Chapter 10
The Classical World

10.1 Houses of the Gods

The classical world, or classical antiquity, is a traditional all-embracing definition describing the cultures of the Mediterranean area from the Ancient Greek civilisation (eighth century BC) to the end of the Roman Empire. It thus includes Classical Greece, Hellenism, and Rome. This chapter is devoted to this broad historical period, and will present some examples of applications of archaeoastronomical ideas and techniques, beginning with the Greek temples of Sicily.

Greek sacred architecture is fêted for its hundreds of magnificent temples, built over the course of several centuries, from the seven century BC onward (Lawrence 1996). Leaving aside regional and chronological distinctions in the layout and in the column orders, which make the precise classification of Greek temple architecture somewhat problematic, these buildings were always based on the same conception: a imposing rectangular construction adorned with columns on the façade. Although in many cases the presence of columned porticoes on all sides made the view of the structure enjoyable from all directions, the main principle always remained the same: a Greek temple was meant to occupy a natural place with an obviously man-made feature, and it was to be admired from the outside only.

Admission was reserved to priests and to the privileged few, and public rites were celebrated outside, in front of the temple, which in many cases was equipped with an altar and a platea (religious occasions included festivals, processions and long rituals). The interior of the temple was, strictly speaking, the home of the god. The god's domestic welfare (hence, the beauty and decorum of the building, correct insertion in the landscape, regular giving of daily offerings) was fundamental to assure benevolence and protection to the community. The cult image, located in the central place of the temple, was in many cases an out-and-out masterpiece, like the famous ivory-and-gold statues of Zeus at Olympia and of Athena in the Parthenon in Athens.

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The positioning of Greek temples has been the subject of some interesting scholarly research. For instance, a connection between the terrain on which the temple is erected and a related deity has been suggested (Retallack 2008). In 84 temples where the divinity worshipped is known, we find an association between terrain and specific gods (the analysis of temple orientations attempted in the same work, however, is extremely naïve and unacceptable). Some of these associations appear quite natural: underworld divinities are associated with rock, gods of fertility and agriculture like Demeter and Dionysos are associated with cultivated land, and so on; other are less easy to grasp.

Then there is the landscape. In his huge erudite tome, Scully (1962) was the first to stress the importance of *Genius Loci*. His work pioneered research on the Archaeology of the Landscape, pursuing the idea that landscape and temples formed an architectural unit that was characterised in accordance with the specific god worshipped (Fig. 10.1). Scully traced back the origin of these ideas to the pre-Greek, Minoan civilization, and focused his attention on the fact that many sacred places were built within sight of distinctive clefts, distinguishable as double peaked arms, horns, and/or breasts. The prototype was considered the palace of Knossos on Crete, where the court opens to the clefts of Mount luktas, traditionally identified as the profile of a human head. Scully found several other examples, both on Crete and on mainland Greece, for instance, at the Eleusis sanctuary and at the Acropolis at Athens, which has a view of the peaks of Mount Hymettos.

Fig. 10.1 Segesta. The temple in its landscape

Skipping forward to the chapter's end

10.4 Astronomy and Empire at the Pantheon

The Roman Emperor Hadrian was born on 24 January 76 AD in Spain. He was the son of one of the cousins of Trajan, who appointed him as his successor shortly before dying. The new emperor was blessed with a profound cultural curiosity which, combined with the official and military duties, prompted him to visit almost every part of the empire. Furthermore, Hadrian had inherited from his predecessor —who commissioned the construction of his own forum and created that stunning specimen of Roman marble carving, Trajan's column—a passion for architecture and the desire to ennoble Rome and her empire with architectural masterpieces. In particular, he commissioned the splendid Villa Adriana at Tivoli, royal retreat and estate (the size of a small town) and he refurbished Campus Martius where he re-built the Augustan Pantheon as an incomparable masterpiece of dome architecture.

Hadrian's Pantheon is the best preserved monument of the imperial period in Rome (Fig. 10.15). It stands over the foundations of the temple originally built under Augustus' rule, which had been destroyed by fire; Hadrian's architects completed the reconstruction in AD 128 (Wilson Jones 2003). As a symbol of continuity, the original dedicatory inscription by Agrippa was affixed to the new façade, where it can still be read. The building consists of a rectangular portico, with three lines of granite columns, fronting a circular building. The latter is a huge hemispherical dome (43.3 m in diameter), built over a cylinder which has the same diameter and is as high as the radius. Therefore, the ideal completion of the upper hemisphere by a hypothetical lower one touches the central point of the floor, directly beneath the only source of natural light of the building. This source of light is the so-called *oculus*, a circular opening 8.3 m wide on the top of the cupola. It is the only source of direct light since no direct sunlight can enter from the door throughout the year, owing to the northward orientation of the entrance, which points $\sim 5°30'$ west of north. A curious consequence of this orientation is that the huge mass of the building gives visitors an eerie impression of cold and dark, quite an atypical feature when compared with the temples of the classical age (think, for example, the Greek temples of Sicily, Sect. 10.1). We shall see in a moment how this impression of coldness is turned on its head on certain days of the year, by means of a spectacular hierophany. Of the original embellishments the interior of the building would have had, the coffered ceiling, part of the marble interiors, the bronze grille over the entrance and the great bronze doors have survived. The interior wall, although circular in plan, is arranged into sixteen regularly spaced sectors: the northernmost one contains the entrance door, and then (proceeding clockwise) pedimented niches and columned recesses alternate, which were probably intended for statues.

The Pantheon has exerted a tremendous influence on architecture since the Renaissance. Yet in spite of having such a prominent role in history, we know very little about its function, as only two Roman sources mention it: Pliny, who was

Fig. 10.15 Rome. The pantheon, front view

writing, however, before Hadrian's reconstruction, and the historian Cassius Dio, writing some 70 years after Hadrian, who made the following cryptic statement:

> Perhaps it has this name because, among the statues which embellished it, there were those of many gods, including Mars and Venus; but my own opinion on the origin of the name is that, because of its vaulted roof, it actually resembles the heavens. (Cassius Dio 53.27.2)

So we do not really know why the Pantheon was built or how it was used: the Pantheon is a one-of-its-kind masterpiece, but its builders left nothing in writing. One thing, however, is certain: on each sunny day, the attention of the visitors to the Pantheon is attracted by the shaft of sunlight from the oculus that penetrates the gloom. As a matter of fact, if a systematic analysis is applied to the motion of the sunbeam inside the monument, it is possible to show that it is precisely this movement that is the key to the whole project, since it governed the entire design from the very beginning (Del Monte 1990; Hannah and Magli 2011) (Fig. 10.16).

The general idea was probably inspired by a particular type of Roman sundial, which captured the beam of sunlight within a shadowy interior (Hannah 2009). This device consisted of a stone block carved out into a hollow hemisphere, with a hole left in its upper surface, through which the sun filtered on to the graduated surface

Fig. 10.16 Rome. The Oculus in the pantheon

inside. Clearly, for this type of sundial to work correctly, the stone face had to be oriented to due south, while the hollow hemisphere faced north. The formal similarity with the project of the Pantheon is thus self-evident, although, of course, the building should not be construed as any sort of precision instrument. As will be clear shortly, its connection with the cycle of the sun was not intended for astronomical observation but rather to highlight the relationship between Roman power and the cosmos.

The main features of the sun-based project of the Pantheon can be understood by keeping the time at (local) noon fixed over the course of the year and studying the position of the sunbeam day by day at this specific time. Since the door opens to the north, the shaft of sunlight at noon is always located on an approximate meridian line which passes over the entrance. At the autumn equinox, the spot of sunlight touches the interior springing of the upper hemisphere. Then the spot moves up to its maximum height in the roof over the entrance, reached at winter solstice. Thereafter, it starts moving down, again brushing the base of the dome at the spring equinox. In the subsequent days, the sun culminates progressively higher, and so the beam moves further down, illuminating the grill over the entrance, and finally the entire opening, which is fully lit around 21 April. After that, the beam starts moving across the floor towards the centre of the building (which is never reached since, of course, the sun does not cross the zenith at the latitude of Rome). From the summer solstice the beam "turns back", re-crossing the entrance between the end of August and the autumn equinox.

We can conclude, accordingly, that the dimension of the oculus was fixed in such a way that the angle between the spring at the base of the dome and the external rim of the oculus coincides with the altitude of the sun in the days in which the springing had to be illuminated, namely the equinoxes. In this way the sun "spends" autumn and winter in the upper hemisphere of the building but, immediately after the March equinox, begins to be visible *from outside,* due to the presence of the grille. This effect increases gradually up to the 21 April, when the maximum illumination of the entrance is attained (a phenomenon probably already noticed by Francesco Piranesi, who depicted it in one of his etchings in the eighteenth century) (Fig. 10.17).

We can, therefore, say that the whole architecture of the Pantheon was conceived of to attract attention to the equinoxes and to the 21st of April. Why? As we have seen in the previous section, Roman religion underwent a reassessment, aimed at accommodating the divine nature of the emperor precisely during the years of the first building of the Pantheon, under Augustus. The emperors wished to promote an association of their power with the sky and there are passages from Latin authors which suggest that a particular point of cosmic balance was understood to be assigned to the emperor in the heavens. Virgil for instance (*Georgics* 1. 24–35) places Caesar between Virgo and Scorpius, so in the equinoctial sign Libra. Manilius (*Astronomica* 4. 546–551, 773–777), writing in Tiberius's reign, again places the emperor in Libra,

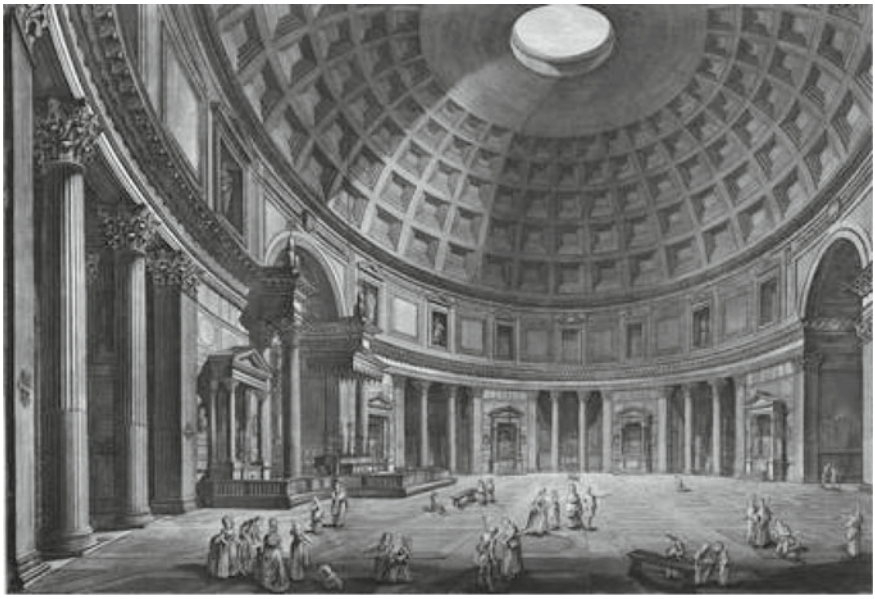

Fig. 10.17 Rome. The interior of the Pantheon as depicted by Francesco Piranesi in the eighteenth century (image in the public domain)

as a point of balance between the ecliptic and the equator. Lucan (1.45–59), writing in Nero's time, has the apotheosised emperor joining the heavens and finding his proper seat on the celestial equator, where he will ensure balance and stability (apparently, Nero took such ideas very seriously, and indeed in his enormous palace, the Domus Aurea, a sort of forerunner of Hadrian's Pantheon can be seen, in the form of a majestic octagonal hall where a equinoctial hierophany manifests itself; see Oudet 1992; Voisin 1987; Hannah et al. 2015).

So far, so good, as far as the equinoxes are concerned. But what about the 21st of April? The month of April was traditionally devoted to Venus, the goddess from whom the Caesar family Gens Julia claimed direct lineage, and the 21st of April is the traditional date of the foundation of Rome (see, e.g., Ovid, *Fasti* 4: 721–862). Therefore, the symbolic action of the sun on this day is "to put Rome among the Gods". If we suppose, as seems likely, that the emperor was celebrating this very day at the Pantheon, then his entrance together along the sun at noon would have been a symbolic link between the people and the gods, as well as an impressive confirmation of the emperor's power and divine nature (Fig. 10.18).

So the Pantheon, besides being an unparalleled engineering masterpiece, was also a cosmological signpost, an icon ideally linking sun and time to the cosmic order.

Perhaps, the most appropriate place to conclude our long journey devoted to the history of the relationships between astronomy, architecture, and power.

Fig. 10.18 Rome, 21 April. The light from the Oculus of the Pantheon hits the entrance at local noon ▶. (*Courtesy* Francesca Agostino)

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