations which could have any meaning, would be those according to equinoxes, solstices, and cross-quarter days of the year. But these orientations are not necessarily of Etruscan origin. We find them important also for Celtic people. And Celtic people lived in Italy too.

Let us continue reading [1]. "All [what has been previously told] shows that we cannot invoke "astronomical proof" for a town whose streets form an orthogonal grid, nor it could be done with the orthogonal grid of lanes in a camp [castrum] or with the "limites"² of a centuriation: the correctness of the traditional theory of orientation according to the sun can therefore only be established by a recourse to the usual sources of a historical research, which requires a particular study for each of the three cases" [1] Page 292.

The camps (castra)

"The layout of the camps - wrote Marquardt³ - took place, as for the foundation of colonies, following the rules of surveying. The camp formed a square, the sides of which, drawn in accordance with surveyors' rules, had to be oriented towards the four cardinal points. The front was turned towards the Levant, the rear towards the west, the right side towards the south and the left side towards the north. The camp was divided into distinct parts by lines, some of which, the decumani, went from east to west, and the others, the cardines, from north to south" [1] Page 292.

"We have four detailed descriptions of the Roman camp spread over half a millennium: that of Polybius, for the 2nd century BC, that of Josephus, for the end of the Julio-Claudian period, that of the *Liber de munitionibus castrorum* by Pseudo-Hyginus, at the end of the High Empire⁴, and that of Vegetius, who exhibited, for a late period of Lower Roman Empire, [and cared] less what was being done in its time than what it would have been necessary to preserve, or to resume, of the old traditions of the Roman armies. Despite the period of time, despite the modifications of military techniques, these descriptions bring us face to face with a tradition of remarkable unity: that of a fortified camp of quadrangular form⁵ (2), carefully organized inside by means of a grid of lanes, crossing at a right angle, therefore that of a camp, the plan of which was perfectly capable of being oriented as Marquardt's thought, but it is necessary to see more closely how Polybius, Josephus, the Pseudo-Hyginus and Vegetius told about it, in this respect" [1]⁶. Page 293.

2 Limes, (Latin: "path") plural limites, in ancient Rome, originally a path that marked the boundary between plots of land.

3 Marquardt, *De l'organisation militaire chez les Romains*, p. 111 of trad. Fr. (by M. Brissaud) - Marquardt (ibid., p. 110, n. 1) largely followed H. Nissen, *Das Templum*, p. 22-53.

4 "II - III century. The period of time is not certain, but this uncertainty does not matter here " [1].

5 The note in [1] tells, about the quadrangular shape, that this is the shape "according to Polybius, Josephus and *De munitionibus castrorum*. Vegetius mentions triangular and circular camps pro ut loci qualitas aut necessitas postulaverit (chap. XXIII), but he is only reasoning on quadrangular camps. In fact, it seems that we have always known how to adapt the camps to the terrain in order to facilitate their defence, a finding which is, by itself, another relevant argument against Marquardt's theory". On the technical history of Roman castrametation, see J. Harmand, *L'armée et le soldat à Rome de 107 à 50 avant notre ère*, p. 99-135. (N.B. However, Le Gall does not "share the author's opinion according to which Caesar's camps around Alesia could have been reused barbarian enclosures").

6 Polybius (c. 200 – 120 BC) was a Greek historian of the Hellenistic period, known for his *Histories*,

"If we follow the translation of René Harmand and Théodore Reinach, the text of Josephus would suffice to remove all doubts: "in the enclosure they open, at the four cardinal points, as many gates ..." but the text is: πύλαι δὲ ἐνοικοδομοῦνται τέσσαρες καθ' ἑκάστον τοῦ περιβόλου κλίμα, [https://www.loebclassics.com/view/josephus-jewish_war/1927/pb_LCL487.29.xml] ... that is to say "four gates are arranged, one on each side of the enclosure. . . ": The translation of R. Harmand and Th. Reinach ranks among beautiful infidelities and, if it has any interest, it is to show how much contemporary scholars can be removed from reality by their belief in solar orientation; in fact Josephus does not take care of the orientation of the camp at all" [1]. Page 293.

"For his part, Polybius distinguishes "the front" "κατὰ πρόσωπον" and "the rear" "ἡ οπισθε πλευρά", but he only defines them in relation to the internal organization of the camp, the location of the praetorium and tents of tribunes; he considers only one factor of external orientation: the ease to access water and fodder, and only to specify that the Roman legions were to be placed in relation to the praetorium, on the side where the access was mostly easy; moreover, Polybius specifies that when two consular armies were united in the same camp, we had in fact two identical camps opposed back to back: thereby, is this denying or not any idea of solar orientation?" [1]

"According to the *De munitionibus castrorum* the orientation depended on the slope of the land - the Porta Decumana had to be at the highest point - and especially on the direction of the enemy, towards which the Porta Praetoria had to be turned⁷. According to Vegetius⁸, the Porta Praetoria had to be turned towards the east, or towards the enemy or in the direction along which the army would take on leaving the camp: this Vegetius' indication constitutes the only allusion to an astronomical orientation of the Roman camps that we have, but [the manner] an army in a military campaign generally installed camps was either to serve as an operational base or to serve as a stopover place before resuming the movement; it is clear that the other two manners had to intervene in most cases and the astronomical one only in exceptional cases, when neither one nor the other were necessarily imposed" [1].

"Now we know that by advising it, Vegetius did not conform to the teaching of the Etruscan priests, but to that of one of his distant predecessors in the theory of the art of war who was a Greek: it is in fact in Xenophon that we find for the first time the idea of choosing this direction to orient the camps; without explaining reason and origin - Persian perhaps? - he attributes it to the hero of his

which covered the period of 264–146 BC in detail. The work describes the rise of the Roman Republic to the status of dominance in the ancient Mediterranean world. It includes his eyewitness account of the Sack of Carthage and Corinth in 146 BC, and the Roman annexation of mainland Greece after the Achaean War. Titus Flavius Josephus (37 – c. 100), born Yosef ben Matityahu, was a first-century Romano-Jewish historian who was born in Jerusalem. Josephus recorded Jewish history, with special emphasis on the first century AD and the First Jewish–Roman War (66–70 AD), including the Siege of Masada. His most important works were *The Jewish War* (c. 75) and *Antiquities of the Jews* (c. 94). Pseudo-Hyginus is a name representing the unknown author of *De Munitionibus Castrorum* ("Concerning the fortifications of a military camp"). Due to the fact that this work has been formerly attributed to Hyginus Gromaticus, its author is often called Pseudo-Hyginus. This work is the most detailed surviving description of a Roman military camp. Publius Flavius Vegetius Renatus, commonly referred to simply as Vegetius, was a writer of the Later Roman Empire. His two surviving works are *Epitoma rei militaris* (also referred to as *De re militari*), and the lesser-known *Digesta Artis Mulomedicinae*, a guide to veterinary medicine.

7 "From *Mun. Castr.*, 56: (the best locations are those) quae ex campo in eminentiam leniter attolluntur, in qua positione porta decimana eminentissimo loco constituitur, ut regiones castris subiaceant. Porta praetoria semper hostem spedare debet. The beginning and the end of the treatise are lost, but reading this chapter 56 gives the impression that the author was not concerned with the orientation of the camp elsewhere" [1].

8 "Veget., XXIII: Porta autem, quae appellatur praetoria, aut orientem spectare debet, aut illum locum qui ad hostes respicit, aut, si iter agitur, illam partem debet attendere, ad quam est profecturus exercitus. . ." [1].

Cyropedia, as M. Garlan has just revealed to the historians of the Roman armies by putting this passage before them in his book on "La Guerre dans l'Antiquité". "Cyrus began by establishing the custom of set-up his tent facing the east; then he first determined at what distance from the royal tent the spear-bearers should set-up their tents; he then assigned a place to bakers on the right, cooks on the left, horses on the right and beasts of burden on the left; and all the rest was regulated so that each one could know the place which was reserved for him, its dimensions and its location"⁹ [1].

The towns

"We have already recalled two of the operations involved in the foundation of a Roman town according to the generally accepted idea: the determination of the direction of the decumanus maximus according to the sunrise on the day of the foundation, then the layout of the orthogonal grid and its streets from this initial direction; a third operation was the delimitation of the urban territory by the rite of the sulcus primigenius, which fixed the course of the rampart on which was moulded that of the pomerium, religious limit of this urban territory; the decumanus maximus was the projection on the earth of the apparent movement of the sun, the cardo maximus was that of the axis of this movement, the urban territory, of quadrangular shape and thus oriented, constituted a templum in the sense that the religious tradition Roman had borrowed from the Etruscan religious tradition¹⁰" [1] Page 295.

"The existence of a theory of this kind should not be ruled out a priori, for Chinese civilization has known as one which was very similar, that of the "red sparrow"¹¹. We have tried to show that "astronomical proof" was worthless, but the existence of Roman towns built ex nihilo according to an orthogonal plan is an undeniable fact: we also know of them from the 4th century BC, like the castrum of Ostia, and from High Empire; it is even from this relatively late period that the most

9 Y. Garlan, *La Guerre dans l'Antiquité*, p. 158. Le Gall gives Mr. Garlan's translation. "Let us add that the officers of the precursor detachment, whose mission was that of choosing the base of the camp and to indicate the route on the ground before the arrival of the main body of the army, would have been hard pressed to orient this route, with all the rigour that Marquardt's theory would have demanded; in fact the Ancients could not determine the cardinal points with precision during the day except by observing the sun at noon or by two points, symmetrical in its course (see below, p. 38, n. 46). If we oriented the camp eastwards, because the neighbourhood of an enemy or the prospect of the next stage did not require doing it in another specific direction, it would only be a very approximate orientation indeed, that is to say "at first glance" [1].

10 "The town / templum theory has long been contested by Valetton (*Mnemos.*, XXI, 1893, p. 65) and by C.O. Thulin (*Die Etruskische Dsciplin*, III, *Die Ritualbücher*, Göteborgs Högskolas Arsskrift, 1909, p. 28 ff) but their opposition did not meet with great success, nor that of F. Castagnoli, *Ippodamo di Mileto e l'urbanistica a pianta ortogonale*, chap. IV. The solar orientation of urban grids is obvious, in 1966, for A. Garcia y Bellido, *Urbanistica de las grandes ciudades del Mundo Antiguo*, p. 145-148, and in 1970 for Massimo Pallottino in his communication "La città etrusco-italica come premessa alla città romana: varietà di sostrati formativi e tendenze di sviluppo unitario" at the Convegno internazionale sulla città antica in Italia; none of the scholars who spoke after M. Pallottino's communication or during the follow-up to the congress questioned it (The acts of this Congress constitute the third volume of the *Atti del Centro Studi e Documentazione sull'Italia Romana* directed by Prof. Mario Attilio Levi". Le Galls warmly thanks Melle Ernst, Director of the *Année Philologique*, who made available to him "the volumes already published by these Atti, in which I found a lot of particularly valuable information for the present study). In their manual: *Villes et structures urbaines dans l'Occident romain*, published in 1971, M. Clavel and P. Leveque limited the solar orientation system to the colonies only (p. 104): the examples that we give below show that it cannot be retained even in this case" [1].

11 "See Mille M. David: The excavations of the palace of Nara, in *CRAI*, 1969, p. 614-626, (The Chinese imperial capitals had a checker-board plan, strictly oriented, which was supposed to reflect on the terrestrial plane the ideal organization of the cosmos. The main axis was materialized by a north-south path, known as "of the red Sparrow", which led to the imperial palace)" [1].

often cited example dates back, that is Timgad, the colony of Trajan. However, when you look at things more closely, difficulties always arise: the enclosure is not quadrangular because it has been adapted to the terrain - for example at Cosa, a colony founded in 273 BC - we do not know where to find the decumanus maximus as in Cuicul (= Djemila), colony founded by Nerva or Trajan¹², - the cardo maximus only exists on one side of the decumanus maximus - and the same was probably for the castrum of Ostia" [1] Page 296.

"The most astonishing case is that of Timgad itself where the two main streets are distinguished by a special paving: the decumanus maximus runs well in a straight line from the eastern gate of the enclosure to the western gate - the "Arch of Trajan" - and the north arm of the cardo maximus occupies in a proper manner the site assigned to it by theory, but its south arm is pushed back into the western part of the city; this is explained by noting that the extension of the north arm would have come up against the small hill which was used for the construction of the theatre, but why has the town not established a little further to the west?¹³. Can we believe that this cardo maximus, with two equally strongly offset sections, could have been considered as the projection on earth of the axis of the world?" [1].

"These are only a few cases: to tell the truth, no other case corresponds exactly to the theory, as long as its knowledge is not superficial; if there were one case, its existence would not be enough to confirm the validity of a theory for which, as far as the towns are concerned, the "archaeological evidence" has actually no more consistency than the "astronomical evidence"." [1] Page 297.

"To support the idea of town / templum, it is often quoted the text of Pseudo-Servius: *Prudentes Etruscae disciplinae aiunt apud conditores Etruscarum urbium non putatas iustas urbes, in quibus non tres portae essent dedicatae et tot viae et tot templa, Iovis, Iunonis, Minervae*. "Scholars in the Etruscan discipline say that among the founders of Etruscan towns, those towns where three gates, and as many streets and temples, were not dedicated to Jupiter, Juno and Minerva were not considered as conforming to religious law". However, it is difficult to invoke this text in support of the theory of town / templum, which seems to postulate the existence of four gates - one on each side - but, above all, it does not assert that an Etruscan urbs iusta should have just three gates, three streets and three temples; even in Marzabotto, which has passed for so long as the town which is offering a typical example of what an Etruscan town was, we already know four main streets¹⁴; this text only indicates a minimum condition, without making the slightest allusion to orientation¹⁵." [1]

12 J. Gasco, *La politique municipale de l'Empire romain en Afrique proconsulaire de Trajan à Septime Sévère*, in the Collection de l'Ecole Française, 1972, p. 108-110.

13 "The anomalies of Timgad's plan have been particularly highlighted by J. Lassus, *Adaptation à Afrique l'Urbanisme romain, Le rayonnement des civilisation grecque et romaine sur les cultures périphériques*. 8e Congrès international d'archéologie classique, Paris, 1963, p. 245-259." [1]

14 "We can no longer keep on Marzabotto the ideas that were current until the recent publication of the very important article by Guido A. Mansuelli, *Marzabotto, dix années de fouilles et de recherches*, MEFRA, 84, 1972, p. 110-144. We now know that the town with an orthogonal plan (Marzabotto II) dated from the first decades of the 5th century BC; Mansuelli believes that the pebbles that were found buried in the centre of a good number of its crossroads had served only as markers, but he continues to think that the course of the axes had been determined by the astronomical orientation" [1].

15 "No gate of the Servian enclosure appears to have been dedicated to the Capitoline divinities. The main entrance to the Capitol was called simply the *clivus Capitolinus*; the *gradus Monetae* (Ovid., *Fast.* 1, 638) was only a part of the *Gemonie* which owed the name due to the proximity of the temple of Juno Moneta (G. Lugli, *Roma Antica, il centro monumentale*, p. 15): there is no indication that they were consecrated to the goddess; it is the same for the *Vicus Iovis Fagutalis* which led to the sanctuary of this god on the Oppius (Id., *I Monumenti antichi di Roma e suburbio*, III, p. 381-382). The Pompei osque may have had an important *Via Jovia* (O. Elia, *Urbanistica di Pompei*, in *Atti del Convegno di Studi sulla città etrusca, e italica preromana*, Bologna, 1966, p. 187, n. 9, after Onorato, *La sistemazione stradale del quartiere del Foro triangolare di Pompei*, in *Rendic. Acc. Dei Lincei, Vili*, vi, 5, 6, 1951). Giving the streets of a new town the names of certain deities was by itself a very commonplace process. The Greek

"A text by Festus, also famous, adds nothing more. - *Rituales nominantur Etruscorum libri, in quibus praescriptum est quo ritu condantur urbes, arae aedes sacrentur, qua sanctitate muri, quo iure portae, quomodo tribus, curiae centuriae distribuuntur, exercitus constituentur, ordinentur, ceteraque eiusmodi ad bellum ac pacem pertinentia.* - "We call Ritual Books the Etruscan books in which it is indicated according to which rite the towns have to be founded, to consecrate the altars and the temples, what is the sacred character of the walls, what is the right of the gates, how to distribute the tribes, curiae et centuriae, how to constitute armies and to put them in order and the other questions of the same kind which concern the war and the peace". [1] Page 298.

"This text clearly shows that Etruscans had a real theology regarding the towns and a ritual for their foundation, unfortunately it gives no indication either on this theology or on this ritual of which the indication of the Pseudo-Servius is undoubtedly an echo; we find another passage in Vitruvius who invokes the writings of Etruscan haruspices too, but simply to say that, according to them, the sanctuaries of Venus, Vulcan and Mars should have to be installed outside the town; perhaps he was also inspired in the same manner to determine the locations which were to be assigned to the sanctuaries of other deities, in particular Jupiter, Juno and Minerva, but as regards the plan, he formally advises against quadrangular plans; even worse, Vitruvius considers that the layout of the streets should be established after that of the walls, and he only thinks of orienting them by taking into account the direction of the winds." [1] Pages 298-299.

"The basic text is that of Varro: *Oppida condebant in Latio Etrusco ritu multi, id est iunctis bobus, tauro et uacca interiore, aratro circumagebant sulcum {hoc faciebant religionis causa die auspicato), ut fossa and muro essent muniti. Terram unde exculpserant, fossam uocabant and introrsum factam, murum. Post ea qui fiebat orbis, urbis principium; qui quod erat post murum, postmoerium dictum eo usque auspicia urbana finiuntur. Cippi pomeri stant et circum Ariciam and circum Romam.* "In Lazio, many town founders followed the Etruscan rite, in other words, with a pair of cattle, a bull and a cow, the latter on the interior line, they ploughed a furrow (they did so according to religion a day of favourable auspices) in order to strengthen themselves by ditch and wall. The void from which they had removed the earth, they called it fossa (ditch), and the earth thrown inside, they called it murus (wall). Behind these elements, the circle (orbis) which was drawn formed the beginning of the town (urbis) and as this circle was post murum (behind the wall) it was called the postmoerium: it marks the limit for taking the urban auspices. The termini, which are limiting the pomerium, are drawn up around Aricia and around Rome" (Le Galls borrows, modifying it very slightly, the translation by J. Collart, Varron, *De Lingua Latina*, book V, p. 93.) [1]. Page 299.

"This rite is described in more detail by Servius in commentary on the founding of Aesta. *Urbem designat aratro: quern Cato in Originibus dicit morem fuisse, conditores enim civitatis taurum in dextram, vaccam intrinsecus iungebant et incincti ritu Gabino, tenebant stivam incurvam, ut glebae omnes intrinsecus caderent, et ita sulco ducto loca murorum designabant, atratrum suspendetes circa loca portarum.* "He draws the town by means of a furrow: In his "Origins" Cato says that this was the custom. Indeed, the founders of a town yoked under the yoke a bull on the right and a cow inside, then, girded according to the ritus gabinus, they held the handle tilted so as to make fall the clods inside. They marked the location of the walls by making a furrow in this way and lifting the plough over the places of the gates". [1] Pages 299-230.

colony of Thourioi had four main streets lengthwise called Herakles, Aphrodite, Zeus, Dionysios, and three widthwise called Hera, Thuria and Thurina, Thuria being a deified source which had been taken as eponym by the founders (Diod., XII, x). In the case of the Pseudo-Servius text, it should be added that the Etruscan character of the triad Jupiter, Juno, Minerva is sometimes disputed today (cf. G. Dumézil, *La religion grecque archaïque*, p. 303-306 and pp. 649-650). Furthermore, the rest of the text almost belies the sentence which we have reproduced and which is always quoted alone: *Bene ergo miratur Aeneas, ubi fuerant magalia, illic esse legitimam civitatem; nam et portas et vias videbat et mox templum Iunoni ingens*; there is no longer any question of Jupiter or Minerva. . . !" [1]

"We know what use in the literature has been made of this rite - especially for the founding of Rome - and the coinages of the imperial era have frequently used it to commemorate that of colonies. The fact that it was mentioned by Cato in his "Origins" confirms its antiquity, but neither Virgil, nor Servius nor any other text specifies that the furrow should draw the perimeter of a quadrangular surface, such as the urban "templum" should have to be; Varro is not useful, who affirms that it is just a question of a "ritus etruscus"; that it was necessary to draw a "templum" to take the auspices is certain, but it was quite another affair, since these auspices had to be taken before the rite of the "sulcus primigenius" took place" [1] Page 300.

"Besides, was this rite really Etruscan? We can doubt it since Virgil has it celebrated by Aeneas at Acesta in Sicily and Varro puts it in relation with the Pomerium: this word is Latin, Varro himself emphasizes that the pomerium was marked by termini only in Rome, and in Aricia, both Latin towns, and the Etruscan kings of Rome seem to have established the Servian enclosure without worrying about enlarging that of Rome to make it corresponding with the planning; the augur Cicero even goes so far as to formally declare that the Etruscan haruspices were not qualified to rule on affairs relating to the Roman pomerium" [1] Page 300. See the article *A propos de la Muraille Servienne et du Pomerium*, cited above p. 287, n. 1.

"In support of the theory of the town / templum we also invoke a few pages of *De limitibus constituendis* by Hyginus Gromaticus, which put the outline of the decumani and cardines in relation to the course of the sun and which attribute this manner of doing things to the Etruscans, unfortunately these texts do not concern the construction of towns but only agrarian surveying - we will find them again on this subject - It is suffice to notice for the moment that no street in any Roman town has ever been called by the Ancients neither Decumanus nor Cardo, it was modern scholars who took the initiative (1). (1) The texts of the *Gromatici veteres* (see p. 302 n. 1) do not establish any necessary relationship between the squaring of the centuriation and that of the town. In general, the initial stationing point of the groma for the centuriation route was chosen outside the town, because the centuriation had to be established on arable land, almost flat therefore, while the scrutiny was carried out, for the town, to find a defensive site, therefore generally a steep site. If it was possible to install this point inside the future town, it was an exceptional case: the only one cited by the *Gromatici* is that of Hammaedara in Africa (Gram, vet., P. 180). a diametrically opposed example was recently highlighted by Melle Lacchini (see infra, p. 306, n. 4): it is that of Altinum, whose centuriation stopped at least 3 km from the town because it had been installed on the banks of the Sile and was separated from its mainland territory by a large marshy area which was unsuitable for cultivation and therefore had not been subjected to centuriation" [1], Pages 300-301.

"We thus arrive for the town at the same conclusion as for the camp: the theory of town / templum has no more foundation than that of the camp / templum. It is in vain, therefore, to try to consolidate them with each other and invoke the comparison which the Ancients made so readily between the town and the Roman camp: Polybius, Hyginus Gromaticus or Vegetius they never dreamed of giving this comparison a religious value" [1] Page 301.

The centuriation

"As much as the geometric plan of new towns, the Roman centuriation strikes the imagination of the modern audience, that discovers them with all the most astonishment, as these immense grids have left traces, sometimes still alive, in the form of roads, paths, agrarian boundaries, and this audience believes that they too were drawn according to solar orientation. In fact the study of these achievements, often grandiose, falls under so many different fields - the history of conquest and that of agrarian assignments, social history and political history, law, surveying technology, astronomy,

cartography, etc ... and through so many centuries - all Roman history - that our knowledge on this subject remains rather superficial: this is the case, in our opinion, for the religious aspect that we usually attribute to these cadastral operations" [1] Page 301.

"The moderns put the system of centuriation in relation with the *disciplina etrusca*, invoking the testimony of the *Gromatici veteres*, but in fact only three texts of this corpus can be considered, one belongs to Hyginus' *De limitibus constituendis*: it seems to date from the time of Trajan; the second is found in the first of the two *Libri coloniarum*: it is from the Lower Empire; the third, perhaps less frequently cited, includes two paragraphs from Frontinus' *De limitibus*: it is, consequently, more or less contemporary with the first; all three deserve to be quoted and translated in extenso" [1] Page 302.

"The text of *Liber coloniarum* concerns the territory of Ancona: it indicates that the *limites* had exceptional names and that these names were found in part of Etruria. *Nam quaedam pars Tusciae his limitibus et nominibus ab etruscorum aruspicum doctrina vel maiorum designatione nuncupa(n)tur*. "In a part of Etruria the designations are given by *limites*¹⁶ the names of which are given according to the doctrine of the Etruscan haruspices or by a designation of the ancients" [1] Page 302.

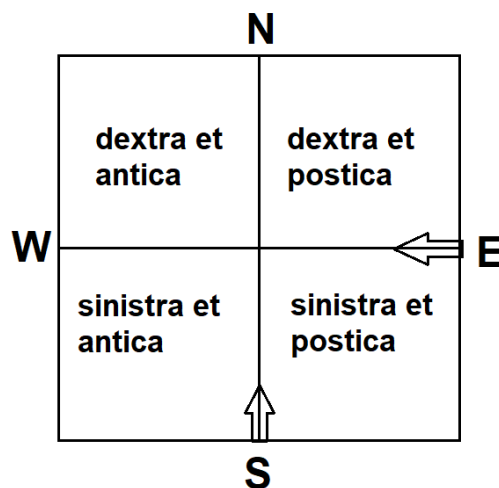
"The beginning of the text is in poor condition, yet these exceptional names are indicated with certainty: *diametralis* instead of *decumanus*, *verticalis diagonalis* instead of *cardo*. These are, therefore, Greek names about which his ignorance alone could have led the author to invoke the Etruscan haruspices, with hesitation however, since he also invokes the *maiores* on the subject, that is to say, the ancient surveyors - Roman - of a time which he does not seek to determine" [1] Page 302.

"Here it is the passage from Hyginus. *Constituti enim limites non sine mundi ratione, quoniam decumani secundum solis decursum diriguntur, kardines a poli axis*. Unde primum haec ratio mensurae constituta ab Etruscorum aruspicum disciplina. "The limits are established by taking into account the system of the world, since the *decumani* are oriented according to the course of the sun, the *kardines* according to the pole axis. Therefore (it emerges) that this way of surveying was first created by the science of Etruscan aruspices ". "Unde primum ..." the expression clearly shows that the Etruscan origin was a deduction by the author or his sources, and that it was not based on any expression of testimony" [1] Pages 302-303.

"Frontinus' passage is more explicit: *Limitum prima origo, sicut Varro descripsit, a disciplina etrusca; quod aruspices orbem terrarum in duas partes diviserunt, dextram appellaverunt quae septentrioni subiaceret, sinistram quae ad meridianum terrae esset, ab oriente ad occasum, quod eo sol and luna spectaret, sicut quidam architecti delubra in occidentem recte spectare scripserunt*. Aruspices altera linea ad septentrionem a meridiano diviserunt terram, and a media ultra antica, citra postica nominaverunt. Ab hoc fundamento maiores nostri in agrorum mensura videntur constituisse rationem. Primo duo limites duxerunt; unum ab oriente in occasum, quem vocaverunt *decumanum*; alterum a meridiano ad septentrionem quem vocaverunt *cardines*. *Decumanus* autem dividebat citra dextra et sinistra, *cardo* citra and ultra. "The first origin of *limites*, as Varro explained, (comes) from Etruscan science. Indeed, the haruspices divided the earth into two parts, they called "dextra" the part which would be in the north and "sinistra" the part which would be in the south, from rising to setting, because sun and moon go in this direction, so that some Architects have written that temples were correctly looking west. The aruspices divided the land from south to north by another line and they named "antica" the part that was beyond the middle, "postica" the part that was ahead. Our elders seem to have established their surveying system from this base. They first drew two *limites*, one from sunrise to sunset, which they called "decumanus" the other from south to north, which they called "cardo"; in fact, the *decumanus* divided the land by right and

16 "We know that the centuries were indicated according to the *limites* which demarcated them" [1].

left, the cardo by below and beyond ” [1] Page 303.



"Perhaps Hyginus simply summed up Frontinus; in any case, the text of the latter clearly exposes the relationship that, following Varro, he established between Roman practices and the disciplina etrusca: it was simply a technological relationship; the Romans had borrowed from the Etruscans the technique which consisted in dividing the ground according to two perpendicular axes, one east-west, the other north-south, but, what it was among the Etruscans a technique wielded by the aruspices, it was in Rome no more than a surveying technique; the Romans had, in such a way, "secularized" it. The proof is that they did not even respect the orientation, orientation on which rested the theory of Etruscan inspiration: it is Hyginus himself who explains it with great precision, because these are facts that he had to know very well" [1] Pages 303-304.

Multi ignorantes mundi rationem solem sunt secuti, hoc est ortum et occasum, quod is semel ferramento comprehendere non potest. Quid ergo? Posita auspiculiter groma, ipso forte conditore praesente, proximum vero ortum comprehenderunt, et in utramque partem limites emisserunt, quibus kardo in horam sextam non convenerit. Et quidam, ne proximarum coloniarum limitibus ordinatos limites mitterent relicta caeli ratione mensuram constituerunt qua tantum modus centuriarum et limitum longitudo constaret. Quidam agri longitudinem secuti and qua longior erat fecerunt decumanum. Quidam in totum converterunt and fecerunt decumanum in meridianum and kardinem in orientem, sicut in agro Campano qui est circa Capuam.

"Many [surveyors], unaware of the system of the world, have allowed themselves to be guided by the sun, that is, by its rising and setting, although it cannot be grasped by means of the iron instrument at one time. But what? After having the groma stationed after taking auspices and, if that be the case, in the presence of the founder, they observed the rising of the sun as closely as possible and had the limites driven in the two parts, and after all this procedure, [the consequence was that] the kardo did not coincide with the direction of sixth hour. Some surveyors, in order to have their limites not coordinated with those of the neighbouring colonies, renouncing to take into account of the sky, established (a system) of measurement by means of which only the area of centuries and the length of limites would be maintained. Some have based their measurements on the length of the territory and they traced the decumanus where it had the longest direction. Some surveyors have turned everything over, they have traced the decumanus towards the south and the kardo towards the east; this happened for the Ager Campanus which is around Capua" [1] Page 304.

"In the first part of this text, the kardo is not the kardo maximus of the centuriation, it is the direction of the geographic north, the direction that the shadows indicate at the sixth hour, that is to

say in the middle of the day; the two parts - in utramque partem - are the two parts on either side of the decumanus maximus according to the definition we have just found in Frontinus' text; at the end of the text, the kardo, on the other hand, is that of the centuriation" [1] Page 304.

"The Liber coloniarum indicates four other examples of reversed centuriation, all in southern Italy, those of the territories of Consentia, Vibo Valentia, Clamptia and Benevento; Hyginus stresses that this system does not entail any unfortunate consequences for the colony. Nam nec illis coloniis hoc nomine quicquam iniuriae factum est, quod kardines loco decumanorum observantur, decimani loco hardinum: omnis limitum conexio rectis angulis continetur, extremitas mensuraliter obligata est, nihil res publica, nihil possessor de finibus queritur, constat illis ratio mensurae, limitum ratio non constat ... "No injustice has been committed from this point of view with regard to these colonies either, because we see the kardines instead of the decumani and the decumani instead of the kardines; the whole grid of limites is at right angles, its outline has been fixed by measurements, neither the republic nor the owners have anything to complain about as regards the surfaces, the measurements are correct, it is only the name of limites which is not ". [1] Page 305.

"Also Hyginus knew of two ways of drawing limites that had nothing to do with solar orientation. The first consisted in taking as a base a pre-existing via consularis or, at least, a via traced before the operations of centuriation: we obviously think of the famous centuriation of the Cispadane which leaned - more or less - on the Via Aemilia. The second method consisted in taking as a base the sea or the foot of the mountains, the surveyor thus traced limites montani or limites maritimi, of which Frontinus gives the definition with regard to the region of Fanum Fortunae in Umbria: qui ad mare spectant, maritimos appellant, alibi which ad montem montanos, Hyginus gives the same, underlined by a fairly well preserved vignette. When they were directed towards the Cisalpine Apennines the "limites montani" took the name of "limites Gallici"; both names are always mentioned, at the same time, with the limites maritimi; the maritimi are quite often mentioned alone, or rather with limites which are only designated in relation to them: limites normales (= perpendicular). It happened that there were limites maritimi in territories far from the sea and without sight towards it; this was certainly the case for the territories of Corfinium, Superaequum, Falerio and Sentinum; in this case, the limites maritimi were simply drawn in the direction of the sea; moreover, it happened to Agrimensores to call them "decumani" and to call "cardines" the limites gallici" [1] Page 305-306.

"In summary, the Agrimensores of the imperial era knew of nine systems which had been used by their predecessors to draw the limites of the centuriation. Five had nothing to do with solar orientation, they were based on: 1) the sea; 2) the mountain ranges; 3) the greatest length of the territory; 4) a via consularis; 5) simply the fact that the orientation of limites allowed to avoid that they could be confused with those of a neighbouring pertica" [1] Page 306.

"Four other systems were related to solar orientation: 6) the orientation by sight of the sun at its rising; 7) orientation with respect to true North and South, determined from observation of [the solar] apparent motion¹⁷; 8 and 9) These systems were identical to 6 and 7 but the Cardines were traced from east to west and the decumani from north to south" [1] Page 306.

"Of these nine systems, we see that only one, the sixth, corresponds to the theory retained by the moderns. The fifth reveals that the Roman surveyors took into account practical considerations, since, for them, it was simply a question of avoiding controversies regarding the boundaries of two neighbouring "perticae", and it is also practical considerations that the first, second, third and fourth systems obviously answered; all of them have a common feature, that of depending on very clear landmarks and therefore being not dependent on demarcation (termini). Then why are they attributed religious motives to astronomical procedures, religious motives to which the texts do not

17 "For the 6 and 7 cases, it would be necessary to distinguish two more varieties, depending on whether the cardines and the centuries were counted from east to west or from west to east" [1].

allude? Methods 7 and 9 do not depend on the course of the sun but on the true geographical orientation defined by the direction of geographic North; this cardinal point is, in fact, the only one that it is possible to determine by simple methods¹⁸; this direction, being always the same in a given place, constitutes itself as a mark not dependent on the demarcation, more precise than seashore or mountains, more independent from human vicissitudes than the greater length of the territory and the path of a main road" [1] Page 307.

"Methods 6 and 8 had also the advantage of depending on the observation of a certain benchmark, the direction of the rising sun on the day of the foundation, which it was possible to verify every year on the anniversary of this foundation (the Moderns readily think that the anniversary of the birth of the founder or the emperor, or of a significant event in their life, was chosen for the foundation: a logical idea, but in support of which no text can be invoked and the application of which would probably have encountered many practical difficulties): the only drawback from this point of view was precisely the fact that the verification could only be done on the anniversary; we can assume that procedures 6 and 8 were used because they allowed them to be carried out on any day" [1] Page 307.

"Useless checks, one might say, since there were *termini*". Look! First, [the surveyors] did not always use *termini*", it happened that they were satisfied with wooden stakes, destined to be destroyed by decay, and the *termini* themselves could disappear or be moved; disputes could therefore arise quite easily: to resolve them it was necessary to have recourse to the *forma*, but it is very difficult to "put back to the ground" the old plans when one does not have indisputable reference points, on which time has had no influence" [1] Page 307-308.

"As it has come down to us, the corpus of *Agrimensores* is remarkably secular in its character. Only two deities are mentioned there: *Vegoia* and Jupiter, both in the texts which constitute what we have become accustomed to calling "the prophecy of *Vegoia*", that is to say pseudo-prophetic texts which were probably drafted for use in the controversy that Etruscan lords waged against the Roman agrarian laws of the late 2nd and early 1st centuries BC; they are, therefore, texts which were very different from the technical treatises which are gathered elsewhere in this corpus." [1] Page 308.

"In these treatises one finds allusions to rural sanctuaries and to the sacrifices which were offered there, but these sanctuaries are not put in touch with the centuriation; one would look in vain here for a memory or a reflection of the "law of Numa" as recalled by Paul Deacon; there is no doubt that it is a question of *termini sacrificales*, of *lignei sacrificales*, of *pali sacrificales* (the stakes of the centuriation are sometimes called *pali sacrificales*, but this is only a habit of language without religious significance), but these reference marks indicated the limits of properties and not those of centuries, which did not coincide - partially - until the properties resulted from a colonization which had wiped out the previous properties and which had been based on a centuriation, but even in Italy, certain towns have always escaped it" [1] Page 308.

"It is difficult to know which lands were submitted to centuriation: probably all those which had been attributed to *ager publicus*, including those which were not assigned to settlers. The peregrine lands could be subjected to centuriation to meet certain needs; these needs may have manifested themselves later: it was Caracalla who made the territory of Pessinonte centuriated, certainly to ensure the base of royalties, the exact nature of which we do not know". [1] Page 308

18 "Operations had to be carried out during the day, because at night it is impossible to establish precise staking. True north is indicated by the direction of the shadows at noon, when the sun is at the zenith; it is then that they are the shortest, but the observation is in fact quite difficult to achieve. It is preferable to have recourse to a slightly more complicated process based on the observation of two shadows of the same length spotted before and after the passage to the zenith, for example to that described by Vitruvius (I, vi, 7; 12) ". [1] In this note, the term "zenith" means the highest altitude reached by the sun during the day.

Discussion

In [1], we can find also the report of some specific cases, where the solar orientation of the town is compared to the orientation according to the local environment and the presence of a main road. We did not consider them here, because our main aim was that of translating Le Gall's report of Latin literature regarding the orientation of camps, towns and centuriation.

Le Gall stresses that the books of the Gromatici are not concerning the foundation of the towns and this is also told in the book by Haverfield on the ancient town planning, the reading of which is strongly suggested [5].

As told before, here the aim was that of proposing Le Gall's words in English, to avoid misinterpretations of them. For instance, in [2], it is told that "In spite of this quantity of instances, the existence of astronomical references in the planning of Roman towns has been repetitively negated, or admitted only for functional, rather than symbolic, motivations (see e.g. the reference book by Adam 1999). This position assessed after the work by Le Gall (1975), who maintained that: 1) the Agrimensores just invented the symbolic and sacred content of their science, claiming for a derivation from the Etruscan *Disciplina* - 2) the astronomical orientation mentioned by them regards in any case only the centuriation procedure, and therefore cannot be extended to the towns - 3) as a consequence, there is no astronomical content in the planning of the roman towns. To sustain his theses Le Gall presented a list of data scattered from ... etc."

All the astronomical references that we can find in the Latin literature have been reported by Le Gall. As we have clearly seen before, Le Gall did not tell that the Agrimensores "invented" (point 1), but that they based themselves on a "secularized" discipline, the origin of which was not only involving the Etruscan discipline. For what concerns the astronomical orientation, the books of the Agrimensores are regarding centuriation, that is the land surveying, and this is also stressed by Haverfield (point 2). Haverfield tells that we have no ancient document about the laws regarding the planning of the towns. Even point 3 is not true. The astronomical orientation is one of the possibilities, among others, according to Le Gall. Moreover, in the texts on the foundation of the Roman towns, the sunrise was never mentioned. Consequently, even in the case of an orientation according to sunrise, it does not mean that it was necessarily a "sacred orientation". Of course, this is quite different for temples, churches or cathedrals, where the buildings have an asymmetry in their planning, where front and rear sides are clearly defined. For them, the study of an astronomical orientation is well-posed and giving interesting results, such as in [6], where the orientation of the Gothic cathedrals of France has been analysed. For them, the solar orientation had a specific symbolic and sacred meaning.

In any case, if we extend what is told for the centuriation to the towns, and assume them oriented to the sunrise, any diagram concerning their orientation is not relevant. As we have seen before, if we cannot distinguish the two main axes, that is, if we are not able to tell which of them was the one to compare to the sunrise azimuth, the probability to find a solar orientation by chance is about 80%. That is, if we orient one of the main axes by chance, we have a solar orientation in eighty cases out of a hundred. And, let us stress, this happens simply by chance. In the case that a non-uniform distribution of directions is assumed or observed, it could be due to local traditions, not necessarily linked to Etruscans.

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References

- [1] Le Gall Joëll (1975). Les Romains et l'orientation solaire, *Mélanges de l'école française de Rome*, Année 1975, 87-1, pp. 287-320 - Available at https://www.persee.fr/doc/mefr_0223-5102_1975_num_87_1_1012
- [2] Magli, G. (2007). On the orientation of Roman towns in Italy. *arXiv:physics/0703213*
- [3] Sparavigna, A. C. (2019). Bononia, the Roman Bologna: Archaeoastronomy and Chronology. *arXiv:1908.02557*.
- [4] Polverini, L. (2016). Augusto e il controllo del tempo. Studi su Augusto. In occasione del XX centenario della morte, a cura di G. Negri e A. Valvo, Torino, 95-114.
- [5] F. Haverfield (1913), *Ancient Town-Planning*, Oxford, Clarendon.
- [6] Sparavigna, Amelia Carolina, The Solar Orientation of the Gothic Cathedrals of France (April 4, 2014). *International Journal of Sciences* Volume 3, April 2014 (4), Available at SSRN: <https://ssrn.com/abstract=2573651>