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The Acropolis of Alatri: Architecture and Astronomy

The astronomical alignments of the Acropolis of Alatri, Italy, are investigated. The results strongly support a dating of the magnificent polygonal walls of the site to a pre-Roman period.

1 Introduction: polygonal walls in Italy

The so-called *cyclopean* or *polygonal* walls are huge walls of megalithic blocks cut in polygonal shapes and fitted together without the use of mortar. Many walls of this kind were constructed during the Bronze Age in the Mediterranean area (probably the most famous are the walls of Mycenae; see e.g. [Heizer 1990]). Slightly less known but equally impressive and magnificent are the walls visible in many Italian towns, spread over a wide area which spans from Umbria to Campania. Besides Alatri, which will be the subject of the present paper, those of Segni, Ferentino, Norba, Arpino and Circei are worth mentioning.

Polygonal walls are traditionally classified into three types or *manners*. The first manner is constructed with blocks of medium dimensions with coarse and inaccurate joints; the second manner shows good stonework with few wedge fillings between main blocks; the third manner is simply perfect, with joints so accurately prepared that it is impossible to insert even a sheet of paper or the blade of a pocket knife between two adjacent stones. The small town of Alatri, in the Frosinone provincial district about an hour's drive from the center of Rome, is the place where this third manner of polygonal walls is still visible nearly intact, as it was constructed at least 2400 years ago. The masonry of Alatri is nearly identical to that of the famous polygonal wall of the Greek Delphi sanctuary, a wall dated no later than circa 520 BC. The two are so similar that one actually gets the impression that they were built by the same engineer (fig. 1).

Fig. 1a Polygonal walls of the Alatri Acropolis. Porta Minore is visible on the right

Fig. 1b The polygonal wall at Delphi

2 The Alatri Acropolis

The city of Alatri was built around a small hill, and the town is surrounded by megalithic walls of which many remains are still visible today. The Acropolis in turn is a gigantic construction built

on the hill and covering the top of it. In some sense the hill was adapted and sculpted in such a way as to obtain a sort of “geometric castle” dominating the center of the town (fig. 1a). The Acropolis is so impressive that the famous German historian Gregorovius (1821-1891) reported “an impression greater than that made by the Coliseum”.

The perimeter of the building is defined by huge walls which give to it a polygonal shape with six sides ABCDEF (fig. 2). The polygonal shape of the Acropolis actually looks like a giant replica of one of the stone blocks of which the Acropolis itself is constructed. The access to the Acropolis was possible through two doors, today called Porta Minore (fig. 3) and Porta Maggiore (fig. 4). Porta Minore is a small trilithon doorway, and on its lintel a symbol composed by three phalli disposed as to form the upper part of a crux can be discerned (fig. 5).

Fig. 2 .Plan of the Acropolis in Alatri

Fig. 3. Porta Minore

Fig. 4. Porta Maggiore. The staircase was added in the eighteenth century

Fig. 5. The lintel of Porta Minore, with the half-crux phallic symbol

Porta Maggiore is one of the most magnificent megalithic structures in Europe, and it is composed of a tunnel of huge stone blocks with a corbelled ceiling and a monumental trilithon access. After the door on the C wall, a short bent wall leads to side D, which contains three huge “niches”. These “niches” look like basements for statues (fig. 6), but no kind of artistic find has been found here or elsewhere in the Acropolis. Thus, the unique “message” left today by the builders of this monument is the half-crux-shaped phallic symbol on the small door (a statue of a lion, badly damaged, lies on the ramp on the north side, but the dating of this sculpture is unknown).

Fig. 6. Two of the three niches on wall D

On the top of the Acropolis an additional megalithic structure, lying on a natural rocky platform, existed. Archaeologists call this structure *ierone*, thinking that it was the basement of a temple. However, no proof of this statement has ever been found. The structure was constructed with enormous stone blocks perfectly cut and joined, without mortar, in such a way that it is impossible, as mentioned, to insert even a sheet of paper between two blocks (fig. 7). On this structure the Alatri cathedral was later built, so that today only the lower courses of stones remain visible under the church.

Fig. 7. The huge polygonal basement on the rocky terrace of the Acropolis, which today lies under the northern side of the Cathedral

3 Solar alignments and geometrical symmetries in the Alatri construction plan

The first to propose the idea that the city of Alatri and its Acropolis were planned on the basis of geometrical and astronomical alignments was a local historian, Don Giuseppe Capone, in 1982. His work is poorly known and of very difficult to access, and therefore I will review here the most important discoveries of this scholar ([Capone 1982, 12-14]; see also [Aveni 1985] where a brief account in English is given).

Capone studied the geometry of the city plan and discovered that there exists a sort of “privileged point” (indicated by O in figs. 2 and 8) which lies just behind the northern wall of the megalithic structure at the center of the Acropolis (and thus today lies near the northern wall of the Church, see fig. 7). With respect to point O, Capone identified many geometrical symmetries and astronomical alignments (fig. 8):

- The northeast (H) corner at of the Acropolis defines a direction OA which identifies the rising sun at the summer solstice;
- The eastern and western sides of the Acropolis are parallel and oriented north-south;
- The city has six main doors (indicated by P1-P6) and three small doors or *portelle* (p1-p3). The north-west sector has two main doors and two small ones, the north-east sector two main doors. “Symmetrically dividing by two” with respect to O, the south-west sector has one main door and the south-east sector one main door and one small door;
- The lines connecting the couples of doors p1-p3, p2-P4, P3-P5 intersect each other in O;
- The p1-p3 line is perpendicular to BA ;
- All the main doors except P2 are equidistant from O. The distance equals three times the value of the segment OH (which is about 92 m. long). This value seems to have governed the whole planning of the city.

Fig. 8 Plan of Alatri, with the alignments discovered by G. Capone (adapted from Capone 1982)

Capone was also puzzled about the shape of the Acropolis, which is *not* governed by the morphology of the hill. As a matter of fact, it is rather the contrary, because the hill was adapted, sculpted, in such a way so as to obtain the desired shape. The idea that Capone courageously suggested was that the plan of the Acropolis could have been conceived as an image of the Gemini constellation.

It should be noted that Capone's idea was greatly original. In fact, today we do know of many examples where people of the past tried to connect earth and heavens, and even to replicate the sky on the ground, by means of astronomically-related buildings. Some such examples are controversial and not all scholars accept them – for instance, the theory that interprets the disposition of the three main pyramids in Giza as a representation of the three stars of Orion's belt [Bauval1989] – but others are certain, such as the use of *hyerophanies*, "sacred machines," which were activated by specific celestial events; among them, the famous *Castillo* of Chichen Itza, in the

Yucatan, a Toltec-Maya pyramid constructed in such a way that a light-and-shadow serpent descends its staircase at the equinox [Aveni 2001]. Another example is that of the megalithic temples of Malta. These huge buildings, constructed between 3500 and 2500 BC, were planned according to a complex cosmographic concept, which included the “shape” of the so-called “mother goddess” (a feminine “fat” deity) in the internal layout of the temples, the orientation of the main axis to the rising of the Southern Cross-Centaurus asterism [Hoskin 2001] and probably also the orientation of the left “altar” of the temple to the winter solstice sunrise [Albrecht 2001]. Recently, I proposed a similar “cosmographic principle” for the Inca capital, Cusco; according to this proposal, the city could have been laid out as a *replica* of a dark cloud constellation having the form of puma [Magli 2005].

4 Stellar alignments of the Acropolis

I present here the results of an investigation of the possible astronomical content of the planning of the Acropolis. The data for the alignments of the walls were collected with a precision which can be reasonably assumed to be around 0.5° .

The idea that the plan of the Alatri Acropolis could have been governed by further stellar alignments came to me in light of the fact that the eastern and western sides are oriented cardinally (they deviate by 0.5° and 0.8° west of north respectively), and that the first available “angle” for a sight line is oriented to the summer solstice sunrise. Why, then, did they not construct the southern side with squared angles as well? Further, why did they not use squared angles, or a single bent line, for the northern side? As we have seen, the Acropolis was not constructed with a form adapted to the shape of the hill, and therefore geo-morphological reasons have to be excluded.

The orientations of the sides are the following:

- The two southern walls are oriented about 4.7° west of south (C side) and about 3.4° east of south (D side);
- The two northern walls are oriented about 28° west of north (E side) and about 12.6° west of north (F side).

To search for an astronomical answer to this puzzle I will take into consideration the scant traces which the builders left to us.

There are only two exceptions to the complete, frightening silence left by them, and both have something to do with a symbolism in which the number three played some role: three phalli forming the half-crux on the Porta Minore, and three huge niches on wall D.

Of course, there is a very important crux in the sky, the group of stars which from the sixteenth century has been known as the Southern Cross. Today, due to precession, it is invisible in Italy, but these stars are currently in the lower part of their precessional cycle and they were actually visible in the Mediterranean area in ancient times. The importance of the asterism composed by the bright stars of Centaurus and the stars of Crux is very well documented not only in the previously-cited megalithic temples of Malta (3400-2000 BC) but also in the megalithic sanctuaries of Minorca of around 1500-1000 BC [Hoskin 2001]. In addition, it has also recently been found in the orientation of the Sardinian towers called Nuraghes (around 1200-800 BC) [Zedda and Belmonte 2004].

If we take a look at the southern sky in Alatri at a reference date of, say, 400 BC we discover that the Southern Cross was only partly visible. In fact, the lower star of the Southern Cross,

Acrux, culminated below the southern horizon and therefore was not visible: the “cross” actually appeared as a “half-cross” composed of *three* stars (actually four if one considers the star *epsilon-crucis*). Moreover, of the two brightest stars of Centaurus, Hadar and Rigel, only Hadar was still visible at that time.

The azimuth at the rising and setting of all such stars cannot of course match the directions very close to due south defined by the aforementioned azimuths of the southern sides of the Acropolis (4.7° west of south and 3.4° east of south). However if we consider *at the same time* both such alignments and suppose that the side containing the three niches was oriented to a position of Crux, then it can be seen that, when the southernmost star of Crux had an azimuth of about 4.7° west of south, the bright star Hadar had an azimuth of 3.4° east of south. Therefore, I suggest that the southern sides of the Acropolis could have been oriented to the Southern Cross–Centaurus asterism in a position when the stars were in the configuration depicted in fig. 9. Of course due to the slowness of the precessional drift, the date has to be considered only as indicative. Since the star Acrux became invisible at the Alatri latitude around 700 BC, this latter date has to be considered as a *post-quem* term for the present theory, which therefore puts the planning of the Acropolis between the seventh and the fourth centuries BC. However, since this kind of interest in the southern sky is not documented by the Romans, this astronomical orientation of the southern sides of the Acropolis, if confirmed, would connect the builders of Alatri to the widespread tradition of astronomical observations of the Southern Cross–Centaurus group of the Mediterranean area in the Bronze Age, in the meanwhile suggesting a pre-Roman dating of the Acropolis.

Fig. 9. The sky close to due south in Alatri in 400 BC

We now turn to the northern sky. Looking in the region around 30° west of north, one immediately sees that Capella, a bright star whose importance is well documented in many cultures throughout the world, was setting at about 32° west of north as viewed from Alatri in 400 BC. The bright stars Vega and Deneb also had setting azimuths in the same region (around 34° for

both). However, Capella seems preferable, both because it is the star nearest to the desired direction and because of the following observation.

As I have mentioned, the Italian scholar Capone noticed a similarity between the plan of Alatri and the constellation Gemini, and proposed that this could have inspired the planning of the site. Actually if we look at the northern sky in Alatri at our reference date of 400 BC, we discover that while Capella was setting, *Gemini was also setting* and this constellation was standing as a “polygon” with a shape that is actually very similar to that of the Acropolis, with the side “looking” at Capella in correspondence with the north-west “bent” side of the Acropolis (fig. 10).

Fig. 10 The western part of the sky as viewed from Alatri in 400 b.C. From left to right: on the two “sides” of the south pole, the Crux-Centaurus group with the bright star Hadar east of south and the Crux west of south. The lower star of Crux was invisible (not only in this picture) due to precession. At the northwest horizon, we see Gemini in a configuration very similar to the Acropolis plan. The “bent” side of Gemini “looks” at the bright star Capella setting at about 30° west of north

5 On the dating of Italian polygonal walls

The builders of the polygonal walls in Italy have *not* been identified with certainty.

A long-standing debate divides those who think that most of the walls were built by the Romans or by Latin people under the strict and direct influence of the Romans, and who therefore date the most ancient of these huge constructions no earlier than the fourth century BC, and those who think that Romans simply had nothing to do with such buildings and therefore that the walls can be several hundred years older than this.

The question about the builders of the Italian polygonal walls was debated at the beginning of the twentieth century, when most scholars adhered to a long-standing tradition which attributed the construction of the walls to a people called *Pelasgi*, who allegedly came to Italy at the end of the Bronze Age (1200-800 BC), bringing with them Hittite-Mycenaean technology. However, proof of the existence of this people is scant and, as a matter of fact, the diffusion of techniques

need not necessarily be identified with the diffusion of a population bringing it, since a technique can be imported via cultural and economic contacts or can be independently invented (it suffices to think of the magnificent polygonal walls built by the Incas two thousand years later). Thus, the walls might be attributed as well to the populations inhabiting the areas before the Roman expansion, people who, like their contemporaries the Etruscans who lived in adjacent areas, had active economic and cultural contacts with the civilizations of the Mediterranean. In 1957 however, this explanation was refuted by the authoritative scholar Giuseppe Lugli [1957] who reformulated, this time with an apparently unassailable argument, the idea that the polygonal walls were nothing but one of the types of Roman walls, a type called *by him* – I repeat, *by him* – *opus siliceum*, to be added to the already well known types of Roman walls described by Vitruvius such as, for instance, *opus quadratum*, walls of stone blocks cut as parallelepipeds and set in place on horizontal layers without mortar, and *opus caementicium*, in which the core of the walls is made of pieces of stones mixed with mortar and sand, while the external faces are of small stones or bricks.

Recently, many scholars of the builders of the polygonal walls are again becoming more doubtful¹ and the important problem of the dating of the walls deserves in-depth treatment in a separate publication. However, the dating of the Alatri walls is of fundamental importance for the present paper, since the results support a pre-Roman construction. Therefore, a discussion of the topic is necessary.

Dating of stone building *per se* is impossible.² While it is common to find on Roman bricks or even on Roman square blocks the presence of marks and timbres identifying the “producers” of the material and in many cases also the year of its extraction from the cave, no traces of this kind have ever been found on polygonal blocks anywhere in Italy. Actually, Lugli’s argument of a Roman dating was founded only on a very debatable interpretation of a statement by Vitruvius (*De architectura* 1.5.II), who *cites* the existence of a sort of construction called *silice* without actually describing it, and on a even more debatable interpretation of a short inscription (dated around 140 BC) which runs on the walls of the Ferentino acropolis. In this inscription, the *censors* (magistrates) who certainly built the upper part of the construction in square blocks, where the inscription is actually located, give the impression of crediting themselves also for the construction of the lower part of the same building, in polygonal blocks, calling it, again, *silice*. The text is, however, quite ambiguous [Solin 1980-82, 102 and references therein].

Against Lugli’s argument many points can be raised, of which the main ones are:

- Romans were, of course, skilled in working with huge objects, such as the granite columns of the Pantheon in Rome, weighing more than two hundreds tons and coming from southern Egypt. They were skilled in building with huge blocks as well, as one can easily see by visiting, for instance, the internal rooms of Castel Sant’Angelo in Rome, which were originally built as the funerary chambers of the mausoleum of the emperor Hadrian. However, *all* the stone buildings *in Rome* were constructed with square blocks (*opus quadratum*) from the very beginning of the Roman civilization, as one can see, for instance, from the remains of the archaic defensive walls of the town, on the Palatine Hill, dated around 530 BC, or from the internal walls of the prison called *Carcer Tullianum*, which were built between the sixth and the fifth century BC, not to mention the first complete defensive walls of Rome, called *serviane*, dated around 390 BC. The fact that polygonal walls were never built in Rome is sometimes explained by observing that the quality of stone most easily available *near* the town, called *tufa*, is not easily cut in polygonal blocks (see e.g. [Guadagno 1988]). If this argument can perhaps explain the most ancient constructions in Rome, it is, at least in my opinion, really flawed

insofar as the civilization destined to become the owner of the whole western world is concerned.

- The megalithic style of the polygonal walls (with blocks that can be as heavy as thirty tons) requires techniques which are completely different from those of *opus quadratum*, in which even the hugest blocks weigh at most a few tons. Romans made large use of tackles and pulleys, but stones like those visible in Alatri, Segni and many other places can be efficiently raised only with the help of earth ramps (perhaps one can raise *one* stone of this kind with the help of an appropriate system of pulleys, but building kilometres of walls with such devices appears impossible). In addition, before putting third-manner polygonal blocks *in situ* the hard work of fine-cutting is required so that the angles of the stones already positioned fit perfectly, while square blocks can be used exactly as they arrive from the cave. Once again, it is frankly difficult to believe (or at least, it is difficult for the present author) that such a spectacular and sophisticated technique was exclusive to the provinces.
- Techniques based on huge blocks were used by the Romans for the retaining walls of earthworks in suburban “villas” (farms) of the Republican age (second-first century BC). However, such walls cannot be classified into one of the three manners and, in fact, in order to describe them Lugli was obliged to introduce an *ad hoc* a “fourth manner” described as “very near to the square blocks technique”. In the walls constructed with this “fourth manner” – actually a sort of “missing link” of Lugli’s argument – there is a clear tendency to use horizontal setting layers, although the disposition is inaccurate and some blocks are trapezoidal and exhibit acute angles. This style is actually the *only* manner used in most, if not in all, the foundations of villas and, as a matter of fact, rather than considering it an “evolved” polygonal blocks technique it could be safely (and very reasonably) interpreted as a naïve way of building with square blocks, which was adopted because the construction did not require aesthetic beauty (for instance, the walls were used for agricultural terraces). The construction technique of the walls of the Acropolis in Ferentino could perhaps be included in this fourth manner as well, thereby validating the credits of the two censors.
- If the Romans used such complicated megalithic techniques, it is strange that they did not leave any document describing or at least depicting it, even in some disguise. There is no Roman historian citing them, not even Livius, who described the foundation (“deduction”) of many colonies where, according to Lugli’s argument, polygonal walls were constructed immediately after the settling of the colonists. We do have many stelae and reliefs illustrating buildings or even construction techniques of buildings, but in *all* such documents the blocks shown are regular, squared blocks.
- Another point which, at least in this author’s view, shows how far the “Roman argument” is from the truth is that the megalithic builders did not use the arch. Their “arches” are trilithon doorways, or the so-called “false arches” (a very bad terminology), composed of corbelled blocks forming an upside down V. In contrast, Roman architects used the arch from the very beginning of the Roman civilization. As a consequence, one can see Roman restoration and integration of polygonal walls in which previously existing “false arches” were substituted by “true arches”.

As we have seen, those who refute Lugli’s argument (including myself) usually think that the construction of most of the walls pre-dates the Romans and can be attributed to the populations

inhabiting the area between the eighth century BC and the Roman expansion in the fourth century. However, only a few sites have actually been securely dated so far (with the use of organic material or pottery associated with the walls) and some of them turned out to belong to such a period.³ Further archaeological work in this direction is certainly advisable, especially in light of the astronomical facts considered above, and the old idea of a Bronze Age retro-dating of the walls cannot be ruled out completely at present. As a matter of fact, it has already happened in the history of archaeology that the dating of a stone building had to be shifted back in time of as much as 1000 years (I am, of course, referring to the Sarsen phase of Stonehenge, today dated around 2100 BC; see e.g. [Pitts 2001]).

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Notes

1. See e.g. [Marta 1990], who states "It is a characteristic of Italic civilization before Roman period: it goes from the end of the VI century to the I century BC."
2. Recently, a thermoluminescence method which allows the dating of the time at which a stone belonging to a wall has been cut has been developed and applied as a test-case to the polygonal wall at Delphi and to other stone buildings in Greece; see [Liritzis 1994], [Liritzis et al. 1997] and [Theocaris et al. 1994]. Of course, it would be worthwhile to apply such a method to the Italian cyclopean walls as well.
3. One the few sites which have been securely dated is the series of megalithic terraces located at the site of *Norba-Monte Carbolino*, which were constructed in the sixth century BC.

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