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THE ROLE OF URBAN TOPOGRAPHY IN THE ORIENTATION OF GREEK TEMPLES: THE CASES OF AKRAGAS AND SELINUNTE

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ABSTRACT

It is well known that the vast majority of the Greek temples of Sicily are oriented to the rising sun. However the factors which influenced the specific orientation of each temple or of each group of temples can be of various nature and no general key is actually applicable. In particular, we show here the role of local topography in orientation, trough two relevant case-studies: the temples of the urban sector of the Valley of the Temples, Akragas, and the temples of Selinunte.

KEYWORDS: Greek temples, Akragas, Selinunte, Monte Kronio, Rocca Nadore, Valley of the Temples, urban topography, ancient Sicily

1. INTRODUCTION

The ancient Greek temples are prevalently orientated towards the arc of the rising sun (Nissen 1869, Penrose 1899, Koldewey and Puchstein 1899, Dinsmoor 1939, Boutsikas 2009, Liritzis and Vassiliou 2003). However, the sole fact of this orientation is only a part of the problem, since the reasons leading to the architect's choices may have been many, and some of them may have had little, if not nothing at all, to do with the sun (Salt and Boutsikas 2005, Boutsikas and Ruggles 2011, Liritzis and Castro 2013). For instance, a temple might have been orientated towards a star which had the very same declination – at the times of construction - of that of the sun on certain days.

A similar situation occurs in the case of the Greek temples of Sicily. The vast majority of them are oriented to the rising sun (Aveni and Romano 2000, Salt 2009), but the reasons for each specific orientation are far from clear. Recently, we have carried out a complete analysis of all the temples of one of the most important ancient Sicilian towns, the world-famous UNESCO site of the Valley of the Temples of Agrigento, ancient Akragas. Some of our results are quite unexpected and show that a variety of factors, not all of them astronomical, influenced the Akragantine architects. In the present paper we report on one of such instances, namely the role of urban topography in the temples' project, and extend the analysis to the case of nearby Selinunte.

2. THE VALLEY OF THE TEMPLES AND THE TOPOGRAPHY OF AKRAGAS

Akragas - today's Agrigento - was one of the most important Greek colonies in Sicily, founded in 582 BC by settlers from the nearby Gela and from Rhodes. The site lies on a huge plateau, naturally protected from the north by the Athena Rock and the Girgenti Hills, and from the south by a long rib-hill, bounded on either side by the rivers Akragas and Hypsas, confluent to the south in a single water's course, at the mouth of which the port was constructed (Figure 1). The extraordinary series of Doric temples today comprised in the UNESCO archaeological site called Valley of the Temples, was built in the 5th century BC. There are as many as ten temples in the complex. Among them, many are located on the rib hills to the south/southeast which surround the plateau of the town and were used to construct the walls. As such, their design was not influenced by the urban layout (these are the temples traditionally denominated as Heracles, Concordia, Juno, Demeter, Vulcan); the same independence also applies to the extra-moenia sanctuary of Aesculapius. Nested into the town layout are instead:

- the Temple of Olympic Jupiter, the largest Doric temple in the western Mediterranean. The temple was left unfinished and later collapsed, probably due to an earthquake. It is built on a huge base (56,30 x 113,45 meters) and was reached through a crepidoma of five steps. The most relevant architectural peculiarity comprises the series of figures of stone giants (the Telamons) which probably were placed in each intercolumniation. The temple was founded to commemorate the Battle of Himera (480 BC), won by Akragas and Syracuse against the Carthaginians, and it is mentioned by Diodorus and by Polybius.
- the Temple of Castor and Pollux (Dioscurides): the Doric temple was hexastyle with 13 columns on the long sides (13.40 x 31 meters); today only a reconstructed corner can be seen. The attribution is completely unknown.
- the Temple L: adjacent to the temple I, it was left unfinished but the foundations excavated in the rock are clearly visible, together with blocks at the north-east corner, and numerous drums of columns scattered in the building area. Attribution is completely unknown.

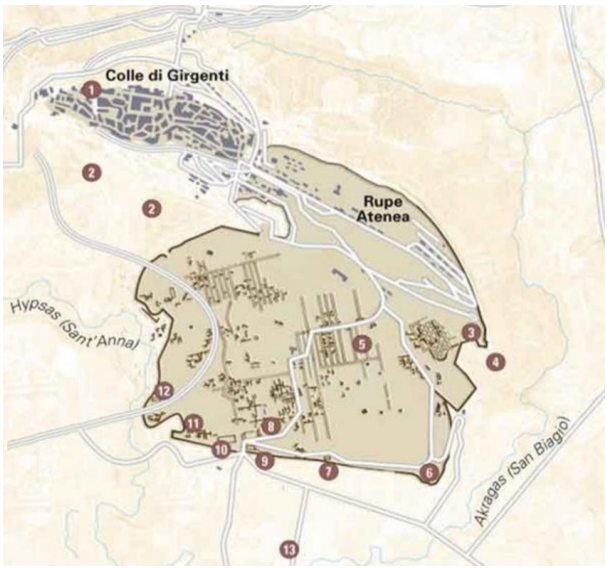

Figure 1. Plan of ancient Akragas (town's wall in black). 1) Athena Temple 2) Necropolis 3) Demetra Temple 4) Archaic Sanctuary 5) Town blocks 6) Juno Temple 7) Concordia Temple 8) Agora' 9) Temple of Heracles 10) Temple of Jupiter 11) Temple of Disocurides and Temple L 12) Temple of Vulcano 13) Temple of Aesculapius.

The orientations of the Akragas temples were studied for the first time at the end of the 19th century. Later, the problem was reconsidered by Aveni & Romano 2000 and Salt 2009. Not all the published data are reliable, however, and not all the temples have been considered. We have, therefore, re-measured all the temples with a high precision optical theodolite during fieldwork which lasted one week, from 1 to 8 August 2015. Almost all temples

have been visited and measured twice on different days. North was calibrated at each measure using a long-distance GPS measure from the theodolite station to a recognizable feature (a corner of a skyscraper) of the modern town of Agrigento (at distances of about 2.5 km); consistency of all measures was cross-checked with compass-clinometer readings corrected for magnetic declination and with Google Earth readings as well.

Figure 2. Part of the ruins of the temple of Jupiter (author's photo).

Due to various reasons, most of all the difficulties in individuating precisely the corners of the side bases of some temples and the fact that some sides are partly covered by huge amounts of sand and/or trees, although the nominal accuracy of the instrument is below 1', we estimate that the error of our measures can be reasonably assumed to be ±15'. Of course we also measured accurately the visible horizon – defined as the visible height from the center of the entrance to the temple – for each temple. It should be noted that in the case of the temples located on the central terrace, which are of interest here, this was possible only with great difficulty (due to intervening modern features), so that their calculated declinations are only approximate. However, as we shall see in a while, it appears that not all these temples were astronomically oriented, so this value is not crucial.

Our data, organized accordingly to increasing azimuths, are given in table I.

Table I. The table shows azimuth, horizon and declinations.

Temple	Az	Hor	Dec
Temple L	77° 54′	2° 48′	+11° 09′
Jupiter	78° 30′	2° 08′	+10° 15′
Discourides	82° 54′	2° 30′	+6° 59′
Town's grid	78° 15′		

In the list, the value of the town's grid orientation has also been reported. Akragas was in fact planned on the basis on an orthogonal street grid plan in the Greek style, with "meridian" roads (plateai) crossed at right angles by longitudinal streets or stenopoi. We have accurately measured the street grid plan; our result is that the grid is orthogonal with a very good accuracy, and the stenopoi are oriented at 78° 15'. This orientation is probably topographical as it is roughly orthogonal to the slope of the Akragas hill. In particular, a stenopos crossed the hill longitudinally heading towards the central sacred area, which houses the circular sanctuary of the chtonic deities, the temple of the Dioscurides, temple L and, to the left of the road, the temple of Jupiter (Figure 2). There is therefore little (if any) doubt that one of the largest temples of the Greek world, the Akragas temple of Jupiter – azimuth 78° 30' – was orientated topographically in accordance with the street grid. Incredible as it may seem, we have been unable to find this simple explanation in the literature.

The same topographical criterion certainly holds for Temple L – azimuth 77° 54' – which fronted the road directly, occupying the horizon of any person descending the hill. This did not occur for the nearby temple of the Dioscurides, which formed instead a sort of stenography for the space fronting Temple L. It is probably for this reason that the Dioscurides temple was skewed clockwise, with an azimuth 82° 54'.

3. SELINUNTE

Selinunte was founded as a colony of Megara Hyblaea around the middle of the 7th century BC.

The city is world famous especially for the 3 temples which were built outside of the city walls, on the hill to the east of the Acropolis, and for the Acropolis in itself, actually a huge town built on a rigorous orthogonal plan and which in itself hosts five Doric temples (Figure 3). Orientations of the temples are given in table II.

The azimuth data are taken from Aveni and Romano, but have been double-checked by the authors using Google Earth; all couples of measures remain within 1/2°. The horizon is discussed separately later on.

Table II. The table shows azimuth, horizon and declinations.

Temple	Az	Hor	Dec
A	96° 30′	1°	-5° 31′
B	95° 42′	1°	-4° 53′
C	93° 30′	1°	-3° 8′
D	94° 42′	1°	-4° 5′
O	96° 18′	1°	-5° 21′
E	93° 36′	50′	-3° 12′
F	93° 42′	50′	-3° 17′
G	94° 30′	50′	-3° 55′
Town's grid	96°		

Thus all the temples on the Acropolis share a similar orientation; four out of five fall very close to the orientation of the town's grid, with one temple – temple C, which is probably also the older one – slightly displaced. The temples of the east hill also share a very close orientation with each other and with the temples down town.

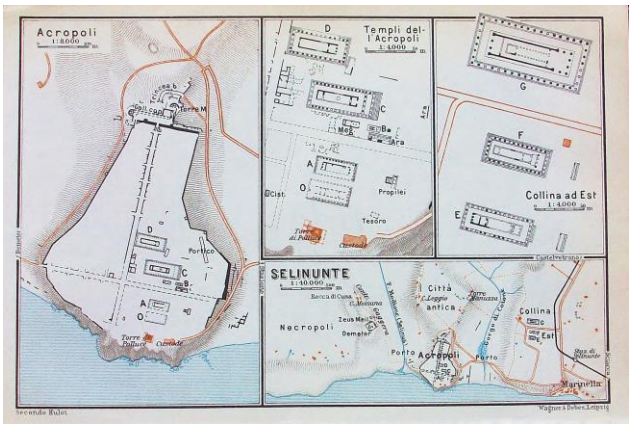

Figure 3. Selinunte map (acropolis and east hill).

It is already well known from the literature that the horizon of temple E is occupied by a very distant, but imposing, hill. Actually, the temple is almost perfectly orientated to this hill. Curiously, however, the possible meaning of this fact and the relationship with the orientations of the other temples have not yet been investigated in depth.

Hannah (2013) noticed the close proximity of the target hill with Monte Kronio, a mountain which overlooks the town of Sciacca on the sea. It can indeed be said that the hill acts as a marker of Monte Kronio, from which it is however separated by a thin valley. Kronio was certainly sacred already in ancient times, due to the presence of hot springs. However, its summit is almost invisible from Selinunte, and the target hill in itself is Rocca Nadore (Figure 4), a small but unmistakable ridge easily recognizable for a huge quarry of limestone located on its south flank. Rocca Nadore was the site of a little known, and as yet unpublished, Greek-Punic fortified settlement which with all probability was contemporary to Selinunte.

Curiously enough, we are unable to find in the literature the fact that a similar orientation is shared by the Selinunte acropolis urban plan which, although many buildings were added during the Punic domination, reflects the original, orthogonal grid planned by the Greeks. The peak of Rocca Nadore dominates the horizon at the eastern end of each of the main streets, and the temples are – as in Akragas – conforming to the grid and therefore oriented as well to the same target. Temple C, perhaps the first temple built in the area and perhaps antecedent to the town's grid, is slightly skewed eastwards (azimuth 93° 30′ while all others stay, in a small interval together with the grid at 96°, namely 94° 42′ - 96° 30′) and even better oriented towards the peak. Perhaps the later orientations were chosen to obtain a better general fit of the orientations distributed along the parallel streets.

4. DISCUSSION AND CONCLUSIONS

We believe that our results for Akragas and Selinunte, besides having interest per se, show that the orientation of the Greek temples of Sicily could be affected by peculiar factors having to do with the topography of the sites and with considerations which did not have a direct relationship with solar orientations, although the general "easterly" rule was usually respected. At least in the case of the temples of Akragas, reasons coming from urban layout and/or morphological aspects of the terrain could be as important as symbolical ones.

In turn, the orientations at Selinunte towards such a peculiar feature at the horizon further raises the question of its meaning: was it practical or symbolical? A practical role of the peak as a survey point seems, however, unlikely, in view of its considerable distance. Perhaps future excavations on Rocca Nadore will help in shedding light on this interesting point.

Figure 4. Rocca Nadore.

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